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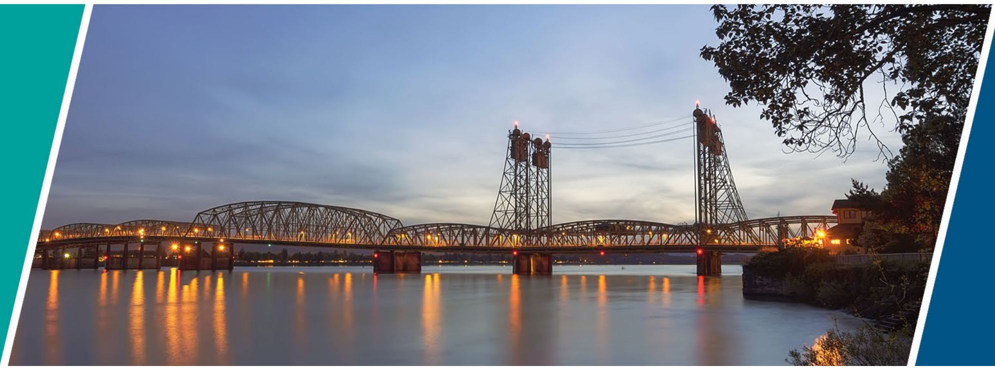

Noise and Vibration Technical Report

September 2024

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Noise and Vibration Technical Report

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
ANSI	American National Standards Institute
BRT	bus rapid transit
CFR	Code of Federal Regulations
CRC	Columbia River Crossing
CTR	Commute Trip Reduction
C-TRAN	Clark County Public Transit Benefit Area Authority
dB	decibels
dBA	A-weighted decibels
FHWA	Federal Highway Administration
FSCR	Flood Safe Columbia River
FTA	Federal Transit Administration
g	gravitational constant
I-5	Interstate 5
IBR	Interstate Bridge Replacement
in/sec	inches per second
L_{dn}	day-night equivalent sound level
L_{eq}	equivalent sound level
L_{max}	maximum sound level
LPA	Locally Preferred Alternative
LRT	light-rail transit

Acronym/Abbreviation	Definition
LRV	light-rail vehicle
LSTM	line source transfer mobility
L_{XX}	sound level exceeded XX percent of the time
MAX	Metropolitan Area Express
mph	miles per hour
NAAC	Noise Abatement Approach Criteria
NAC	Noise Abatement Criteria
NAVD 88	North American Vertical Datum of 1988
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
OAR	Oregon Administrative Rules
ODOT	Oregon Department of Transportation
OTC	Oregon Transportation Commission
PMLS	Portland Metro Levee System
PNCD	Preliminary Navigation Clearance Determination
PPV	peak particle velocity
RMS	root mean square
ROD	Record of Decision
RTP	Regional Transportation Plan
RV	recreational vehicle
SEIS	Supplemental Environmental Impact Statement

Acronym/Abbreviation	Definition
SEL	sound exposure level
SOV	single-occupancy vehicle
SR	State Route
TDA	Tire Derived Aggregate
TDM	transportation demand management
TPSs	Traction Power Supply Substation
TriMet	Tri-County Metropolitan Transportation District
UFSWQD	Urban Flood Safety and Water Quality District
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCG	U.S. Coast Guard
VdB	vibration decibels
VMC	Vancouver Municipal Code
VNHR	Vancouver National Historic Reserve
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation
WSTC	Washington State Transportation Commission

1. PROJECT OVERVIEW

This technical report identifies, describes, and evaluates long-term and temporary effects related to noise, as heard and experienced by humans, and vibration from the Interstate Bridge Replacement (IBR) Program's Modified Locally Preferred Alternative (LPA). The construction and operation of transportation infrastructure can have noise and vibration effects on land uses or structures sensitive within or nearby. Where possible, the Modified LPA would be designed to avoid or minimize these effects. This report assesses mitigation measures for potential effects when avoidance is not feasible.

This Noise and Vibration Technical Report was prepared to satisfy applicable portions of the National Environmental Policy Act (NEPA) 42 United States Code (USC) 4321 "to promote efforts which will prevent or eliminate damage to the environment." Information and potential environmental consequences described in this technical report will be used to support the Draft Supplemental Environmental Impact Statement (SEIS) for the pursuant to 42 USC 4332.

The objectives of this report are to: IBR Program

- Define the study area and the methods of data collection and evaluation used for the analysis (Chapter 2).
- Describe existing land uses and applicable noise guidance and policies within the study area (Chapter 3).
- Discuss potential long-term, temporary, and indirect effects resulting from construction and operation of the Modified LPA in comparison to the No-Build Alternative (Chapters 4 through 7).
- Provide proposed avoidance and mitigation measures to help prevent, eliminate, or minimize environmental consequences from the Modified LPA (Chapter 7).
- Identify required federal, state, and local permits (Chapter 8).

The IBR Program is a continuation of the previously suspended Columbia River Crossing (CRC) project with the same purpose to replace the aging Interstate 5 (I-5) Bridge across the Columbia River with a modern, seismically resilient multimodal structure. The proposed infrastructure improvements are located along a 5-mile stretch of the I-5 corridor that extends from approximately Victory Boulevard in Portland to State Route (SR) 500 in Vancouver as shown in Figure 1-1.

The Modified LPA is a modification of the CRC LPA, which completed the NEPA process with a signed Record of Decision (ROD) in 2011 and two re-evaluations that were completed in 2012 and 2013. The CRC project was discontinued in 2014. This Technical Report is evaluating the effects of changes in project design since the CRC ROD and re-evaluations, as well as changes in regulations, policy, and physical conditions.

Figure 1-1. IBR Program Location Overview

1.1 Components of the Modified LPA

The basic components of the Modified LPA include:

- A new pair of Columbia River bridges—one for northbound and one for southbound travel—built west of the existing bridge. The new bridges would each include three through lanes, safety shoulders, and one auxiliary lane (a ramp-to-ramp connection on the highway that improves interchange safety by providing drivers with more space and time to merge, diverge, and weave) in each direction. When all highway, transit, and active transportation would be moved to the new Columbia River bridges, the existing Interstate Bridge (both spans) would be removed.
    - Three bridge configurations are under consideration: (1) double-deck truss bridges with fixed spans, (2) single-level bridges with fixed spans, and (3) single-level bridges with movable spans over the primary navigation channel. The fixed-span configurations would provide up to 116 feet of vertical navigation clearance, and the movable-span configuration would provide 178 feet of vertical navigation clearance in the open position. The primary navigation channel would be relocated approximately 500 feet south (measured by channel centerline) of its existing location near the Vancouver shoreline.
    - A two auxiliary lane design option (two ramp-to-ramp lanes connecting interchanges) across the Columbia River is also being evaluated. The second auxiliary lane in each direction of I-5 would be added from approximately Interstate Avenue/Victory Boulevard to SR 500/39th Street.
- A 1.9-mile light-rail transit (LRT) extension of the current Metropolitan Area Express (MAX) Yellow Line from the Expo Center MAX Station in North Portland, where it currently ends, to a terminus near Evergreen Boulevard in Vancouver. Improvements would include new stations at Hayden Island, downtown Vancouver (Waterfront Station), and near Evergreen Boulevard (Evergreen Station), as well as revisions to the existing Expo Center MAX Station. Park and rides to serve LRT riders in Vancouver could be included near the Waterfront Station and Evergreen Station. The Tri-County Metropolitan Transportation District of Oregon (TriMet), which operates the MAX system, would also operate the Yellow Line extension.
    - Potential site options for park and rides include three sites near the Waterfront Station and two near the Evergreen Station (up to one park and ride could be built for each station location in Vancouver).
- Associated LRT improvements such as traction power substations, overhead catenary system, signal and communications support facilities, an overnight light-rail vehicle (LRV) facility at the Expo Center, 19 new LRVs, and an expanded maintenance facility at TriMet's Ruby Junction.
- Integration of local bus transit service, including bus rapid transit (BRT) and express bus routes, in addition to the proposed new LRT service.
- Wider shoulders on I-5 from Interstate Avenue/Victory Boulevard to SR 500/39th Street to accommodate express bus-on-shoulder service in each direction.
- Associated bus transit service improvements would include three additional bus bays for eight new electric double-decker buses at the Clark County Public Transit Benefit Area Authority (C-

TRAN) operations and maintenance facility (see Section 1.1.7, Transit Operating Characteristics, for more information about this service).

- Improvements to seven I-5 interchanges and I-5 mainline improvements between Interstate Avenue/ Victory Boulevard in Portland and SR 500/39th Street in Vancouver. Some adjacent local streets would be reconfigured to complement the new interchange designs, and improve local east-west connections.
  - An option that shifts the I-5 mainline up to 40 feet westward in downtown Vancouver between the SR 14 interchange and Mill Plain Boulevard interchange is being evaluated.
  - An option that eliminates the existing C Street ramps in downtown Vancouver is being evaluated.
- Six new adjacent bridges across North Portland Harbor: one on the east side of the existing I-5 North Portland Harbor bridge and five on the west side or overlapping with the existing bridge (which would be removed). The bridges would carry (from west to east) LRT tracks, southbound I-5 off-ramp to Marine Drive, southbound I-5 mainline, northbound I-5 mainline, northbound I-5 on-ramp from Marine Drive, and an arterial bridge for local traffic with a shared-use path for pedestrians and bicyclists.
- A variety of improvements for people who walk, bike, and roll throughout the study area, including a system of shared-use paths, bicycle lanes, sidewalks, enhanced wayfinding, and facility improvements to comply with the Americans with Disabilities Act. These are referred to in this document as *active transportation* improvements.
- Variable-rate tolling for motorists using the river crossing as a demand-management and financing tool.

The transportation improvements proposed for the Modified LPA and the design options are shown in Figure 1-2. The Modified LPA includes all of the components listed above. If there are differences in environmental effects or benefits between the design options, those are identified in the sections below.

Figure 1-2. Modified LPA Components

Section 1.1.1, Interstate 5 Mainline, describes the overall configuration of the I-5 mainline through the study area, and Sections 1.1.2, Portland Mainland and Hayden Island (Subarea A), through Section 1.1.5, Upper Vancouver (Subarea D), provide additional detail on four geographic subareas (A through D), which are shown on Figure 1-3. In each subarea, improvements to I-5, its interchanges, and the local roadways are described first, followed by transit and active transportation improvements. Design options are described under separate headings in the subareas in which they would be located.

Table 1-1 shows the different combinations of design options analyzed in this Technical Report. However, **any combination of design options is compatible**. In other words, any of the bridge configurations could be combined with one or two auxiliary lanes, with or without the C Street ramps, a centered or westward shift of I-5 in downtown Vancouver, and any of the park-and-ride location options. Figures in each section show both the anticipated limit of ground disturbance, which includes disturbance from temporary construction activities, and the location of permanent infrastructure elements.

Figure 1-3. Modified LPA – Geographic Subareas

Table 1-1. Modified LPA and Design Options

Design Options	Modified LPA	Modified LPA with Two Auxiliary Lanes	Modified LPA Without C Street Ramps	Modified LPA with I-5 Shifted West	Modified LPA with a Single-Level Fixed-Span Configuration	Modified LPA with a Single-Level Movable-Span Configuration
Bridge Configuration	**Double-deck fixed-span***	Double-deck fixed-span	Double-deck fixed-span	Double-deck fixed-span	**Single-level fixed-span***	**Single-level movable-span***
Auxiliary Lanes	**One***	**Two***	One	One	One	One
C Street Ramps	**With C Street ramps***	With C Street ramps	**Without C Street Ramps***	With C Street ramps	With C Street ramps	With C Street ramps
I-5 Alignment	**Centered***	Centered	Centered	**Shifted West***	Centered	Centered
Park-and-Ride Options	**Waterfront**:* 1. Columbia Way (below I-5); 2. Columbia Street/SR 14; 3. Columbia Street/Phil Arnold Way **Evergreen**:* 1. Library Square; 2. Columbia Credit Union					

Bold text with an asterisk (*) indicates which design option is different in each configuration.

1.1.1 Interstate 5 Mainline

Today, within the 5-mile corridor, I-5 has three 12-foot-wide through lanes in each direction, an approximately 6- to 11-foot-wide inside shoulder, and an approximately 10- to 12-foot-wide outside shoulder with the exception of the Interstate Bridge, which has approximately 2- to 3-foot-wide inside and outside shoulders. There are currently intermittent auxiliary lanes between the Victory Boulevard and Hayden Island interchanges in Oregon and between SR 14 and SR 500 in Washington.

The Modified LPA would include three 12-foot through lanes from Interstate Avenue/Victory Boulevard to SR 500/39th Street and a 12-foot auxiliary lane from the Marine Drive interchange to the Mill Plain Boulevard interchange in each direction. Many of the existing auxiliary lanes on I-5 between the SR 14 and Main Street interchanges in Vancouver would remain, although they would be reconfigured. The existing auxiliary lanes between the Victory Boulevard and Hayden Island interchanges would be replaced with changes to on- and off-ramps and interchange reconfigurations. The Modified LPA would also include wider shoulders (12-foot inside shoulders and 10- to 12-foot outside shoulders) to be consistent with ODOT and WSDOT design standards. The wider inside shoulder would be used by express bus service to bypass mainline congestion, known as “bus on shoulder” (refer to Section 1.1.7, Transit Operating Characteristics). The shoulder would be available for express bus service when general-purpose speeds are below 35 miles per hour (mph).

Figure 1-4 shows a cross section of the collector-distributor (C-D)[1] roadways, Figure 1-5 shows the location of the C-D roadways, and Figure 1-6 shows the proposed auxiliary lane layout. The existing Interstate Bridge over the Columbia River does not have an auxiliary lane; the Modified LPA would add one auxiliary lane in each direction across the new Columbia River bridges.

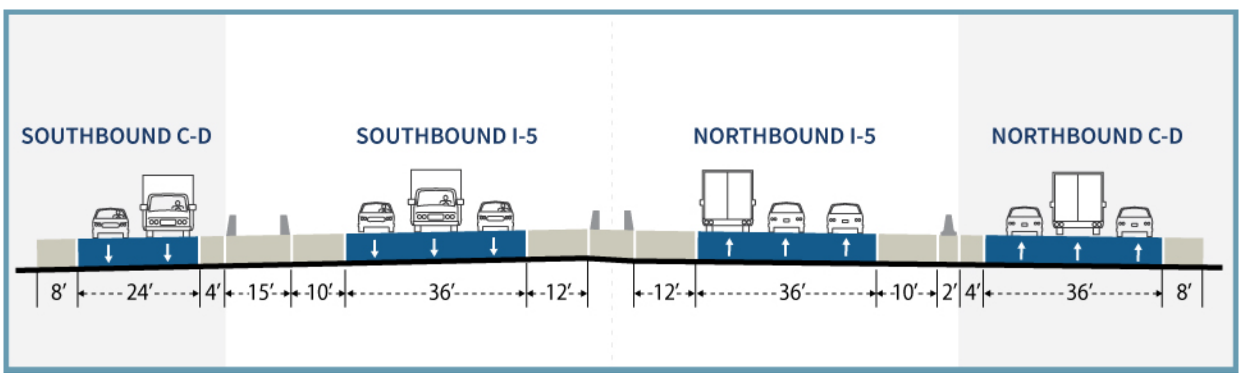
On I-5 northbound, the auxiliary lane that would begin at the on-ramp from Marine Drive would continue across the Columbia River bridge and end at the off-ramp to the C-D roadway, north of SR 14 (see Figure 1-5). The on-ramp from SR 14 westbound would join the off-ramp to the C-D roadway, forming the northbound C-D roadway between SR 14 and Fourth Plain Boulevard. The C-D roadway would provide access from I-5 northbound to the off-ramps at Mill Plain Boulevard and Fourth Plain Boulevard. The C-D roadway would also provide access from SR 14 westbound to the off-ramps at Mill Plain Boulevard and Fourth Plain Boulevard, and to the on-ramp to I-5 northbound.

On I-5 northbound, the Modified LPA would also add one auxiliary lane beginning at the on-ramp from the C-D roadway and ending at the on-ramp from 39th Street, connecting to an existing auxiliary lane from 39th Street to the off-ramp at Main Street. Another existing auxiliary lane would remain between the on-ramp from Mill Plain Boulevard to the off-ramp to SR 500.

On I-5 southbound, the off-ramp to the C-D roadway would join the on-ramp from Mill Plain Boulevard to form a C-D roadway. The C-D roadway would provide access from I-5 southbound to the off-ramp to SR 14 eastbound and from Mill Plain Boulevard to the off-ramp to SR 14 eastbound and the on-ramp to I-5 southbound.

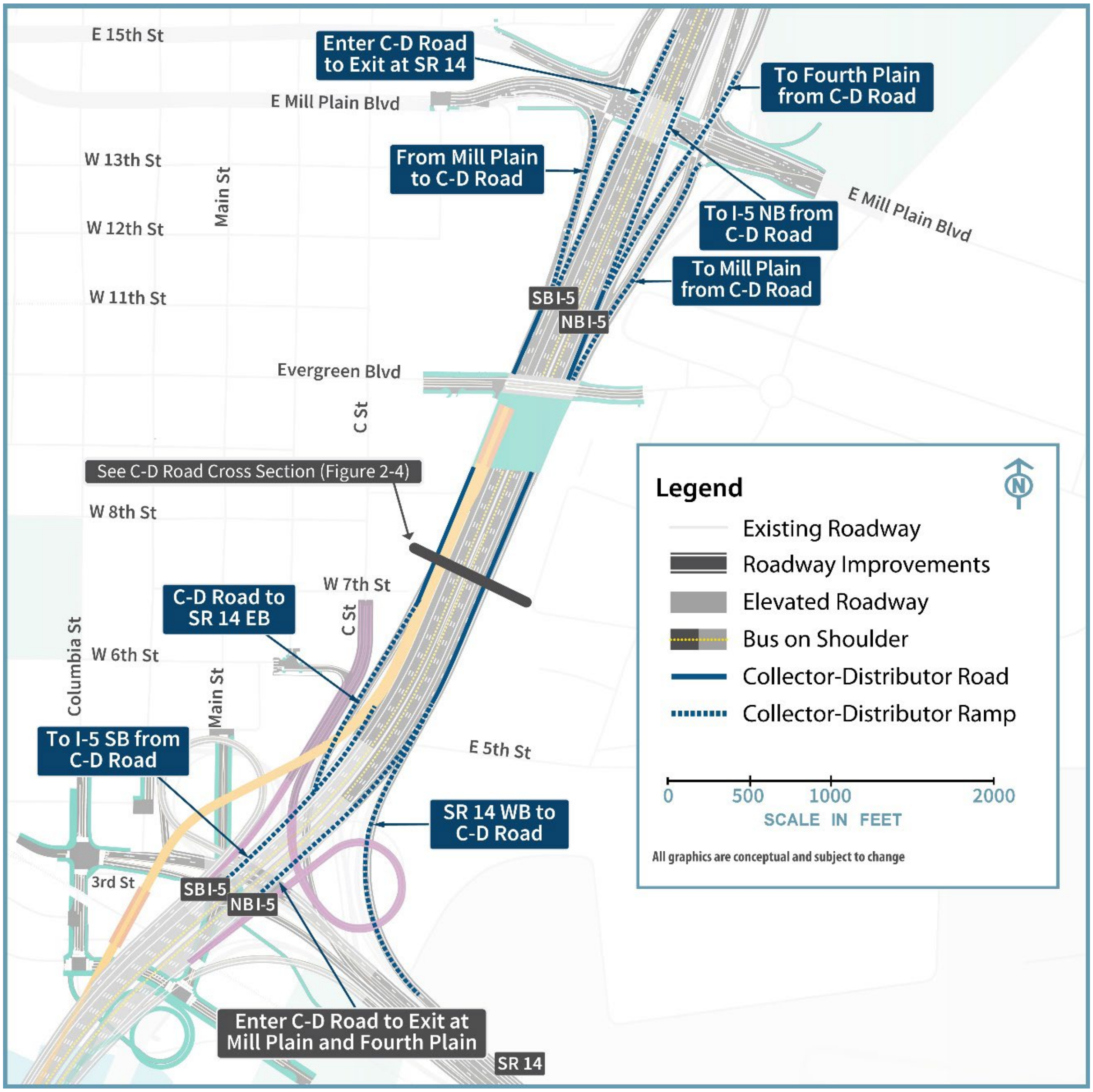
On I-5 southbound, an auxiliary lane would begin at the on-ramp from the C-D roadway and would continue across the southbound Columbia River bridge and end at the off-ramp to Marine Drive. The combined on-ramp from SR 14 westbound and C Street would merge into this auxiliary lane.

Figure 1-4. Cross Section of the Collector-Distributor Roadways



[1] A collector-distributer roadway parallels and connects the main travel lanes of a highway and frontage roads or entrance ramps.

Figure 1-5. Collector-Distributor Roadways



C-D = collector-distributor; EB = eastbound; NB = northbound; SB = southbound; WB = westbound

1.1.1.1 Two Auxiliary Lane Design Option

This design option would add a second 12-foot-wide auxiliary lane in each direction of I-5 with the intent to further optimize travel flow in the corridor. This second auxiliary lane is proposed from the Interstate Avenue/Victory Boulevard interchange to the SR 500/39th Street interchange.

On I-5 northbound, one auxiliary lane would begin at the combined on-ramp from Interstate Avenue and Victory Boulevard, and a second auxiliary lane would begin at the on-ramp from Marine Drive. Both auxiliary lanes would continue across the northbound Columbia River bridge, and the on-ramp from Hayden Island would merge into the second auxiliary lane on the northbound Columbia River bridge. At the off-ramp to the C-D roadway, the second auxiliary lane would end but the first auxiliary lane would continue. A second auxiliary lane would begin again at the on-ramp from Mill Plain Boulevard. The second auxiliary lane would end at the off-ramp to SR 500, and the first auxiliary lane would connect to an existing auxiliary lane at 39th Street to the off-ramp at Main Street.

On I-5 southbound, two auxiliary lanes would begin at the on-ramp from SR 500. Between the on-ramp from Fourth Plain Boulevard and the off-ramp to Mill Plain Boulevard, one auxiliary lane would be added to the existing two auxiliary lanes. The second auxiliary lane would end at the off-ramp to the C-D roadway, but the first auxiliary lane would continue. A second auxiliary lane would begin again at the southbound I-5 on-ramp from the C-D roadway. Both auxiliary lanes would continue across the southbound Columbia River bridge, and the combined on-ramp from SR 14 westbound and C Street would merge into the second auxiliary lane on the southbound Columbia River bridge. The second auxiliary lane would end at the off-ramp to Marine Drive, and the first auxiliary lane would end at the combined off-ramp to Interstate Avenue and Victory Boulevard.

Figure 1-6 shows a comparison of the one auxiliary lane configuration and the two auxiliary lane configuration design option. Figure 1-7 shows a comparison of the footprints (i.e., the limit of permanent improvements) of the one auxiliary lane and two auxiliary lane configurations on a double-deck fixed-span bridge. For all Modified LPA bridge configurations (described in Section 1.1.3, Columbia River Bridges (Subarea B)), the footprints of the two auxiliary lane configurations differ only over the Columbia River and in downtown Vancouver. The rest of the corridor would have the same footprint. For all bridge configurations analyzed in this document, the two auxiliary lane option would add 16 feet (8 feet in each direction) in total roadway width compared to the one auxiliary lane option due to the increased shoulder widths for the one auxiliary lane option.[2] The traffic operations analysis incorporating both the one and two auxiliary lane design options applies equally to all bridge configurations in this Technical Report.

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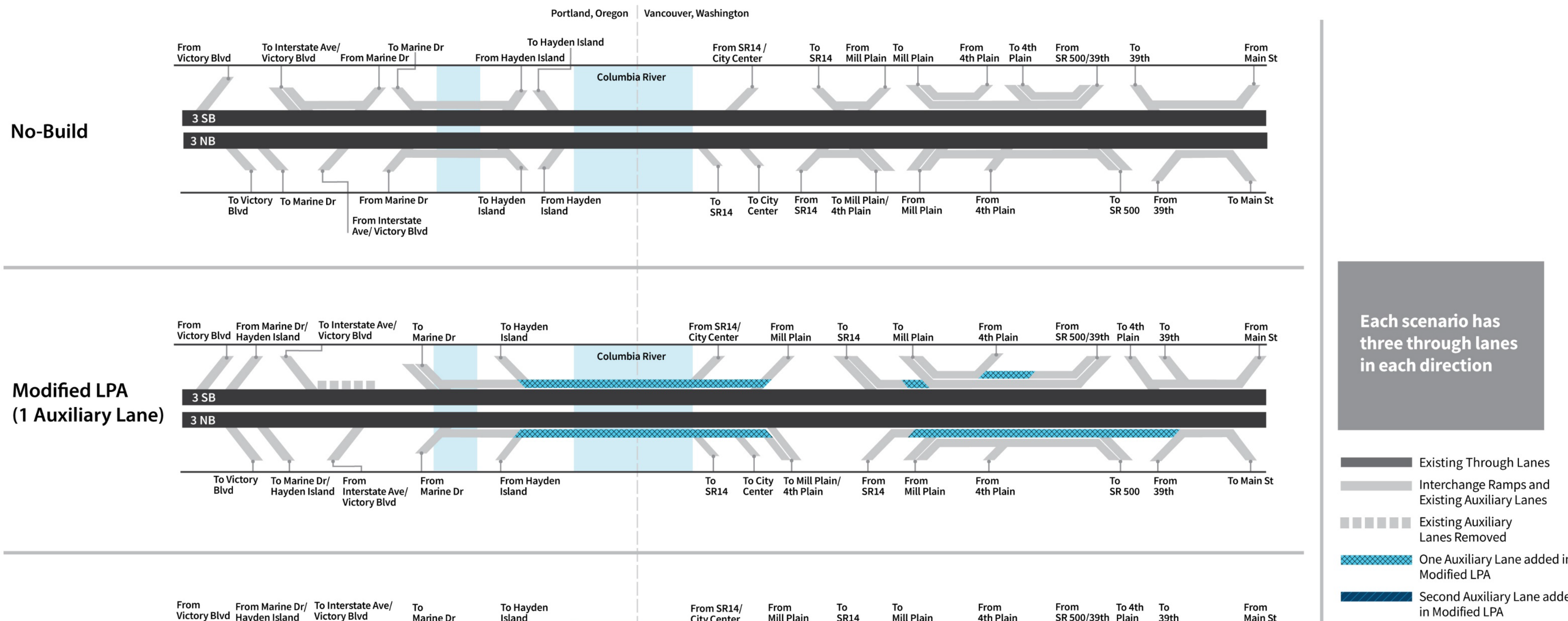
[2] Under the one auxiliary lane option, the width of each shoulder would be approximately 14 feet to accommodate maintenance of traffic during construction. Under the two auxiliary lane option, maintenance of traffic could be accommodated with 12-foot shoulders because the additional 12-foot auxiliary lane provides adequate roadway width. The total difference in roadway width in each direction between the one auxiliary lane option and the two auxiliary lane option would be 8 feet (12-foot auxiliary lane – 2 feet from the inside shoulder – 2 feet from the outside shoulder = 8 feet).

Figure 1-6. Comparison of Auxiliary Lane Configurations



Notes:

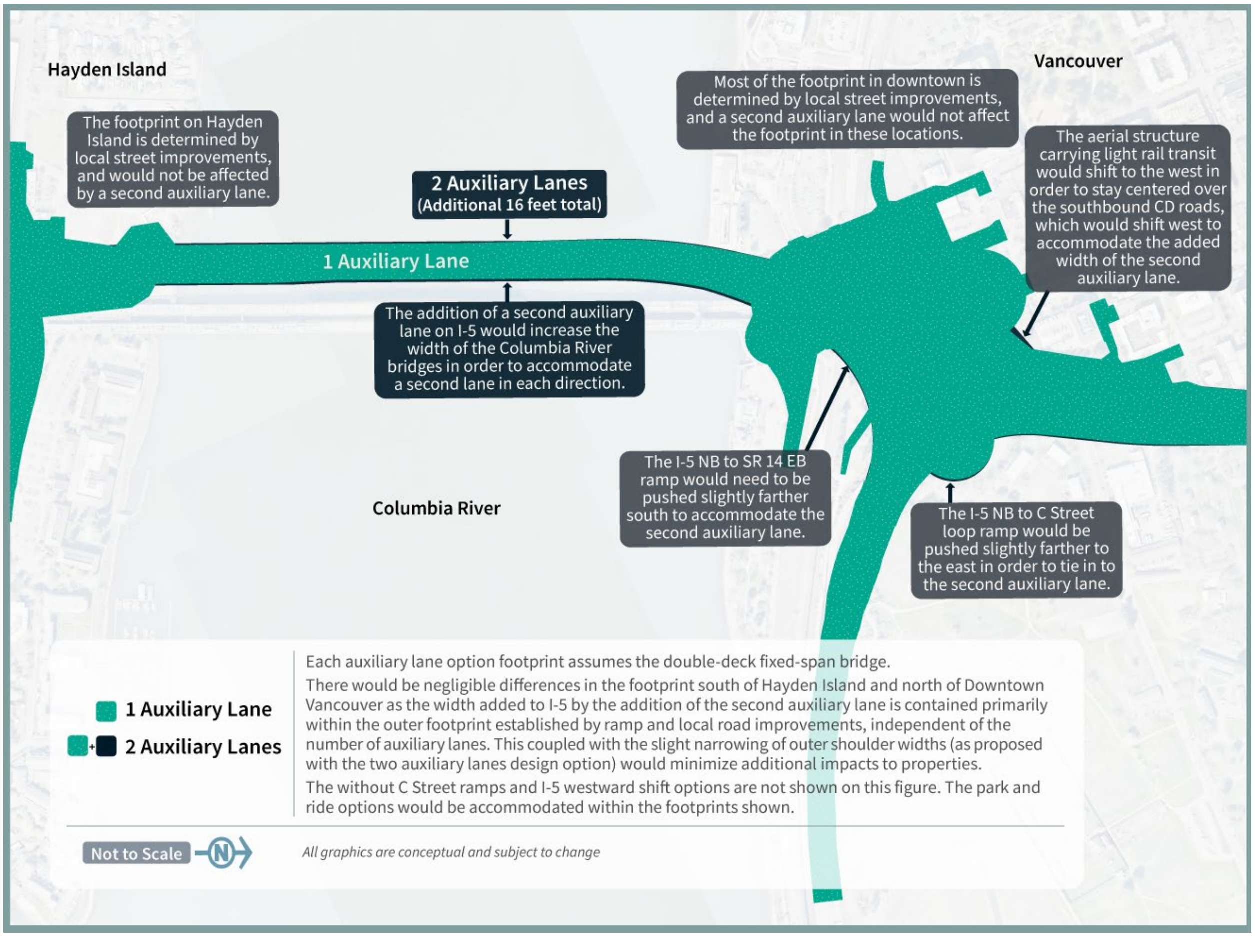
Collector Distributor Lanes not shown.

The traffic operations analysis incorporating both the one and two auxiliary lane design option applies equally to all bridge configuration options in this Draft SEIS.

The C Street ramp (NB to City Center) is an option.

Figure is not to scale.

Figure 1-7. Auxiliary Lane Configuration Footprint Differences



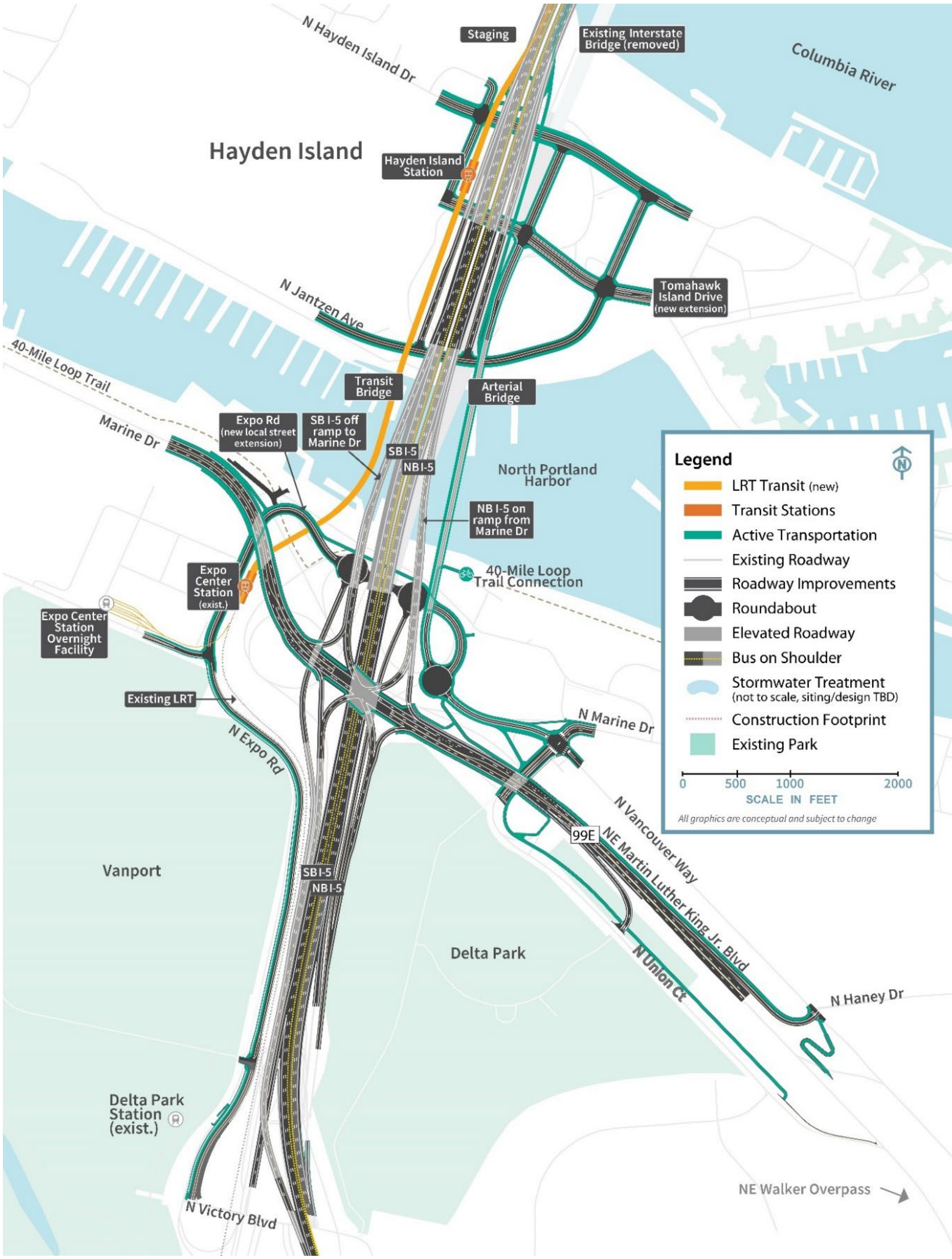
1.1.2 Portland Mainland and Hayden Island (Subarea A)

This section discusses the geographic Subarea A shown in Figure 1-3. See Figure 1-8 for highway and interchange improvements in Subarea A, including the North Portland Harbor bridge. Figure 1-8 illustrates the one auxiliary lane design option; please refer to Figure 1-6 and the accompanying description for how two auxiliary lanes would alter the Modified LPA's proposed design. Refer to Figure 1-3 for an overview of the geographic subareas.

Within Subarea A, the IBR Program has the potential to alter three federally authorized levee systems:

- The Oregon Slough segment of the Peninsula Drainage District Number 1 levee (PEN 1).
- The Oregon Slough segment of the Peninsula Drainage District Number 2 levee (PEN 2).
- The PEN1/PEN2 cross levee segment of the PEN 1 levee (Cross Levee).

Figure 1-8. Portland Mainland and Hayden Island (Subarea A)



LRT = light-rail transit; NB = northbound; SB = southbound; TBD = to be determined

The levee systems are shown on Figure 1-9, and intersections with Modified LPA components are described throughout Section 1.1.2, Portland Mainland and Hayden Island (Subarea A), where appropriate. Within Subarea A, the IBR Program study area intersects with PEN 1 to the west of I-5 and with PEN 2 to the east of I-5. PEN 1 and PEN 2 include a main levee along the south side of North Portland Harbor and are part of a combination of levees and floodwalls. PEN 1 and PEN 2 are separated by the Cross Levee that is intended to isolate the two districts if one of them fails. The Cross Levee is located along the I-5 mainline embankment, except in the Marine Drive interchange area where it is located on the west edge of the existing ramp from Marine Drive to southbound I-5.[3]

There are two concurrent efforts underway that are planning improvements to PEN1, PEN2, and the Cross Levee to reduce flood risk:

- The U.S. Army Corps of Engineers (USACE) Portland Metro Levee System (PMLS) project.
- The Flood Safe Columbia River (FSCR) program (also known as "Levee Ready Columbia").

The Urban Flood Safety and Water Quality District (UFSWQD)[4] is working with the USACE through the PMLS project, which includes improvements at PEN 1 and PEN 2 (e.g., raising these levees to elevation 38 feet North American Vertical Datum of 1988 [NAVD 88]).[5] Additionally, as part of the FSCR program, UFSWQD is studying raising a low spot in the Cross Levee on the southwest side of the Marine Drive interchange.

The IBR Program is in close coordination with these concurrent efforts to ensure that the IBR Program's design efforts consider the timing and scope of the PMLS and the FSCR proposed modifications. The intersection of the IBR Program proposed actions to both the existing levee configuration and the anticipated future condition based on the proposed PMLS and FSCR projects are described below, where appropriate.

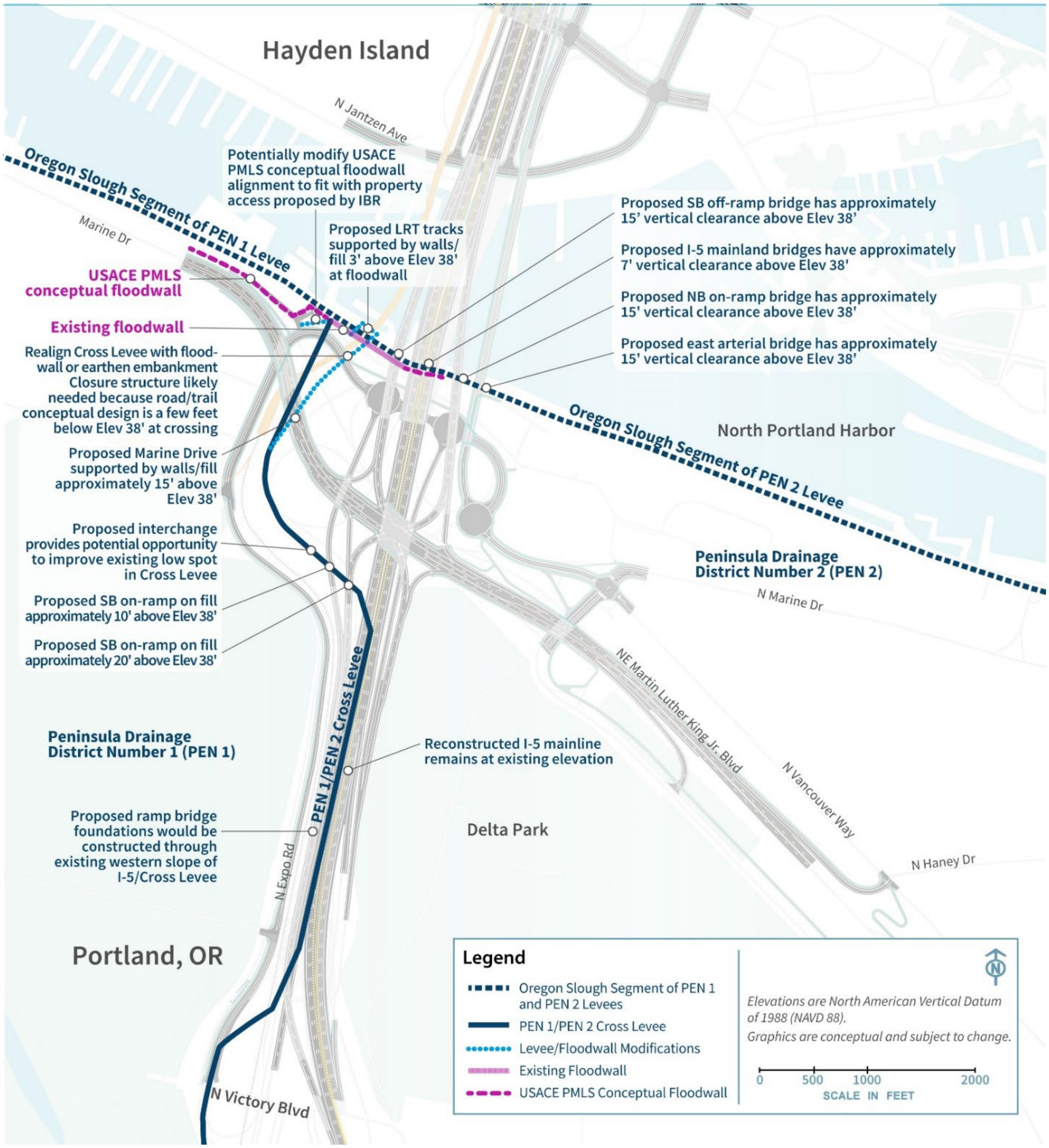
1.1.2.1 Highways, Interchanges, and Local Roadways

VICTORY BOULEVARD/INTERSTATE AVENUE INTERCHANGE AREA

The southern extent of the Modified LPA would improve two ramps at the Victory Boulevard/Interstate Avenue interchange (see Figure 1-8). The first ramp improvement would be the southbound I-5 off-ramp to Victory Boulevard/ Interstate Avenue; this off-ramp would be braided below (i.e., grade separated or pass below) the Marine Drive to the I-5 southbound on-ramp (see the Marine Drive Interchange Area section below). The other ramp improvement would lengthen the merge distance for northbound traffic entering I-5 from Victory Boulevard and from Interstate Avenue.

[3] The portion of the original Denver Avenue levee alignment within the Marine Drive interchange area is no longer considered part of the levee system by UFSWQD.
[4] UFSWQD includes PEN 1 and PEN 2, Urban Flood Safety and Water Quality District No. 1, and the Sandy Drainage Improvement Company.
[5] NAVD 88 is a vertical control datum (reference point) used by federal agencies for surveying.

Figure 1-9. Levee Systems in Subarea A



The existing I-5 mainline between Victory Boulevard/Interstate Avenue and Marine Drive is part of the Cross Levee (see Figure 1-9). The Modified LPA would require some pavement reconstruction of the mainline in this area; however, the improvements would mostly consist of pavement overlay and the profile and footprint would be similar to existing conditions.

MARINE DRIVE INTERCHANGE AREA

The next interchange north of the Victory Boulevard/Interstate Avenue interchange is at Marine Drive. All movements within this interchange would be reconfigured to reduce congestion for motorists entering and exiting I-5. The new configuration would be a single-point urban interchange. The new interchange would be centered over I-5 versus on the west side under existing conditions. See Figure 1-8 for the Marine Drive interchange's layout and construction footprint.

The Marine Drive to I-5 southbound on-ramp would be braided over I-5 southbound to the Victory Boulevard/Interstate Avenue off-ramp. Martin Luther King Jr. Boulevard would have a new more direct connection to I-5 northbound.

The new interchange configuration would change the westbound Marine Drive and westbound Vancouver Way connections to Martin Luther King Jr. Boulevard. An improved connection farther east of the interchange (near Haney Street) would provide access to westbound Martin Luther King Jr. Boulevard for these two streets. For eastbound travelers on Martin Luther King Jr. Boulevard exiting to Union Court, the existing loop connection would be replaced with a new connection farther east (near the access to the East Delta Park Owens Sports Complex).

Expo Road from Victory Boulevard to the Expo Center would be reconstructed with improved active transportation facilities. North of the Expo Center, Expo Road would be extended under Marine Drive and continue under I-5 to the east, connecting with Marine Drive and Vancouver Way through three new connected roundabouts. The westernmost roundabout would connect the new local street extension to I-5 southbound. The middle roundabout would connect the I-5 northbound off-ramp to the local street extension. The easternmost roundabout would connect the new local street extension to an arterial bridge crossing North Portland Harbor to Hayden Island. This roundabout would also connect the local street extension to Marine Drive and Vancouver Way.

To access Hayden Island using the arterial bridge from the east on Martin Luther King Jr. Boulevard, motorists would exit Martin Luther King Jr. Boulevard at the existing off-ramp to Vancouver Way just west of the Walker Street overpass. Then motorists would travel west on Vancouver Way, through the intersection with Marine Drive and straight through the roundabout to the arterial bridge.

From Hayden Island, motorists traveling south to Portland via Martin Luther King Jr. Boulevard would turn onto the arterial bridge southbound and travel straight through the roundabout onto Vancouver Way. At the intersection of Vancouver Way and Marine Drive, motorists would turn right onto Union Court and follow the existing road southeast to the existing on-ramp onto Martin Luther King Jr. Boulevard.

The conceptual floodwall alignment from the proposed USACE PMLS project is located on the north side of Marine Drive, near two industrial properties, with three proposed closure structures[6] for property access. The Modified LPA would realign Marine Drive to the south and provide access to the two industrial properties via the new local road extension from Expo Road. Therefore, the change in access for the two industrial properties could require small modifications to the floodwall alignment (a potential shift of 5 to 10 feet to the south) and closure structure locations.

Marine Drive and the two southbound on-ramps would travel over the Cross Levee approximately 10 to 20 feet above the proposed elevation of the improved levee, and they would be supported by fill and retaining walls near an existing low spot in the Cross Levee.

The I-5 southbound on-ramp from Marine Drive would continue on a new bridge structure. Although the bridge's foundation locations have not been determined yet, they would be constructed through the western slope of the Cross Levee (between the existing I-5 mainline and the existing light-rail).

NORTH PORTLAND HARBOR BRIDGES

To the north of the Marine Drive interchange is the Hayden Island interchange area, which is shown in Figure 1-8. I-5 crosses over the North Portland Harbor when traveling between these two interchanges. The Modified LPA proposes to replace the existing I-5 bridge spanning North Portland Harbor to improve seismic resiliency.

Six new parallel bridges would be built across the waterway under the Modified LPA: one on the east side of the existing I-5 North Portland Harbor bridge and five on the west side or overlapping the location of the existing bridge (which would be removed). From west to east, these bridges would carry:

- The LRT tracks.
- The southbound I-5 off-ramp to Marine Drive.
- The southbound I-5 mainline.
- The northbound I-5 mainline.
- The northbound I-5 on-ramp from Marine Drive.
- An arterial bridge between the Portland mainland and Hayden Island for local traffic; this bridge would also include a shared-use path for pedestrians and bicyclists.

Each of the six replacement North Portland Harbor bridges would be supported on foundations constructed of 10-foot-diameter drilled shafts. Concrete columns would rise from the drilled shafts and connect to the superstructures of the bridges. All new structures would have at least as much vertical navigation clearance over North Portland Harbor as the existing North Portland Harbor bridge.

[6] Levee closure structures are put in place at openings along the embankment/floodwall to provide flood protection during high water conditions.

Compared to the existing bridge, the two new I-5 mainline bridges would have a similar vertical clearance of approximately 7 feet above the proposed height of the improved levees (elevation 38 feet NAVD 88). The two ramp bridges and the arterial bridge would have approximately 15 feet of vertical clearance above the proposed height of the levees. The foundation locations for the five roadway bridges have not been determined at this stage of design, but some foundations could be constructed through landward or riverward levee slopes.

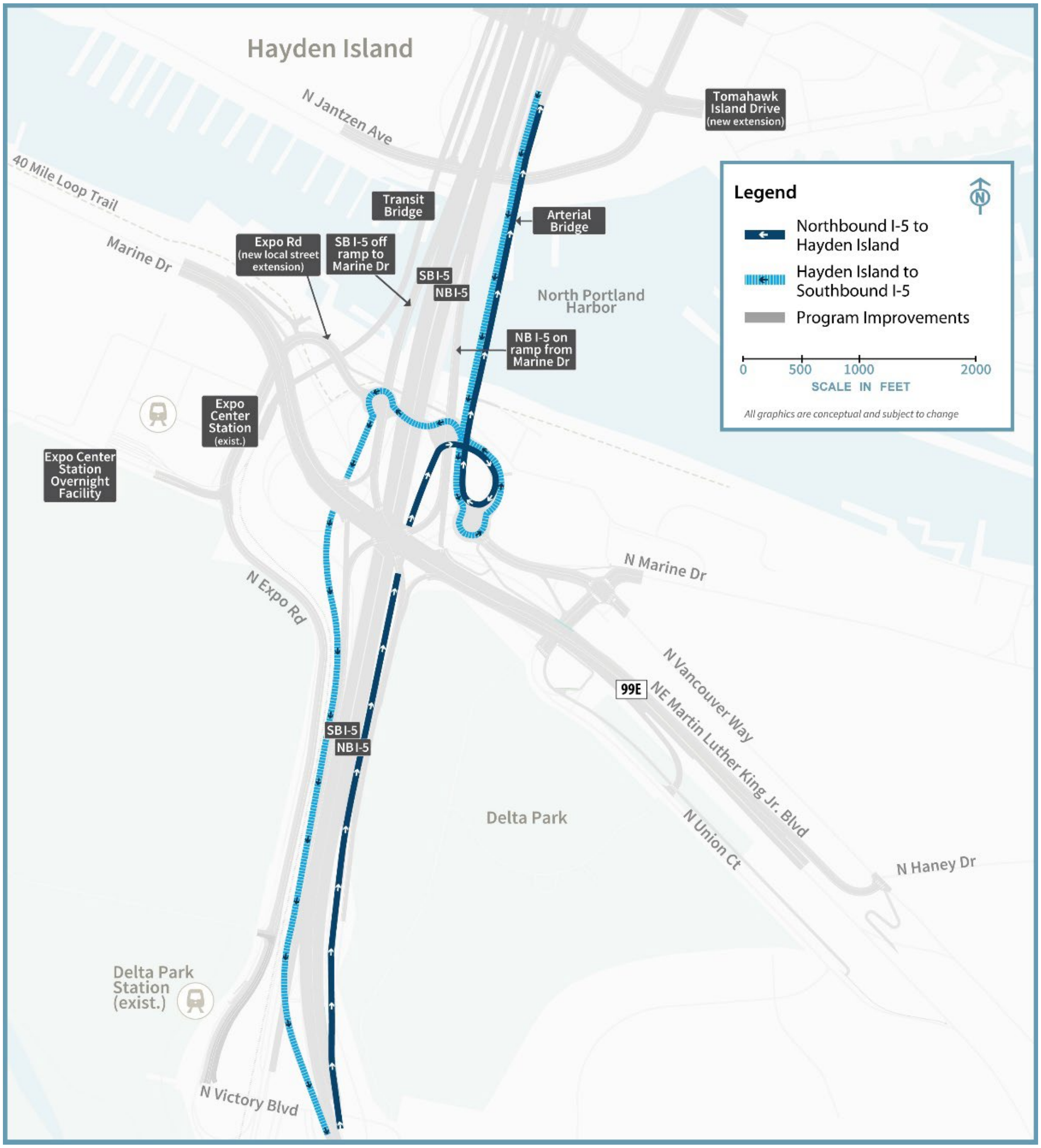
HAYDEN ISLAND INTERCHANGE AREA

All traffic movements for the Hayden Island interchange would be reconfigured. See Figure 1-8 for a layout and construction footprint of the Hayden Island interchange. A half-diamond interchange would be built on Hayden Island with a northbound I-5 on-ramp from Jantzen Drive and a southbound I-5 off-ramp to Jantzen Drive. This would lengthen the ramps and improve merging/diverging speeds compared to the existing substandard ramps that require acceleration and deceleration in a short distance. The I-5 mainline would be partially elevated and partially located on fill across the island.

There would not be a southbound I-5 on-ramp or northbound I-5 off-ramp on Hayden Island. Connections to Hayden Island for those movements would be via the local access (i.e., arterial) bridge connecting North Portland to Hayden Island (Figure 1-10). Vehicles traveling northbound on I-5 wanting to access Hayden Island would exit with traffic going to the Marine Drive interchange, cross under Martin Luther King Jr. Boulevard to the new roundabout at the Expo Road local street extension, travel east through this roundabout to the easternmost roundabout, and use the arterial bridge to cross North Portland Harbor. Vehicles on Hayden Island looking to enter I-5 southbound would use the arterial bridge to cross North Portland Harbor, cross under I-5 using the new Expo Road local street extension to the westernmost roundabout, cross under Marine Drive, merge with the Marine Drive southbound on-ramp, and merge with I-5 southbound south of Victory Boulevard.

Improvements to Jantzen Avenue may include additional left-turn and right-turn lanes at the interchange ramp terminals and active transportation facilities. Improvements to Hayden Island Drive would include new connections to the new arterial bridge over North Portland Harbor. The existing I-5 northbound and southbound access points from Hayden Island Drive would also be removed. A new extension of Tomahawk Island Drive would travel east-west through the middle of Hayden Island and under the I-5 interchange, thus improving connectivity across I-5 on the island.

Figure 1-10. Vehicle Circulation between Hayden Island and the Portland Mainland



NB = northbound; SB = southbound

1.1.2.2 Transit

A new light-rail alignment for northbound and southbound trains would be constructed within Subarea A (see Figure 1-8) to extend from the existing Expo Center MAX Station over North Portland Harbor to a new station at Hayden Island. An overnight LRV facility would be constructed on the southeast corner of the Expo Center property (see Figure 1-8) to provide storage for trains during hours when MAX is not in service. This facility is described in Section 1.1.6, Transit Support Facilities. The existing Expo Center MAX Station would be modified to remove the westernmost track and platform. Other platform modifications, including track realignment and regrading the station, are anticipated to transition to the extension alignment. This may require reconstruction of the operator break facility, signal/communication buildings, and traction power substations. Immediately north of the Expo Center MAX Station, the alignment would curve east toward I-5, pass beneath Marine Drive, cross the proposed Expo Road local street extension and the 40-Mile Loop Trail at grade, then rise over the existing levee onto a light-rail bridge to cross North Portland Harbor. On Hayden Island, proposed transit components include northbound and southbound LRT tracks over Hayden Island; the tracks would be elevated at approximately the height of the new I-5 mainline. An elevated LRT station would also be built on the island immediately west of I-5. The light-rail alignment would extend north on Hayden Island along the western edge of I-5 before transitioning onto the lower level of the new double-deck western bridge over the Columbia River (see Figure 1-8). For the single-level configurations, the light-rail alignment would extend to the outer edge of the western bridge over the Columbia River.

After crossing the new local road extension from Expo Road, the new light-rail track would cross over the main levee (see Figure 1-9). The light-rail profile is anticipated to be approximately 3 feet above the improved levees at the existing floodwall (and improved floodwall), and the tracks would be constructed on fill supported by retaining walls above the floodwall. North of the floodwall, the light-rail tracks would continue onto the new light-rail bridge over North Portland Harbor (as described above).

The Modified LPA's light-rail extension would be close to or would cross the north end of the Cross Levee. The IBR Program would realign the Cross Levee to the east of the light-rail alignment to avoid the need for a closure structure on the light-rail alignment. This realigned Cross Levee would cross the new local road extension. A closure structure may be required because the current proposed roadway is a few feet lower than the proposed elevation of the improved levee.

1.1.2.3 Active Transportation

In the Victory Boulevard interchange area (see Figure 1-8), active transportation facilities would be provided along Expo Road between Victory Boulevard and the Expo Center; this would provide a direct connection between the Victory Boulevard and Marine Drive interchange areas, as well as links to the Delta Park and Expo Center MAX Stations.

New shared-use path connections throughout the Marine Drive interchange area would provide access between the Bridgeton neighborhood (on the east side of I-5), Hayden Island, and the Expo Center MAX Station. There would also be connections to the existing portions of the 40-Mile Loop Trail, which runs north of Marine Drive under I-5 through the interchange area. The path would continue along the extension of Expo Road under the interchange to the intersection of Marine Drive and Vancouver Way, where it would connect under Martin Luther King Jr. Boulevard to Delta Park.

East of the Marine Drive interchange, new shared-use paths on Martin Luther King Jr. Boulevard and on the parallel street, Union Court, would connect travelers to Marine Drive and across the arterial bridge to Hayden Island. The shared-use facilities on Martin Luther King Jr. Boulevard would provide westbound and eastbound cyclists and pedestrians with off-street crossings of the interchange and would also provide connections to both the Expo Center MAX Station and the 40-Mile Loop Trail to the west.

The new arterial bridge over North Portland Harbor would include a shared-use path for pedestrians and bicyclists (see Figure 1-8). On Hayden Island, pedestrian and bicycle facilities would be provided on Jantzen Avenue, Hayden Island Drive, and Tomahawk Island Drive. The shared-use path on the arterial bridge would continue along the arterial bridge to the south side of Tomahawk Island Drive. A parallel, elevated path from the arterial bridge would continue adjacent to I-5 across Hayden Island and cross above Tomahawk Island Drive and Hayden Island Drive to connect to the lower level of the new double-deck eastern bridge or the outer edge of the new single-level eastern bridge over the Columbia River. A ramp down to the north side of Hayden Island Drive would be provided from the elevated path.

1.1.3 Columbia River Bridges (Subarea B)

This section discusses the geographic Subarea B shown in Figure 1-3. See Figure 1-11 for highway and interchange improvements in Subarea B. Refer to Figure 1-3 for an overview of the geographic subareas.

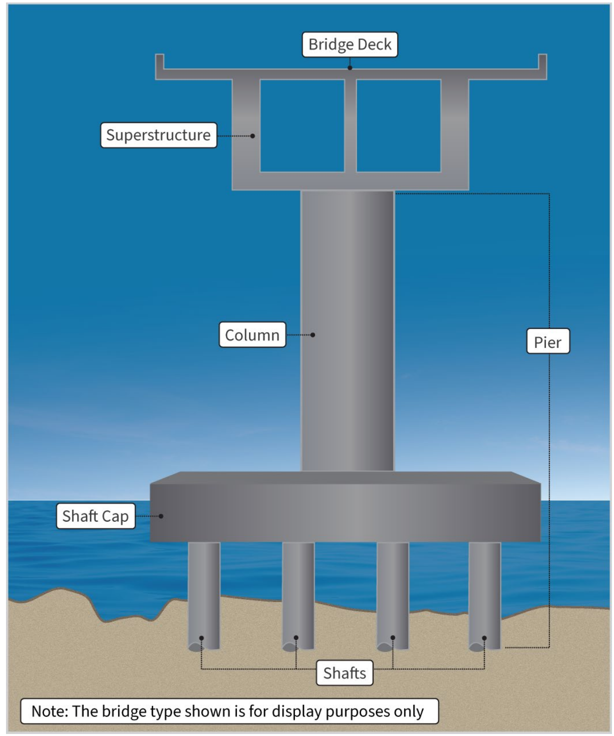
1.1.3.1 Highways, Interchanges, and Local Roadways

The two existing parallel I-5 bridges that cross the Columbia River would be replaced by two new parallel bridges, located west of the existing bridges (see Figure 1-11). The new eastern bridge would accommodate northbound highway traffic and a shared-use path. The new western bridge would carry southbound traffic and two-way light-rail tracks. Whereas the existing bridges each have three lanes with no shoulders, each of the two new bridges would be wide enough to accommodate three through lanes, one or two auxiliary lanes, and shoulders on both sides of the highway. Lanes and shoulders would be built to full design standards.

Figure 1-11. Columbia River Bridges (Subarea B)

As with the existing bridge (Figure 1-13), the new Columbia River bridges would provide three navigation channels: a primary navigation channel and two barge channels (see Figure 1-14). The current location of the primary navigation channel is near the Vancouver shoreline where the existing lift spans are located. Under the Modified LPA, the primary navigation channel would be shifted south approximately 500 feet (measured by channel centerlines), and the existing center barge channel would shift north and become the north barge channel. The new primary navigation channel would be 400 feet wide (this width includes a 300-foot congressionally or USACE-authorized channel plus a 50-foot channel maintenance buffer on each side of the authorized channel) and the two barge channels would also each be 400 feet wide.

Figure 1-12. Bridge Foundation Concept



The existing Interstate Bridge has nine in-water pier sets,[7] whereas the new Columbia River bridges (any bridge configuration) would be built on six in-water pier sets, plus multiple piers on land (pier locations are shown on Figure 1-14). Each in-water pier set would be supported by a foundation of drilled shafts; each group of shafts would be tied together with a concrete shaft cap. Columns or pier walls would rise from the shaft caps and connect to the superstructures of the bridges (see Figure 1-12).

BRIDGE CONFIGURATIONS

Three bridge configurations are being considered: (1) double-deck fixed-span (with one bridge type), (2) a single-level fixed-span (with three potential bridge types), and (3) a single-level movable-span (with one bridge type). Both the double-deck and single-level fixed-span configurations would provide 116 feet of vertical navigation clearance at their respective highest spans; the same as the CRC LPA. The CRC LPA included a double-deck fixed-span bridge configuration. The single-level fixed-span configuration was developed and is being considered as part of the IBR Program in response to physical and contextual changes (i.e., design and operational considerations) since 2013 that necessitated examination of a refinement in the double-deck bridge configuration (e.g., ingress and egress of transit from the lower level of the double-deck fixed-span configuration on the north end of the southbound bridge).

[7] A pier set consists of the pier supporting the northbound bridge and the pier supporting the southbound bridge at a given location.

Figure 1-13. Existing Navigation Clearances of the Interstate Bridge

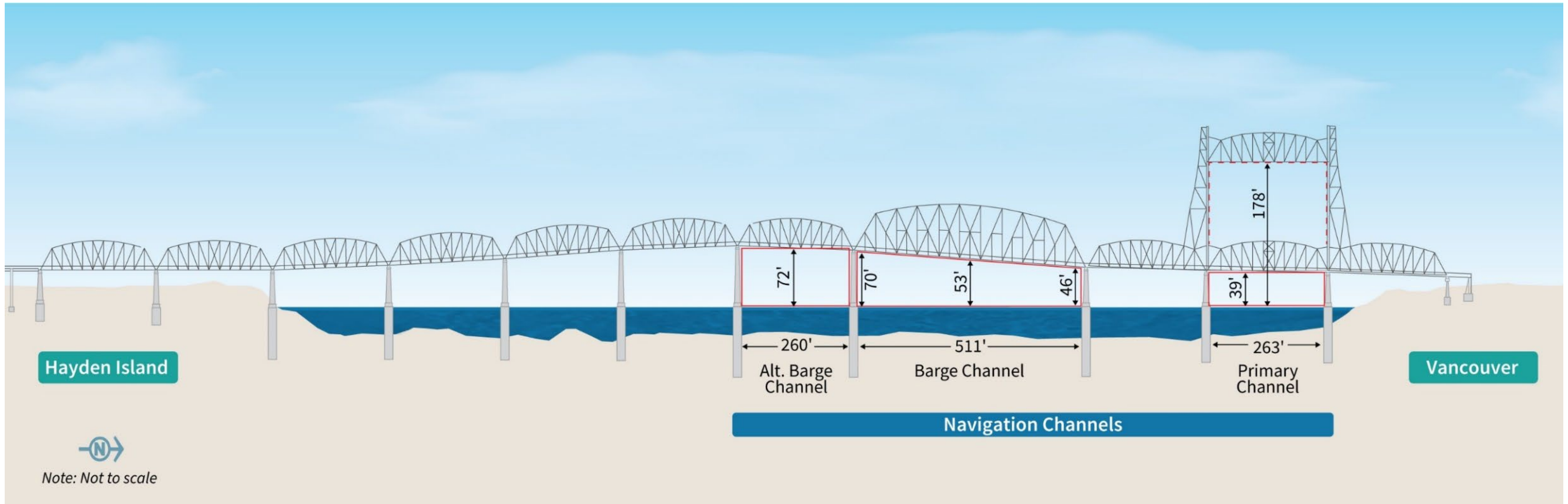
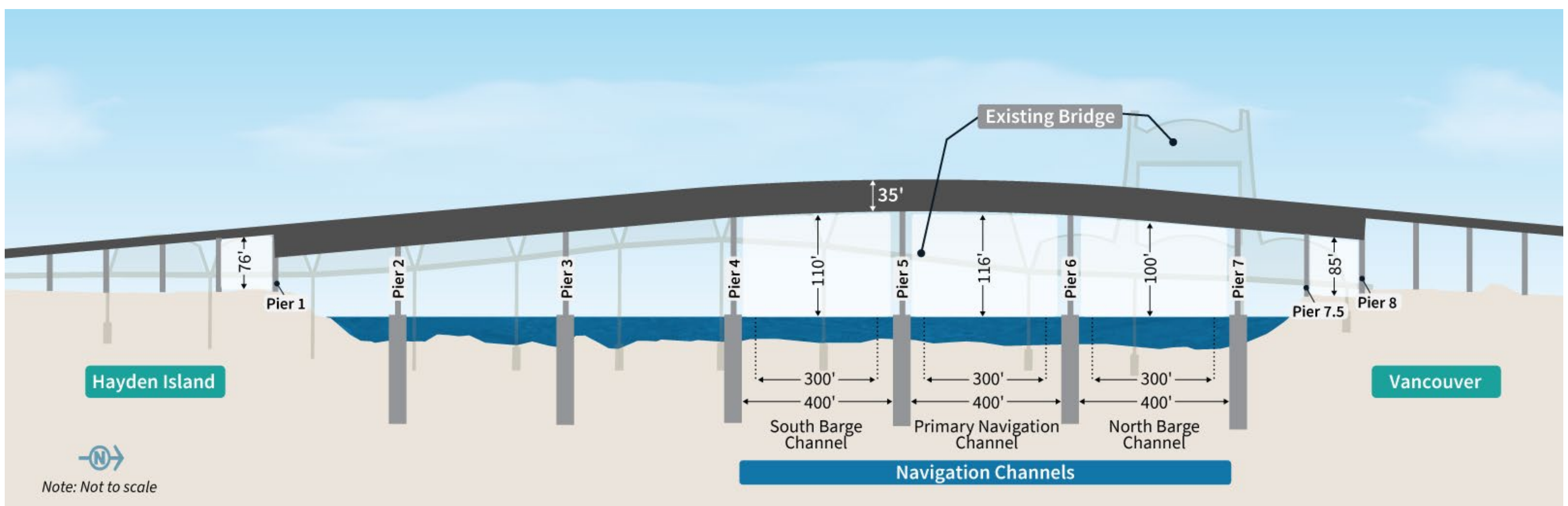


Figure 1-14. Profile and Navigation Clearances of the Proposed Modified LPA Columbia River Bridges with a Double-Deck Fixed-Span Configuration



Note: The location and widths of the proposed navigation channels would be same for all bridge configuration and bridge type options. The three navigation channels would each be 400 feet wide (this width includes a 300-foot congressionally or USACE-authorized channel (shown in dotted lines) plus a 50-foot channel maintenance buffer on each side of the authorized channel). The vertical navigation clearance would vary.

Consideration of the single-level movable-span configuration as part the IBR Program was necessitated by the U.S. Coast Guard's (USCG) review of the Program's navigation impacts on the Columbia River and issuance of a Preliminary Navigation Clearance Determination (PNCD) (USCG 2022). The USCG PNCD set the preliminary vertical navigation clearance recommended for the issuance of a bridge permit at 178 feet; this is the current vertical navigation clearance of the Interstate Bridge.

The IBR Program is carrying forward the three bridge configurations to address changed conditions, including changes in the USCG bridge permitting process, in order to ensure a permittable bridge configuration is within the range of options considered. The IBR Program continues to refine the details supporting navigation impacts and is coordinating closely with the USCG to determine how a fixed-span bridge may be permittable. Although the fixed-span configurations do not comply with the current USCG PNCD, they do meet the Purpose and Need and provide potential improvements to traffic (passenger vehicle and freight), transit, and active transportation operations.

Each of the bridge configurations assumes one auxiliary lane; two auxiliary lanes could be applied to any of the bridge configurations. All typical sections for the one auxiliary lane option would provide 14-foot shoulders to maintain traffic during construction of the Modified LPA and future maintenance.

Double-Deck Fixed-Span Configuration

The double-deck fixed-span configuration would be two side-by-side, double-deck, fixed-span steel truss bridges. Figure 1-15 is an example of this configuration (this image is subject to change and is shown as a representative concept; it does not depict the final design). The double-deck fixed-span configuration would provide 116 feet of vertical navigation clearance for river traffic using the primary navigation channel and 400 feet of horizontal navigation clearance at the primary navigation channel, as well as barge channels. This bridge height would not impede takeoffs and landings by aircraft using Pearson Field or Portland International Airport.

The eastern bridge would accommodate northbound highway traffic on the upper level and the shared-use path and utilities on the lower level. The western bridge would carry southbound traffic on the upper level and two-way light-rail tracks on the lower level. Each bridge deck would be 79 feet wide, with a total out-to-out width of 173 feet.[8]

Figure 1-16 is a cross section of the two parallel double-deck bridges. Like all bridge configurations, the double-deck fixed-span configuration would have six in-water pier sets. Each pier set would require 12 in-water drilled shafts, for a total of 72 in-water drilled shafts. Each individual shaft cap would be approximately 50 feet by 85 feet. This bridge configuration would have a 3.8% maximum grade on the Oregon side of the bridge and a 4% maximum grade on the Washington side.

[8] "Out-to-out width" is the measurement between the outside edges of the bridge across its width at the widest point.

Figure 1-15. Conceptual Drawing of a Double-Deck Fixed-Span Configuration

Note: Visualization is looking southwest from Vancouver.

Single-Level Fixed-Span Configuration

The single-level fixed-span configuration would have two side-by-side, single-level, fixed-span steel or concrete bridges. This report considers three single-level fixed-span bridge type options: a girder bridge, an extradosed bridge, and a finback bridge. The description in this section applies to all three bridge types (unless otherwise indicated). Conceptual examples of each of these options are shown on Figure 1-17. These images are subject to change and do not represent final design.

This configuration would provide 116 feet of vertical navigation clearance for river traffic using the primary navigation channel and 400 feet of horizontal navigation clearance at the primary navigation channel, as well as barge channels. This bridge height would not impede takeoffs and landings by aircraft using Pearson Field or Portland International Airport.

The eastern bridge would accommodate northbound highway traffic and the shared-use path; the bridge deck would be 104 feet wide. The western bridge would carry southbound traffic and two-way light-rail tracks; the bridge deck would be 113 feet wide. The I-5 highway, light-rail tracks, and the shared-use path would be on the same level across the two bridges, instead of being divided between two levels with the double-deck configuration. The total out-to-out width of the single-level fixed-span configuration (extradosed or finback options) would be 272 feet at its widest point, approximately 99 feet wider than the double-deck configuration. The total out-to-out width of the single-level fixed-span configuration (girder option) would be 232 feet at its widest point. Figure 1-18 shows a typical cross section of the single-level configuration. This cross section is a representative example of an extradosed or finback bridge as shown by the 10-foot-wide superstructure above the bridge deck; the girder bridge would not have the 10-foot-wide bridge columns shown on Figure 1-18.

There would be six in-water pier sets with 16 in-water drilled shafts on each combined shaft cap, for a total of 96 in-water drilled shafts. The combined shaft caps for each pier set would be 50 feet by 230 feet.

This bridge configuration would have a 3% maximum grade on both the Oregon and Washington sides of the bridge.

Figure 1-16. Cross Section of the Double-Deck Fixed-Span Configuration

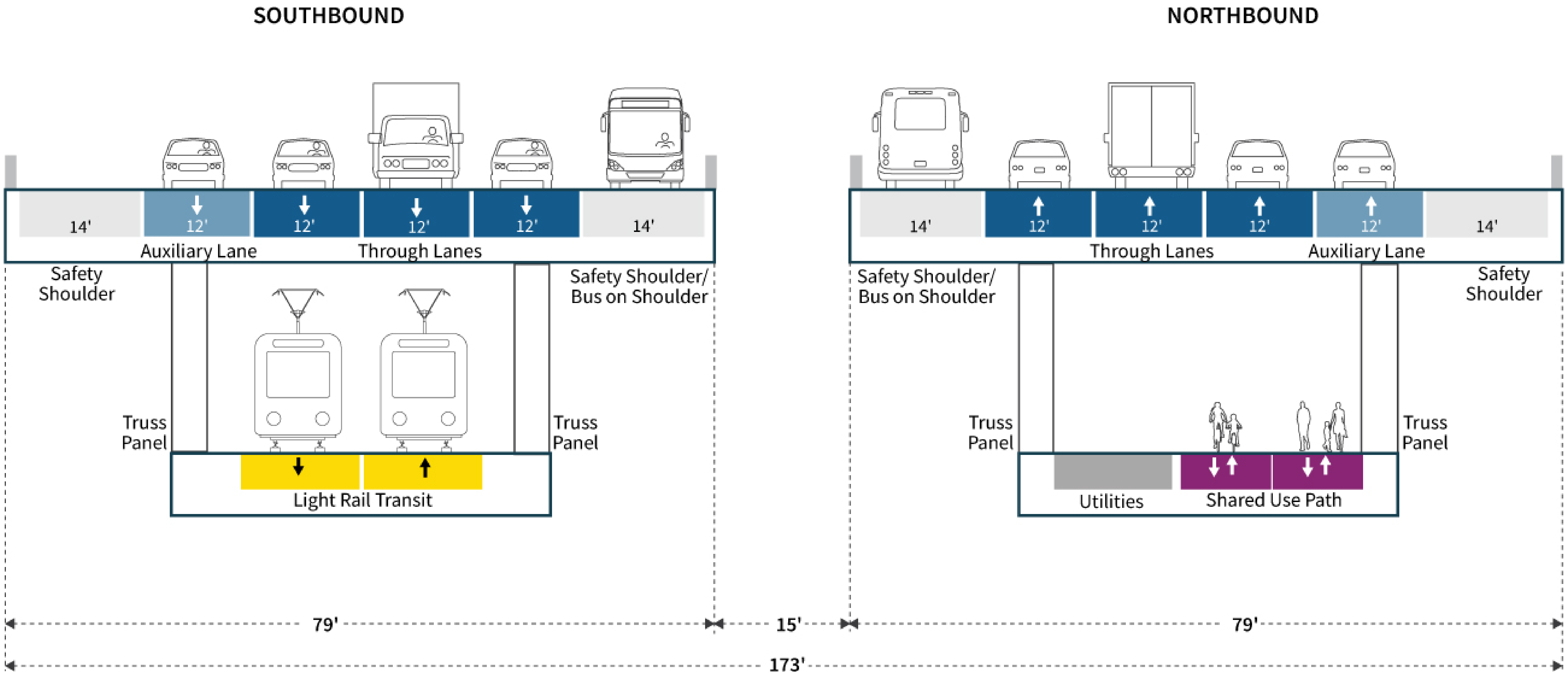
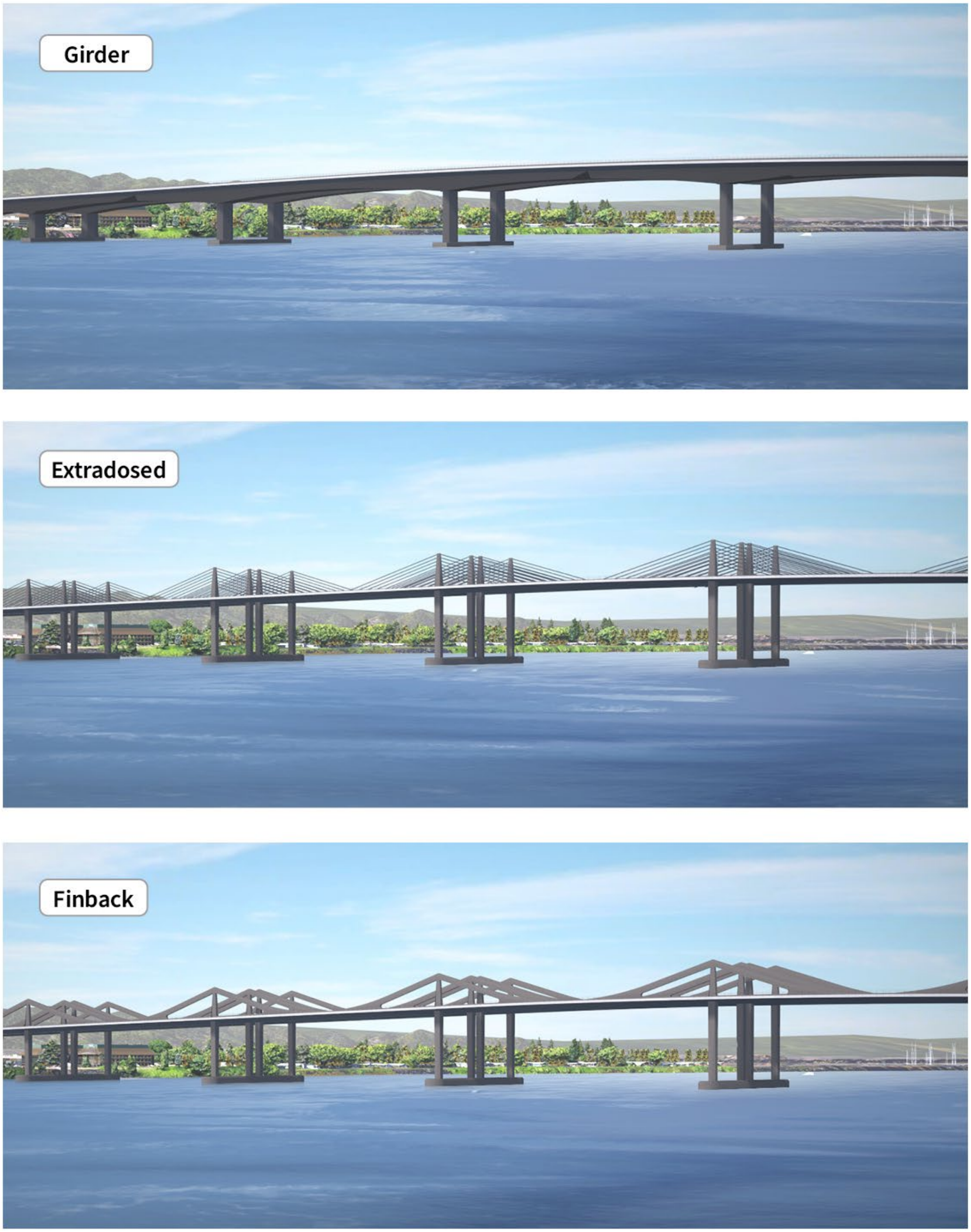
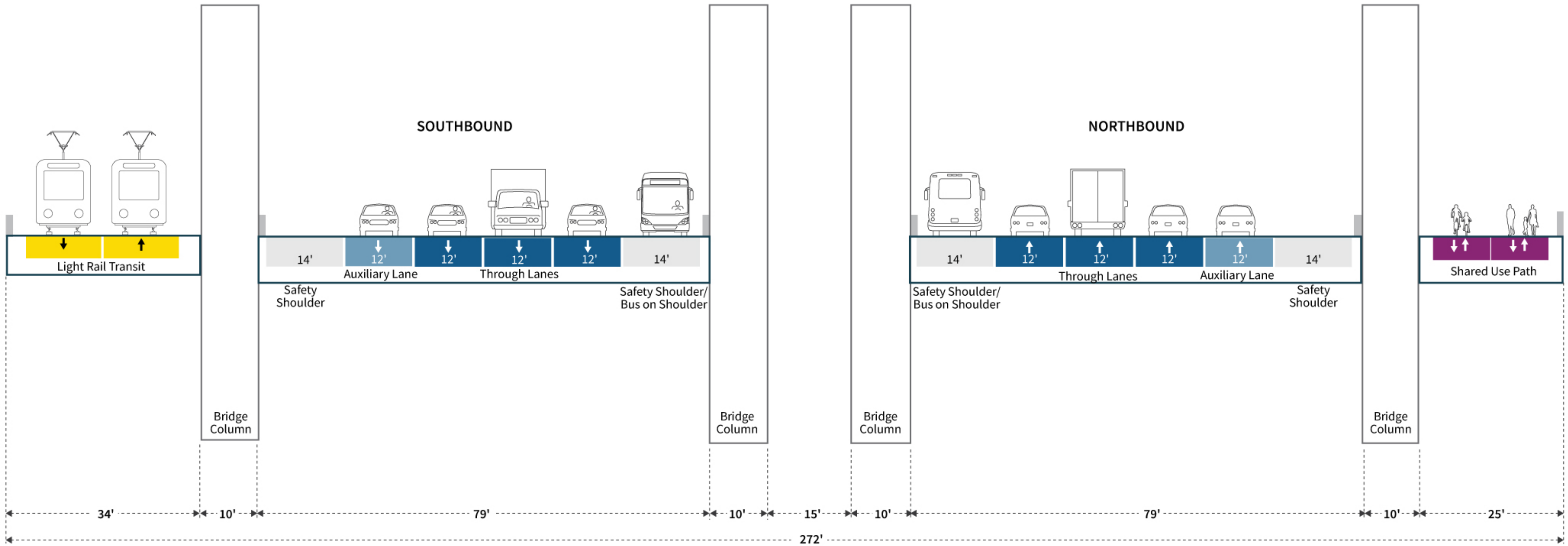


Figure 1-17. Conceptual Drawings of Single-Level Fixed-Span Bridge Types



Note: Visualizations are for illustrative purposes only. They do not reflect property impacts or represent final design. Visualization is looking southwest from Vancouver.

Figure 1-18. Cross Section of the Single-Level Fixed-Span Configuration (Extradosed or Finback Bridge Types)



Note: The cross section for a girder type bridge would be the same except that it would not have the four 10-foot bridge columns making the total out-to-out width 232 feet.

Single-Level Movable-Span Configuration

The single-level movable-span configuration would have two side-by-side, single-level steel girder bridges with movable spans between Piers 5 and 6. For the purpose of this report, the IBR Program assessed a vertical lift span movable-span configuration with counterweights based on the analysis in the *River Crossing Bridge Clearance Assessment Report – Movable-Span Options,* included as part of Attachment C in Appendix D, Design Options Development, Screening, and Evaluation Technical Report. A conceptual example of a vertical lift-span bridge is shown in Figure 1-19. These images are subject to change and do not represent final design.

A movable span must be located on a straight and flat bridge section (i.e., without curvature and with minimal slope). To comply with these requirements, and for the bridge to maintain the highway, transit, and active transportation connections on Hayden Island and in Vancouver while minimizing property acquisitions and displacements, the movable span is proposed to be located 500 feet south of the existing lift span, between Piers 5 and 6. To accommodate this location of the movable span, the IBR Program is coordinating with USACE to obtain authorization to change the location of the primary navigation channel, which currently aligns with the Interstate Bridge lift spans near the Washington shoreline.

The single-level movable-span configuration would provide 92 feet of vertical navigation clearance over the proposed relocated primary navigation channel when the movable spans are in the closed position, with 99 feet of vertical navigation clearance available over the north barge channel. The 92-foot vertical clearance is based on achieving a straight, movable span and maintaining an acceptable grade for transit operations. In addition, it satisfies the requirement of a minimum of 72 feet of vertical navigation clearance (the existing Interstate Bridge's maximum clearance over the alternate (southernmost) barge channel when the existing lift span is in the closed position).

In the open position, the movable span would provide 178 feet of vertical navigation clearance over the proposed relocated primary navigation channel.

Similar to the fixed-span configurations, the movable span would provide 400 feet of horizontal navigation clearance for the primary navigation channel and for each of the two barge channels.

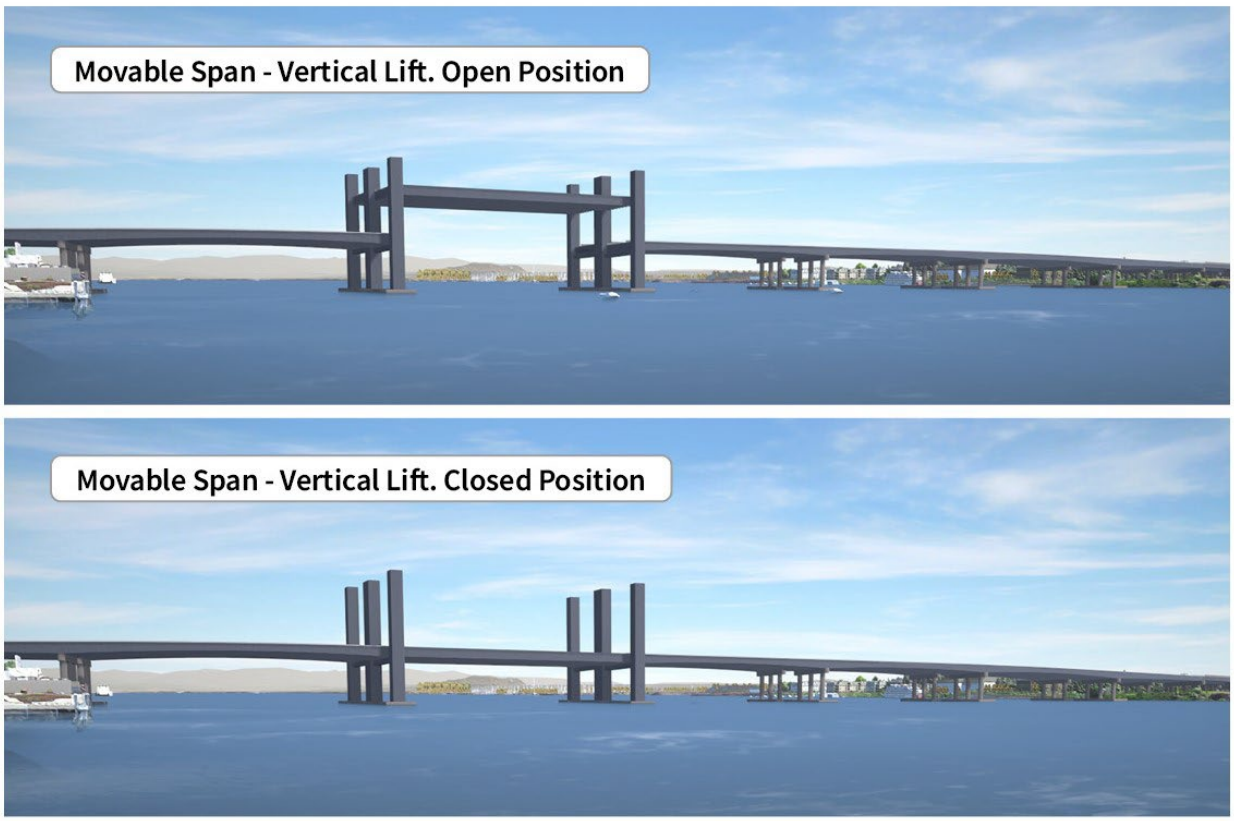
The vertical lift-span towers would be approximately 243 feet high; this is shorter than the existing lift-span towers, which are 247 feet high. This height of the vertical lift-span towers would not impede takeoffs and landings by aircraft using Portland International Airport. At Pearson Field, the Federal Aviation Administration issues obstacle departure procedures to avoid the existing Interstate Bridge lift towers; the single-level movable-span configuration would retain the same procedures.

Similar to the single-level fixed-span configuration, the eastern bridge would accommodate northbound highway traffic and the shared-use path, and the western bridge would carry southbound traffic and two-way light-rail tracks. The I-5 highway, light-rail tracks, and shared-use path would be on the same level across the bridges instead of on two levels as with the double-deck configuration. Cross sections of the single-level movable-span configuration are shown in Figure 1-20; the top cross section depicts the vertical lift spans (Piers 5 and 6), and the bottom cross section depicts the fixed spans (Piers 2, 3, 4, and 7). The movable and fixed cross sections are slightly different because the movable span requires lift towers, which are not required for the other fixed spans of the bridges.

There would be six in-water pier sets and two piers on land per bridge. The vertical lift span would have 22 in-water drilled shafts each for Piers 5 and 6; the shaft caps for these piers would be 50 feet by 312 feet to accommodate the vertical lift spans. Piers 2, 3, 4, and 7 would have 16 in-water drilled shafts each; the shaft caps for these piers would be the same as for the fixed-span options (50 feet by 230 feet). The vertical lift-span configuration would have a total of 108 in-water drilled shafts.

This single-level movable-span configuration would have a 3% maximum grade on the Oregon side of the bridge and a 1.5% maximum grade on the Washington side.

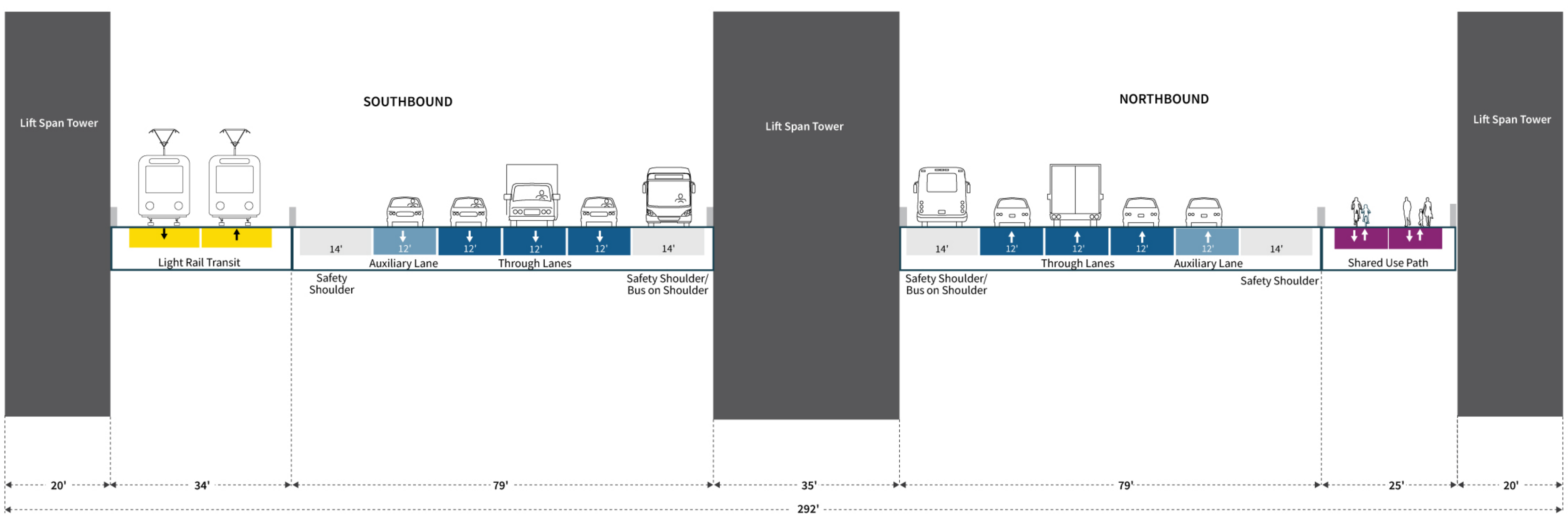
Figure 1-19. Conceptual Drawings of Single-Level Movable-Span Configurations in the Closed and Open Positions



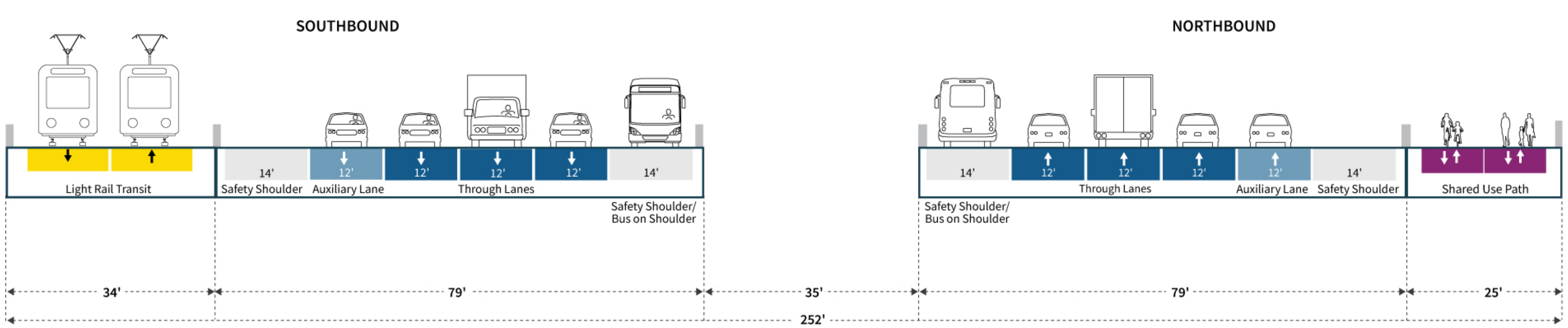
Note: Visualizations are for illustrative purposes only. They do not reflect property impacts or represent final design. Visualization is looking southeast (upstream) from Vancouver.

Figure 1-20. Cross Section of the Single-Level Movable-Span Bridge Type

Single-level Bridge with Movable Span - Vertical Lift Span Cross-section (Piers 5 and 6)



Single-level Bridge with Movable Span - Fixed Spans Cross-section (Piers 2, 3, 4, and 7)



Summary of Bridge Configurations

This section summarizes and compares each of the bridge configurations. Table 1-2 lists the key considerations for each configuration. Figure 1-21 compares each configuration's footprint. The footprints of each configuration would differ in only three locations: over the Columbia River and at the bridge landings on Hayden Island and Vancouver. The rest of the I-5 corridor would have the same footprint. Over the Columbia River, the footprint of the double-deck fixed-span configuration would be 173 feet wide. Comparatively, the finback or extradosed bridge types of the single-level fixed-span configuration would be 272 feet wide (approximately 99 feet wider), and the single-level fixed-span configuration with a girder bridge type would be 232 feet wide (approximately 59 feet wider). The single-level movable-span configuration would be 252 feet wide (approximately 79 feet wider than the double-deck fixed-span configuration), except at Piers 5 and 6, where larger bridge foundations would require an additional 40 feet of width to support the movable span. The single-level configurations would have a wider footprint at the bridge landings on Hayden Island and Vancouver because transit and active transportation would be located adjacent to the highway, rather than below the highway in the double-deck option.

Figure 1-22 compares the basic profile of each configuration. The lower deck of the double-deck fixed-span and the single-level fixed-span configuration would have similar profiles. The single-level movable-span configuration would have a lower profile than the fixed-span configurations when the span is in the closed position.

Figure 1-21. Bridge Configuration Footprint Comparison

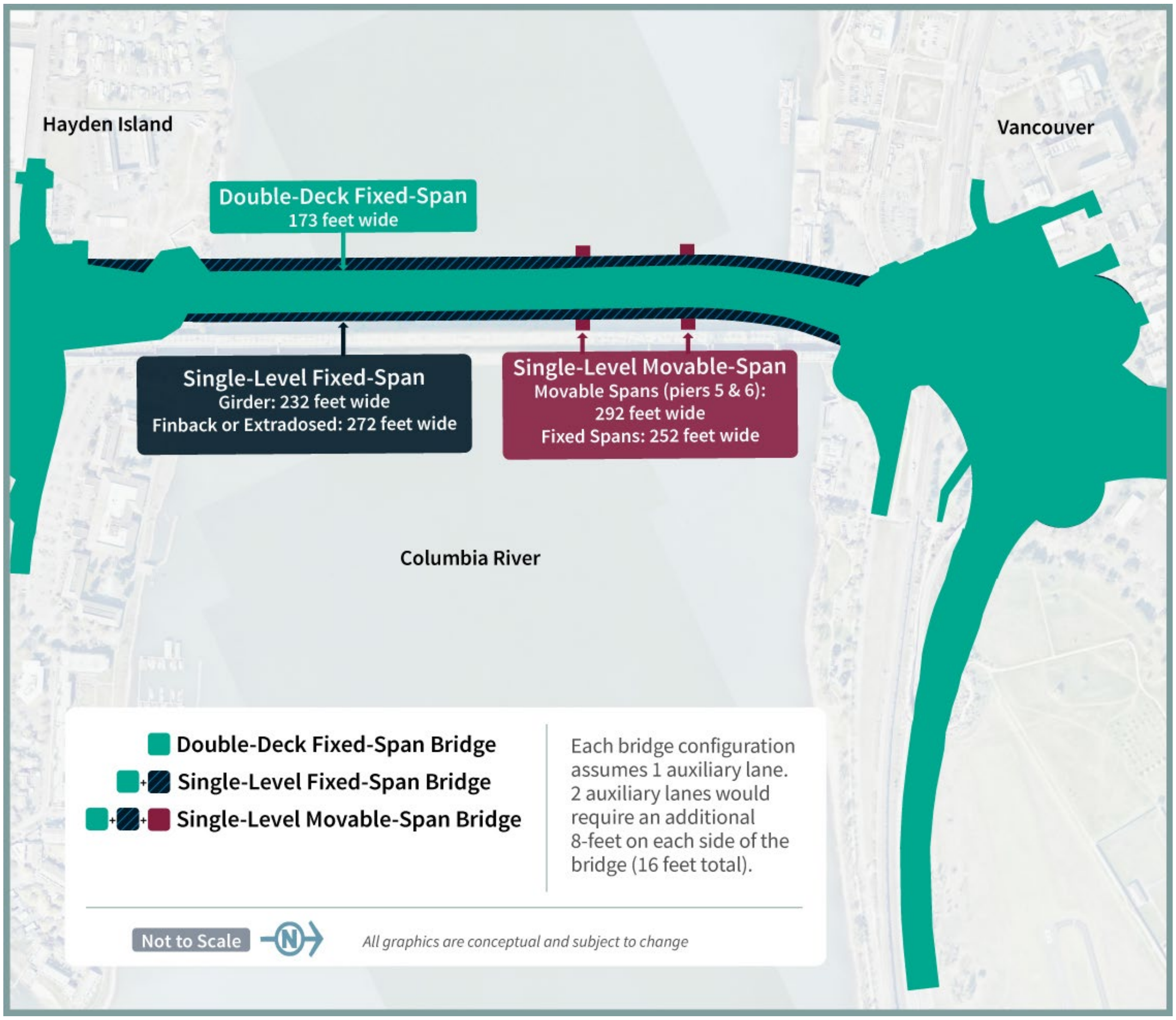
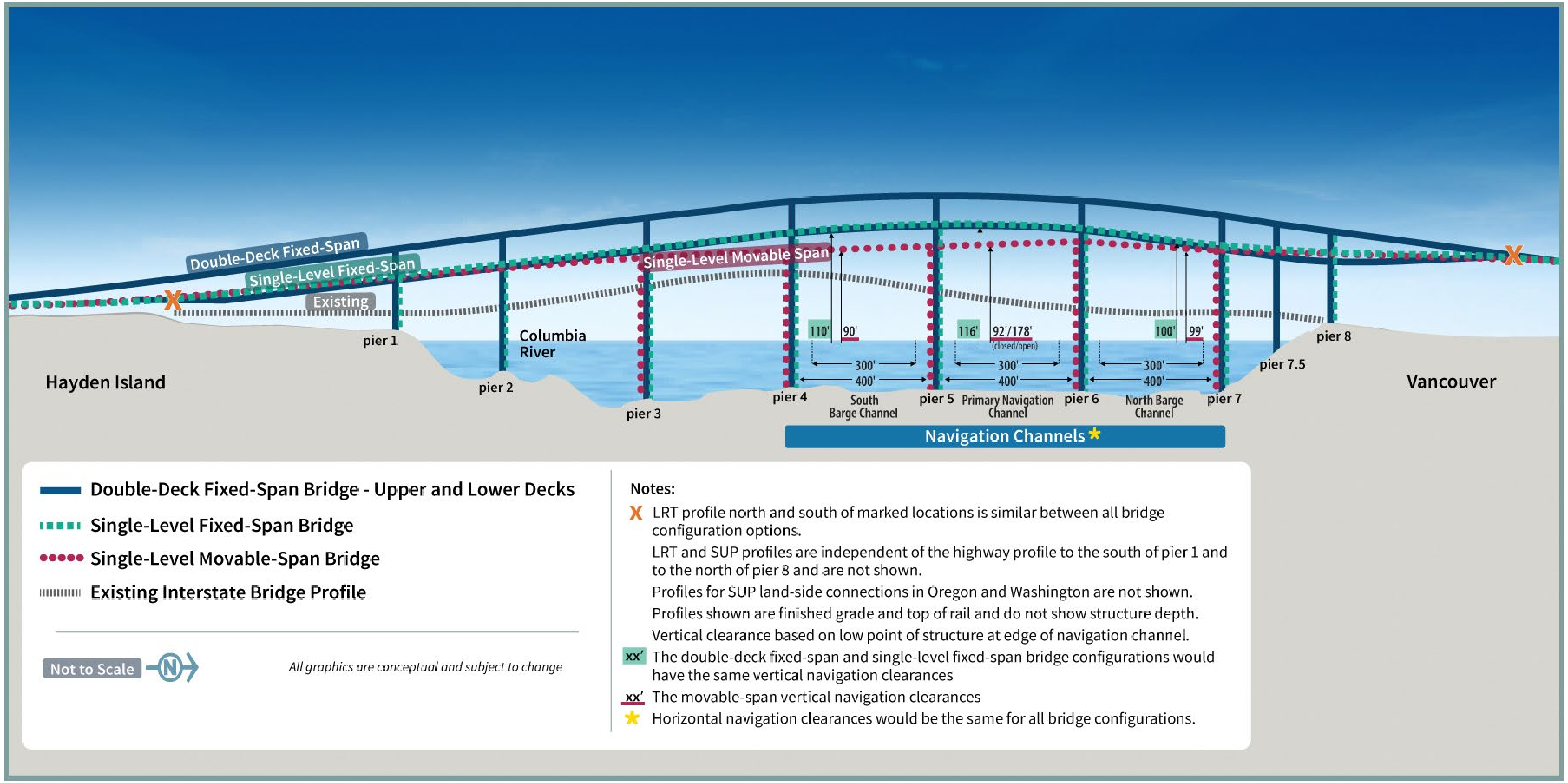


Figure 1-22. Bridge Configuration Profile Comparison



LRT = light-rail transit; SUP = shared-use path

Table 1-2. Summary of Bridge Configurations

	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration	Modified LPA with Single-Level Fixed-Span Configuration [a]	Modified LPA with Single-Level Movable-Span Configuration
Bridge type	Steel through-truss spans.	Double-deck steel truss.	Single-level, concrete or steel girders, extradosed or finback.	Single-level, steel girders with vertical lift span.
Number of bridges	Two	Two	Two	Two
Movable-span type	Vertical lift span with counterweights.	N/A	N/A	Vertical lift span with counterweights.
Movable-span location	Adjacent to Vancouver shoreline.	N/A	N/A	Between Piers 5 and 6 (approximately 500 feet south of the existing lift span).
Lift opening restrictions	Weekday peak AM and PM highway travel periods. [b]	N/A	N/A	Additional restrictions to daytime bridge openings; requires future federal rulemaking process and authorization by USCG (beyond the assumed No-Build Alternative bridge restrictions for peak AM and PM highway travel periods).[b] Typical opening durations are assumed to be 9 to 18 minutes [c] for the purposes of impact analysis but would ultimately depend on various operational considerations related to vessel traffic and river and weather conditions. Additional time would also be required to stop traffic prior to opening and restart traffic after the bridge closes.
Out-to-out width [d]	138 feet total width.	173 feet total width.	Girder: 232 feet total width. Extradosed/Finback: 272 feet total width.	• 292 feet at the movable span. • 252 feet at the fixed spans.

	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration	Modified LPA with Single-Level Fixed-Span Configuration [a]	Modified LPA with Single-Level Movable-Span Configuration
Deck widths	52 feet (SB) 52 feet (NB)	79 feet (SB) 79 feet (NB)	Girder: • 113 feet (SB) • 104 feet (NB) Extradosed/Finback: • 133 feet (SB) • 124 feet (NB)	113 feet SB fixed span. 104 feet NB fixed span.
Vertical navigation clearance	Primary navigation channel: • 39 feet when closed. • 178 feet when open. Barge channel: • 46 feet to 70 feet. Alternate barge channel: • 72 feet (maximum clearance without opening).	Primary navigation channel: • 116 feet maximum. North barge channel: • 100 feet maximum. South barge channel: • 110 feet maximum.	Primary navigation channel: • 116 feet maximum. North barge channel: • 100 feet maximum. South barge channel: • 110 feet maximum.	Primary navigation channel: • Closed position: 92 feet. • Open position: 178 feet. North barge channel: • 99 feet maximum. South barge channel: • 90 feet maximum.
Horizontal navigation clearance	263 feet for primary navigation channel. 511 feet for barge channel. 260 feet for alternate barge channel.	400 feet for all navigation channels (300-foot congressionally or USACE-authorized channel plus a 50-foot channel maintenance buffer on each side).	400 feet for all navigation channels (300-foot congressionally or USACE-authorized channel plus a 50-foot channel maintenance buffer on each side).	400 feet for all navigation channels (300-foot congressionally or USACE-authorized channel plus a 50-foot channel maintenance buffer on each side).
Maximum elevation of bridge component (NAVD 88)[e]	247 feet at top of lift tower.	166 feet.	Girder: 137 feet. Extradosed/Finback: 179 feet at top of pylons.	243 feet at top of lift tower.

	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration	Modified LPA with Single-Level Fixed-Span Configuration [a]	Modified LPA with Single-Level Movable-Span Configuration
Movable span length (from center of pier to center of pier)	278 feet.	N/A	N/A	450 feet.
Number of in-water pier sets	Nine	Six	Six	Six
Number of in-water drilled shafts	N/A	72	96	108
Shaft cap sizes	N/A	50 feet by 85 feet.	50 feet by 230 feet.	Piers 2, 3, 4, and 7: 50 feet by 230 feet. Piers 5 and 6: 50 feet by 312 feet (one combined footing at each location to house tower/equipment for the lift span).
Maximum grade	5%	4% on the Washington side. 3.8% on the Oregon side.	3% on the Washington side. 3% on the Oregon side.	1.5% on the Washington side. 3% on the Oregon side.
Light-rail transit location	N/A	Below highway on SB bridge.	West of highway on SB bridge.	West of highway on SB bridge.
Express bus	Shared roadway lanes.	Inside shoulder of NB and SB (upper) bridges.	Inside shoulder of NB and SB bridges.	Inside shoulder of NB and SB bridges.
Shared-use path location	Sidewalk adjacent to roadway in both directions.	Below highway on NB bridge.	East of highway on NB bridge.	East of highway on NB bridge.

a When different bridge types are not mentioned, data applies to all bridge types under the specified bridge configuration.
b The No-Build Alternative assumes existing conditions that restrict bridge openings during weekday peak periods (Monday through Friday 6:30 a.m. to 9 a.m.; 2:30 p.m. to 6 p.m., excluding federal holidays). This analysis estimates the potential frequency for bridge openings for vessels requiring more than 99 feet of clearance.
c For the purposes of the transportation analysis (see the Transportation Technical Report), the movable-span opening time is assumed to be an average of 12 minutes.
d "Out-to-out width" is the measurement between the outside edges of the bridge across its width at the widest point.
e NAVD 88 (North American Vertical Datum of 1988) is a vertical control datum (reference point) used by federal agencies for surveying.
NB = northbound; SB = southbound; USCG = U.S. Coast Guard

1.1.4 Downtown Vancouver (Subarea C)

This section discusses the geographic Subarea C shown in Figure 1-3. See Figure 1-23 for all highway and interchange improvements in Subarea C. Refer to Figure 1-3 for an overview of the geographic subareas.

1.1.4.1 Highways, Interchanges, and Local Roadways

North of the Columbia River bridges in downtown Vancouver, improvements are proposed to the SR 14 interchange (Figure 1-23).

SR 14 INTERCHANGE

The new Columbia River bridges would touch down just north of the SR 14 interchange (Figure 1-23). The function of the SR 14 interchange would remain essentially the same as it is now, although the interchange would be elevated. Direct connections between I-5 and SR 14 would be rebuilt. Access to and from downtown Vancouver would be provided as it is today, but the connection points would be relocated. Downtown Vancouver I-5 access to and from the south would be at C Street as it is today, while downtown connections to and from SR 14 would be from Columbia Street at 3rd Street.

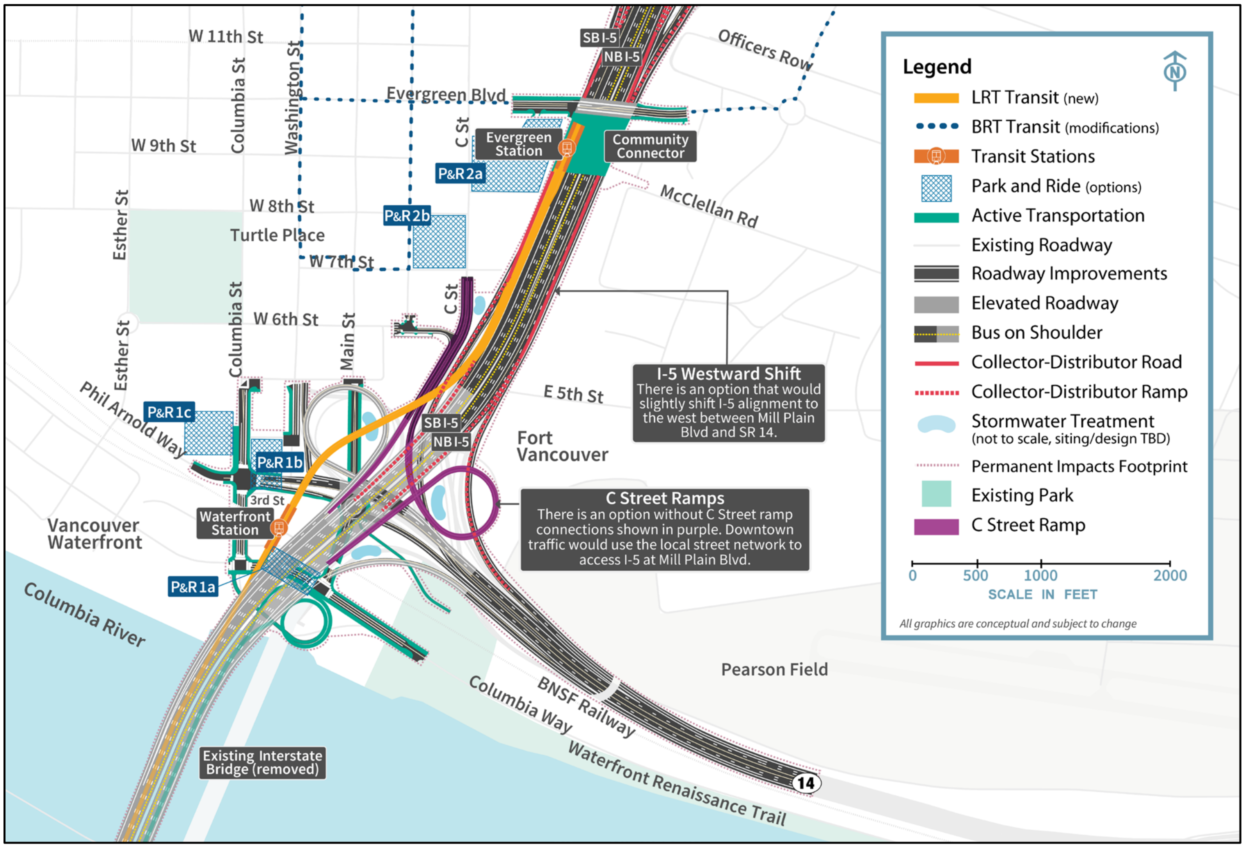
Main Street would be extended between 5th Street and Columbia Way. Vehicles traveling from downtown Vancouver to access SR 14 eastbound would use the new extension of Main Street to the roundabout underneath I-5. If coming from the west or south (waterfront) in downtown Vancouver, vehicles would use the Phil Arnold Way/3rd Street extension to the roundabout, then continue to SR 14 eastbound. The existing Columbia Way roadway under I-5 would be realigned to the north of its existing location and would intersect both the new Main Street extension and Columbia Street with T intersections.

In addition, the existing overcrossing of I-5 at Evergreen Boulevard would be reconstructed.

Design Option Without C Street Ramps

Under this design option, downtown Vancouver I-5 access to and from the south would be through the Mill Plain interchange rather than C Street. There would be no eastside loop ramp from I-5 northbound to C Street and no directional ramp on the west side of I-5 from C Street to I-5 southbound. The existing eastside loop ramp would be removed. This design option has been included because of changes in local planning that necessitate consideration of design options that reduce the footprint and associated direct and temporary environmental impacts in Vancouver.

Figure 1-23. Downtown Vancouver (Subarea C)



BRT = bus rapid transit; LRT = light-rail transit; NB = northbound; P&R = park and ride; SB = southbound

Design Option to Shift I-5 Westward

This design option would shift the I-5 mainline and ramps approximately 40 feet to the west between SR 14 and Mill Plain Boulevard. The westward I-5 alignment shift could also be paired with the design option without C Street ramps. The inclusion of this design option is due to changes in local planning, which necessitate consideration of design options that that shifts the footprint and associated direct and temporary environmental impacts in Vancouver.

1.1.4.2 Transit

LIGHT-RAIL ALIGNMENT AND STATIONS

Under the Modified LPA, the light-rail tracks would exit the highway bridge and be on their own bridge along the west side of the I-5 mainline after crossing the Columbia River (see Figure 1-23). The light-rail bridge would cross approximately 35 feet over the BNSF Railway tracks. An elevated light-rail station near the Vancouver waterfront (Waterfront Station) would be situated near the overcrossing of the BNSF tracks between Columbia Way and 3rd Street. Access to the elevated station would be primarily by elevator as the station is situated approximately 75 feet above existing ground level. A stairwell(s) would be provided for emergency egress. The number of elevators and stairwells provided would be based on the ultimate platform configuration, station location relative to the BNSF trackway, projected ridership, and fire and life safety requirements. Passenger drop-off facilities would be located at ground level and would be coordinated with the C-TRAN bus service at this location. The elevated light-rail tracks would continue north, cross over the westbound SR 14 on-ramp and the C Street/6th Street on-ramp to southbound I-5, and then straddle the southbound I-5 C-D roadway. Transit components in the downtown Vancouver area are similar between the two SR 14 interchange area design options discussed above.

North of the Waterfront Station, the light-rail tracks would continue to the Evergreen Station, which would be the terminus of the light-rail extension (see Figure 1-23). The light-rail tracks from downtown Vancouver to the terminus would be entirely on an elevated structure supported by single columns, where feasible, or by columns on either side of the roadway where needed. The light-rail tracks would be a minimum of 27 feet above the I-5 roadway surface. The Evergreen Station would be located at the same elevation as Evergreen Boulevard, on the proposed Community Connector, and it would provide connections to C-TRAN's existing BRT system. Passenger drop-off facilities would be near the station and would be coordinated with the C-TRAN bus service at this location.

PARK AND RIDES

Up to two park and rides could be built in Vancouver along the light-rail alignment: one near the Waterfront Station and one near the Evergreen Station. Additional information regarding the park and rides can be found in the Transportation Technical Report.

> Park and rides can expand the catchment area of public transit systems, making transit more accessible to people who live farther away from fixed-route transit service, and attracting new riders who might not have considered using public transit otherwise.

Waterfront Station Park-and-Ride Options

There are three site options for the park and ride near the Waterfront Station (see Figure 1-23). Each would accommodate up to 570 parking spaces.

1. Columbia Way (below I-5). This park-and-ride site would be a multilevel aboveground structure located below the new Columbia River bridges, immediately north of a realigned Columbia Way.
2. Columbia Street/SR 14. This park-and-ride site would be a multilevel aboveground structure located along the east side of Columbia Street. It could span across (or over) the SR 14 westbound off-ramp to provide parking on the north and south sides of the off-ramp.
3. Columbia Street/Phil Arnold Way (Waterfront Gateway Site). This park-and-ride site would be located along the west side of Columbia Street immediately north of Phil Arnold Way. This park and ride would be developed in coordination with the City of Vancouver's Waterfront Gateway program and could be a joint-use parking facility not constructed exclusively for park-and-ride users.

Evergreen Station Park-and-Ride Options

There are two site options for the park and ride near the Evergreen Station (see Figure 1-23).

- Library Square. This park-and-ride site would be located along the east side of C Street and south of Evergreen Boulevard. It would accommodate up to 700 parking spaces in a multilevel belowground structure according to a future agreement on City-owned property associated with Library Square. Current design concepts suggest the park and ride most likely would be a joint-use parking facility for park-and-ride users and patrons of other uses on the ground or upper levels as negotiated as part of future decisions.
- Columbia Credit Union. This park-and-ride site is an existing multistory garage that is located below the Columbia Credit Union office tower along the west side of C Street between 7th Street and 8th Street. The existing parking structure currently serves the office tower above it and the Regal City Center across the street. This would be a joint-use parking facility, not for the exclusive use of park-and-ride users, that could serve as additional or overflow parking if the 700 required parking spaces cannot be accommodated elsewhere.

1.1.4.3 Active Transportation

Within the downtown Vancouver area, the shared-use path on the northbound (or eastern) bridge would exit the bridge at the SR 14 interchange, loop down on the east side of I-5 via a vertical spiral path, and then cross back below I-5 to the west side of I-5 to connect to the Waterfront Renaissance Trail on Columbia Street and into Columbia Way (see Figure 1-23). Access would be provided across state right of way beneath the new bridges to provide a connection between the recreational areas along the City's Columbia River waterfront east of the bridges and existing and future waterfront uses west of the bridges.

Active transportation components in the downtown Vancouver area would be similar without the C Street ramps and with the I-5 westward shift.

At Evergreen Boulevard, a community connector is proposed to be built over I-5 just south of Evergreen Boulevard and east of the Evergreen Station (see Figure 1-23). The structure is proposed to include off-street pathways for active transportation modes including pedestrians, bicyclists, and other micro-mobility modes, and public space and amenities to support the active transportation facilities. The primary intent of the Community Connector is to improve connections between downtown Vancouver on the west side of I-5 and the Vancouver National Historic Reserve on the east side.

1.1.5 Upper Vancouver (Subarea D)

This section discusses the geographic Subarea D shown in Figure 1-3. See Figure 1-24 for all highway and interchange improvements in Subarea D. Refer to Figure 1-3 for an overview of the geographic subareas.

1.1.5.1 Highways, Interchanges, and Local Roadways

Within the upper Vancouver area, the IBR Program proposes improvements to three interchanges—Mill Plain, Fourth Plain, and SR 500—as described below.

MILL PLAIN BOULEVARD INTERCHANGE

The Mill Plain Boulevard interchange is north of the SR 14 interchange (see Figure 1-24). This interchange would be reconstructed as a tight-diamond configuration but would otherwise remain similar in function to the existing interchange. The ramp terminal intersections would be sized to accommodate high, wide heavy freight vehicles that travel between the Port of Vancouver and I-5. The off-ramp from I-5 northbound to Mill Plain Boulevard would diverge from the C-D road that would continue north, crossing over Mill Plain Boulevard, to provide access to Fourth Plain Boulevard via a C-D roadway. The off-ramp to Fourth Plain Boulevard would be reconstructed and would cross over Mill Plain Boulevard east of I-5, similar to the way it functions today.

FOURTH PLAIN BOULEVARD INTERCHANGE

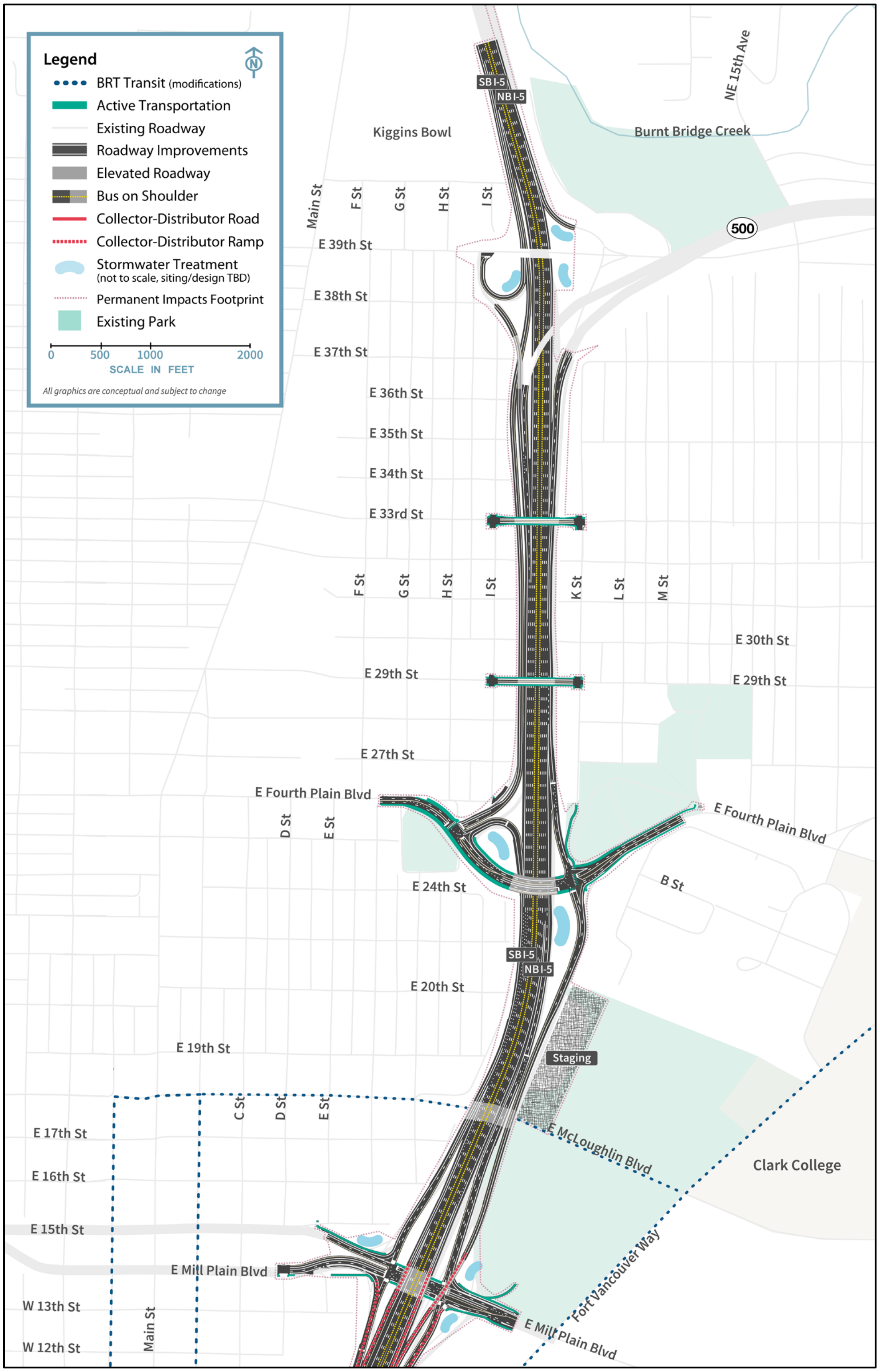
At the Fourth Plain Boulevard interchange (Figure 1-24), improvements would include reconstruction of the overpass of I-5 and the ramp terminal intersections. Northbound I-5 traffic exiting to Fourth Plain Boulevard would first exit to the northbound C-D roadway which provides off-ramp access to Fourth Plain Boulevard and Mill Plain Boulevard. The westbound SR 14 to northbound I-5 on-ramp also joins the northbound C-D roadway before continuing north past the Fourth Plain Boulevard and Mill Plain Boulevard off-ramps as an auxiliary lane. The southbound I-5 off-ramp to Fourth Plain Boulevard would be braided below the 39th Street on-ramp to southbound I-5. This change would eliminate the existing nonstandard weave between the SR 500 interchange and the off-ramp to Fourth Plain Boulevard. It would also eliminate the existing westbound SR 500 to Fourth Plain Boulevard off-ramp connection. The existing overcrossing of I-5 at 29th Street would be reconstructed to accommodate a widened I-5, provide adequate vertical clearance over I-5, and provide pedestrian and bicycle facilities.

SR 500 INTERCHANGE

The northern terminus of the I-5 improvements would be in the SR 500 interchange area (Figure 1-24). The improvements would primarily be to connect the Modified LPA to existing ramps. The off-ramp from I-5 southbound to 39th Street would be reconstructed to establish the beginning of the braided ramp to Fourth Plain Boulevard and restore the loop ramp to 39th Street. Ramps from existing I-5 northbound to SR 500 eastbound and from 39th Street to I-5 northbound would be partially reconstructed. The existing bridges for 39th Street over I-5 and SR 500 westbound to I-5 southbound would be retained. The 39th Street to I-5 southbound on-ramp would be reconstructed and braided over (i.e., grade separated or pass over) the new I-5 southbound off-ramp to Fourth Plain Boulevard.

The existing overcrossing of I-5 at 33rd Street would also be reconstructed to accommodate a widened I-5, provide adequate vertical clearance over I-5, and provide pedestrian and bicycle facilities.

Figure 1-24. Upper Vancouver (Subarea D)



BRT = bus rapid transit; TBD = to be determined

1.1.5.2 Transit

There would be no LRT facilities in upper Vancouver. Proposed operational changes to bus service, including I-5 bus-on-shoulder service, are described in Section 1.1.7, Transit Operating Characteristics.

1.1.5.3 Active Transportation

Several active transportation improvements would be made in Subarea D consistent with City of Vancouver plans and policies. At the Fourth Plain Boulevard interchange, there would be improvements to provide better bicycle and pedestrian mobility and accessibility; these include bicycle lanes, neighborhood connections, and a connection to the City of Vancouver's planned two-way cycle track on Fourth Plain Boulevard. The reconstructed overcrossings of I-5 at 29th Street and 33rd Street would provide pedestrian and bicycle facilities on those cross streets. No new active transportation facilities are proposed in the SR 500 interchange area. Active transportation improvements at the Mill Plain Boulevard interchange include buffered bicycle lanes and sidewalks, pavement markings, lighting, and signing.

1.1.6 Transit Support Facilities

1.1.6.1 Ruby Junction Maintenance Facility Expansion

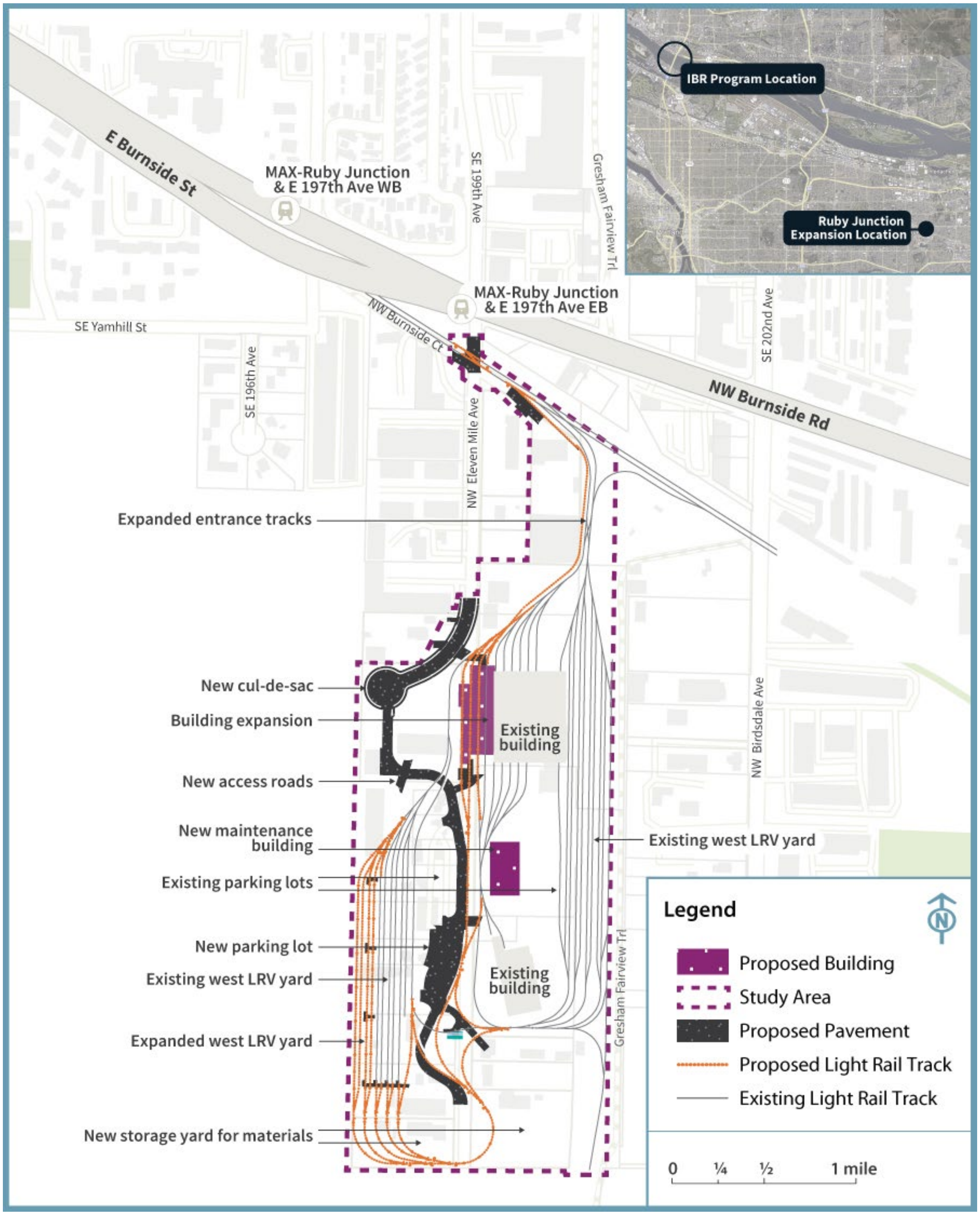
The TriMet Ruby Junction Maintenance Facility in Gresham, Oregon, would be expanded to accommodate the additional LRVs associated with the Modified LPA's LRT service (the Ruby Junction location relative to the study area is shown in Figure 1-25). Improvements would include additional storage for LRVs and maintenance materials and supplies, expanded LRV maintenance bays, expanded parking and employee support areas for additional personnel, and a third track at the northern entrance to Ruby Junction. Figure 1-25 shows the proposed footprint of the expansion.

The existing main building would be expanded west to provide additional maintenance bays. To make space for the building expansion, Eleven Mile Avenue would be vacated and would terminate in a new cul-de-sac west of the main building. New access roads would be constructed to maintain access to TriMet buildings south of the cul-de-sac.

The existing LRV storage yard, west of Eleven Mile Avenue, would be expanded to the west to accommodate additional storage tracks and a runaround track (a track constructed to bypass congestion in the maintenance yard). This expansion would require partial demolition of an existing TriMet building (just north of the LRV storage) and would require relocating the material storage yard to the properties just south of the south building.

All tracks in the west LRV storage yard would also be extended southward to connect to the proposed runaround track. The runaround track would connect to existing tracks near the existing south building. The connections to the runaround track would require partial demolition of an existing TriMet building plus full demolition of one existing building and partial demolition of another existing building on the private property west of the south end of Eleven Mile Avenue. The function of the existing TriMet building would either be transferred to existing modified buildings or to new replacement buildings on site.

Figure 1-25. Ruby Junction Maintenance Facility Study Area



EB = eastbound; LRV = light-rail vehicle; WB = westbound

The existing parking lot west of Eleven Mile Avenue would be expanded toward the south to provide more parking for TriMet personnel.

A third track would be needed at the north entrance to Ruby Junction to accommodate increased train volumes without decreasing service. The additional track would also reduce operational impacts during construction and maintenance outages for the yard. Constructing the third track would require reconstruction of Burnside Court east of Eleven Mile Avenue. An additional crossover would also be needed on the mainline track where it crosses Eleven Mile Avenue; it would require reconstruction of the existing track crossings for vehicles, bicycles, and pedestrians.

1.1.6.2 Expo Center Overnight LRV Facility

An overnight facility for LRVs would be constructed on the southeast corner of the Expo Center property (as shown on Figure 1-8) to reduce deadheading between Ruby Junction and the northern terminus of the MAX Yellow Line extension. Deadheading occurs when LRVs travel without passengers to make the vehicles ready for service. The facility would provide a yard access track, storage tracks for approximately 10 LRVs, one building for light LRV maintenance, an operator break building, a parking lot for operators, and space for security personnel. This facility would necessitate relocation and reconstruction of the Expo Road entrance to the Expo Center (including the parking lot gates and booths). However, it would not affect existing Expo Center buildings.

The overnight facility would connect to the mainline tracks by crossing Expo Road just south of the existing Expo Center MAX Station. The connection tracks would require relocation of one or two existing LRT facilities, including a traction power substation building and potentially the existing communication building, which are both just south of the Expo Center MAX Station. Existing artwork at the station may require relocation.

1.1.6.3 Additional Bus Bays at the C-TRAN Operations and Maintenance Facility

Three bus bays would be added to the C-TRAN operations and maintenance facility. These new bus bays would provide maintenance capacity for the additional express bus service on I-5 (see Section 1.1.7, Transit Operating Characteristics). Modifications to the facility would accommodate new vehicles as well as maintenance equipment.

1.1.7 Transit Operating Characteristics

1.1.7.1 LRT Operations

Nineteen new LRVs would be purchased to operate the extension of the MAX Yellow Line. These vehicles would be similar to those currently used for the TriMet MAX system. With the Modified LPA, LRT service in the new and existing portions of the Yellow Line in 2045 would operate with 6.7-minute average headways (defined as gaps between arriving transit vehicles) during the 2-hour morning peak period. Mid-day and evening headways would be 15 minutes, and late-night headways would be 30 minutes. Service would operate between the hours of approximately 5 a.m. (first southbound train leaving Evergreen Station) and 1 a.m. (last northbound train arriving at the station), which is consistent with current service on the Yellow Line. LRVs would be deadheaded at Evergreen Station before beginning service each day. A third track at this northern terminus would accommodate layovers.

1.1.7.2 Express Bus Service and Bus on Shoulder

C-TRAN provides bus service that connects to LRT and augments travel between Washington and Oregon with express bus service to key employment centers in Oregon. Beginning in 2022, the main express route providing service in the IBR corridor, Route 105, had two service variations. One pattern provides service between Salmon Creek and downtown Portland with a single intermediate stop at the 99th Street Transit Center, and one provides service between Salmon Creek and downtown Portland with two intermediate stops: 99th Street Transit Center and downtown Vancouver. This route currently provides weekday service with 20-minute peak and 60-minute off-peak headways.

Once the Modified LPA is constructed, C-TRAN Route 105 would be revised to provide direct service from the Salmon Creek Park and Ride and 99th Street Transit Center to downtown Portland, operating at 5-minute peak headways with no service in the off-peak. The C-TRAN Route 105 intermediate stop service through downtown Vancouver would be replaced with C-TRAN Route 101, which would provide direct service from downtown Vancouver to downtown Portland at 10-minute peak and 30-minute off-peak headways.

Two other existing C-TRAN express bus service routes would remain unchanged after completion of the Modified LPA. C-TRAN Route 190 would continue to provide service from the Andresen Park and Ride in Vancouver to Marquam Hill in Portland. This route would continue to operate on SR 500 and I-5 within the study area. Route headways would be 10 minutes in the peak periods with no off-peak service. C-TRAN Route 164 would continue to provide service from the Fisher's Landing Transit Center to downtown Portland. This route would continue to operate within the study area only in the northbound direction during PM service to use the I-5 northbound high-occupancy vehicle lane in Oregon before exiting to eastbound SR 14 in Washington. Route headways would be 10 minutes in the peak and 30 minutes in the off-peak.

C-TRAN express bus Routes 105 and 190 are currently permitted to use the existing southbound inside shoulder of I-5 from 99th Street to the Interstate Bridge in Vancouver. However, the existing shoulders are too narrow for bus-on-shoulder use in the rest of the I-5 corridor in the study area. The Modified LPA would include inside shoulders on I-5 that would be wide enough (14 feet on the Columbia River bridges and 11.5 to 12 feet elsewhere on I-5) to allow northbound and southbound buses to operate on the shoulder, except where I-5 would have to taper to match existing inside shoulder widths at the north and south ends of the corridor. Figure 1-8, Figure 1-16, Figure 1-23, and Figure 1-24 show the potential bus-on-shoulder use over the Columbia River bridges. Bus on shoulder could operate on any of the Modified LPA bridge configurations and bridge types. Additional approvals (including a continuing control agreement), in coordination with ODOT, may be needed for buses to operate on the shoulder on the Oregon portion of I-5.

After completion of the Modified LPA, two C-TRAN express bus routes operating on I-5 through the study area would be able to use bus-on-shoulder operations to bypass congestion in the general-purpose lanes. C-TRAN Route 105 would operate on the shoulder for the full length of the study area. C-TRAN Route 190 would operate on the shoulder for the full length of the corridor except for the distance required to merge into and out of the shoulder as the route exits from and to SR 500. These two express bus routes (105 and 190) would have a combined frequency of every 3 minutes during the 2045 AM and PM peak periods. To support the increased frequency of express bus service, eight electric double-decker or articulated buses would be purchased.

If the C Street ramps were removed from the SR 14 interchange, C-TRAN Route 101 could also use bus-on-shoulder operations south of Mill Plain Boulevard; however, if the C Street ramps remained in place, Route 101 could still use bus-on-shoulder operations south of the SR 14 interchange but would need to begin merging over to the C Street exit earlier than if the C Street ramps were removed. Route 101 would operate at 10-minute peak and 30-minute off-peak headways. C-TRAN Route 164 would not be anticipated to use bus-on-shoulder operations because of the need to exit to SR 14 from northbound I-5.

1.1.7.3 Local Bus Route Changes

The TriMet Line 6 bus route would be changed to terminate at the Expo Center MAX Station, requiring passengers to transfer to the new LRT connection to access Hayden Island. TriMet Line 6 is anticipated to travel from Martin Luther King Jr. Boulevard through the newly configured area providing local connections to Marine Drive. It would continue west to the Expo Center MAX Station. Table 1-3 shows existing service and anticipated future changes to TriMet Line 6.

As part of the Modified LPA, several local C-TRAN bus routes would be changed to better complement the new light-rail extension. Most of these changes would reroute existing bus lines to provide a transfer opportunity near the new Evergreen Station. Table 1-3 shows existing service and anticipated future changes to C-TRAN bus routes. In addition to the changes noted in Table 1-3, other local bus route modifications would move service from Broadway to C Street. The changes shown may be somewhat different if the C Street ramps are removed.

Table 1-3. Proposed TriMet and C-TRAN Bus Route Changes

Bus Route	Existing Route	Changes with Modified LPA
TriMet Line 6	Connects Goose Hollow, Portland City Center, N/NE Portland, Jantzen Beach and Hayden Island. Within the study area, service currently runs between Delta Park MAX Station and Hayden Island via I-5.	Route would be revised to terminate at the Expo Center MAX Station. Route is anticipated to travel from Martin Luther King Jr. Boulevard through the newly configured Marine Drive area, then continue west to connect via facilities on the west side of I-5 with the Expo Center MAX Station.

Bus Route	Existing Route	Changes with Modified LPA
C-TRAN Fourth Plain and Mill Plain bus rapid transit (The Vine)	Runs between downtown Vancouver and the Vancouver Mall Transit Center via Fourth Plain Boulevard, with a second line along Mill Plain Boulevard. In the study area, service currently runs along Washington and Broadway Streets through downtown Vancouver.	Route would be revised to begin/end near the Evergreen Station in downtown Vancouver and provide service along Evergreen Boulevard to Fort Vancouver Way, where it would travel to or from Mill Plain Boulevard or Fourth Plain Boulevard depending on clockwise/counterclockwise operations. The Fourth Plain Boulevard route would continue to serve existing Vine stations beyond Evergreen Boulevard.
C-TRAN #2 Lincoln	Connects the 99th Street Transit Center to downtown Vancouver via Lincoln and Kaufman Avenues. Within the study area, service currently runs along Washington and Broadway Streets between 7th and 15th Streets in downtown Vancouver.	Route would be modified to begin/end near C Street and 9th Street in downtown Vancouver.
C-TRAN #25 St. Johns	Connects the 99th Street Transit Center to downtown Vancouver via St. Johns Boulevard and Fort Vancouver Way. Within the study area, service currently runs along Evergreen Boulevard, Jefferson Street/Kaufman Avenue, 15th Street, and Franklin Street in downtown Vancouver.	Route would be modified to begin/end near C Street and 9th Street in downtown Vancouver.
C-TRAN #30 Burton	Connects the Fisher's Landing Transit Center with downtown Vancouver via 164th/162nd Avenues and 18th, 25th, 28th, and 39th Streets. Within the study area, service currently runs along McLoughlin Boulevard and on Washington and Broadway Streets between 8th and 15th Streets.	Route would be modified to begin/end near C Street and 9th Street in downtown Vancouver.
C-TRAN #60 Delta Park Regional	Connects the Delta Park MAX station in Portland with downtown Vancouver via I-5. Within the study area, service currently runs along I-5, Mill Plain Boulevard, and Broadway Street.	Route would be discontinued.

1.1.8 Tolling

Tolling cars and trucks that would use the new Columbia River bridges is proposed as a method to help fund the bridge construction and future maintenance, as well as to encourage alternative mode choices for trips across the Columbia River. Federal and state laws set the authority to toll the I-5 crossing. The IBR Program plans to toll the I-5 river bridge under the federal tolling authorization program codified in 23 U.S. Code Section 129 (Section 129). Section 129 allows public agencies to impose new tolls on federal-aid interstate highways for the reconstruction or replacement of toll-free bridges or tunnels. In 2023, the Washington State Legislature authorized tolling on the Interstate Bridge, with toll rates and policies to be set by the Washington State Transportation Commission (WSTC). In Oregon, the legislature authorized tolling giving the Oregon Transportation Commission the authority to toll I-5, including the ability to set the toll rates and policies. Subsequently, the Oregon Transportation Commission (OTC) is anticipated to review and approve the I-5 tollway project application that would designate the Interstate Bridge as a “tollway project” in 2024. At the beginning of 2024, the OTC and the WSTC entered into a bi-state tolling agreement to establish a cooperative process for setting toll rates and policies. This included the formation of the I-5 Bi-State Tolling Subcommittee consisting of two commissioners each from the OTC and WSTC and tasked with developing toll rate and policy recommendations for joint consideration and adoption by each state’s commission. Additionally, the two states plan to enter into a separate agreement guiding the sharing and uses of toll revenues, including the order of uses (flow of funds) for bridge construction, debt service, and other required expenditures. WSDOT and ODOT also plan to enter into one or more agreements addressing implementation logistics, toll collection, and operations and maintenance for tolling the bi-state facility.

The Modified LPA includes a proposal to apply variable tolls on vehicles using the Columbia River bridges with the toll collected electronically in both directions. Tolls would vary by time of day with higher rates during peak travel periods and lower rates during off-peak periods. The IBR Program has evaluated multiple toll scenarios generally following two different variable toll schedules for the tolling assessment. For purposes of this NEPA analysis, the lower toll schedule was analyzed with tolls assumed to range between $1.50 and $3.15 (in 2026 dollars as representative of when tolling would begin) for passenger vehicles with a registered toll payment account. Medium and heavy trucks would be charged a higher toll than passenger vehicles and light trucks. Passenger vehicles and light trucks without a registered toll payment account would pay an additional $2.00 per trip to cover the cost of identifying the vehicle owner from the license plate and invoicing the toll by mail.

The analysis assumes that tolling would commence on the existing Interstate Bridge—referred to as pre-completion tolling—starting April 1, 2026. The actual date pre-completion tolling begins would depend on when construction would begin. The traffic and tolling operations on the new Columbia River bridges were assumed to commence by July 1, 2033. The actual date that traffic and tolling operations on the new bridges begin would depend on the actual construction completion date. During the construction period, the two commissions may consider toll-free travel overnight on the existing Interstate Bridge, as was analyzed in the Level 2 Toll Traffic and Revenue Study, for the hours between 11 p.m. and 5 a.m. This toll-free period could help avoid situations where users would be charged during lane or partial bridge closures where construction delays may apply. Once the new I-5 Columbia River bridges open, twenty-four-hour tolling would begin.

Tolls would be collected using an all-electronic toll collection system using transponder tag readers and license plate cameras mounted to structures over the roadway. Toll collection booths would not be required. Instead, motorists could obtain a transponder tag and set up a payment account that would automatically bill the account holder associated with the transponder each time the vehicle crossed the bridge. Customers without transponders, including out-of-area vehicles, would be tolled by a license plate recognition system that would bill the address of the owner registered to that vehicle's license plate. The toll system would be designed to be nationally interoperable. Transponders for tolling systems elsewhere in the country could be used to collect tolls on I-5, and drivers with an account and transponder tag associated with the Interstate Bridge could use them to pay tolls in other states for which reciprocity agreements had been developed. There would be new signage, including gantries, to inform drivers of the bridge toll. These signs would be on local roads, I-5 on-ramps, and on I-5, including locations north and south of the bridges where drivers make route decisions (e.g., I-5/I-205 junction and I-5/I-84 junction).

1.1.9 Transportation System- and Demand-Management Measures

Many well-coordinated transportation demand-management and system-management programs are already in place in the Portland-Vancouver metropolitan region. In most cases, the impetus for the programs comes from state regulations: Oregon's Employee Commute Options rule and Washington's Commute Trip Reduction law (described in the sidebar).

The physical and operational elements of the Modified LPA provide the greatest transportation demand-management opportunities by promoting other modes to fulfill more of the travel needs in the corridor. These include:

- Major new light-rail line in exclusive right of way, as well as express bus routes and bus routes that connect to new light-rail stations.
- I-5 inside shoulders that accommodate express buses.
- Modern bicycle and pedestrian facilities that accommodate more bicyclists and pedestrians and improve connectivity, safety, and travel time.
- Park-and-ride facilities.
- A variable toll on the new Columbia River bridges.

In addition to these fundamental elements of the Modified LPA, facilities and equipment would be implemented that could help existing or expanded transportation system management measures

State Laws to Reduce Commute Trips

Oregon and Washington have both adopted regulations intended to reduce the number of people commuting in single-occupancy vehicles (SOVs). Oregon's Employee Commute Options Program, created under Oregon Administrative Rule 340-242-0010, requires employers with over 100 employees in the greater Portland area to provide commute options that encourage employees to reduce auto trips to the work site. Washington's 1991 Commute Trip Reduction (CTR) Law, updated as the 2006 CTR Efficiency Act (Revised Code of Washington §70.94.521) addresses traffic congestion, air pollution, and petroleum fuel consumption. The law requires counties and cities with the greatest traffic congestion and air pollution to implement plans to reduce SOV demand. An additional provision mandates "major employers" and "employers at major worksites" to implement programs to reduce SOV use.

maximize the capacity and efficiency of the system. These include:

- Replacement or expanded variable message signs in the study area. These signs alert drivers to incidents and events, allowing them to seek alternate routes or plan to limit travel during periods of congestion.
- Replacement or expanded traveler information systems with additional traffic monitoring equipment and cameras.
- Expanded incident response capabilities, which help traffic congestion to clear more quickly following accidents, spills, or other incidents.
- Queue jumps or bypass lanes for transit vehicles where multilane approaches are provided at ramp signals for on-ramps. Locations for these features will be determined during the detailed design phase.
- Active traffic management including strategies such as ramp metering, dynamic speed limits, and transit signal priority. These strategies are intended to manage congestion by controlling traffic flow or allowing transit vehicles to enter traffic before single-occupant vehicles.

1.2 Modified LPA Construction

The following information on the construction activities and sequence follows the information prepared for the CRC LPA. Construction durations have been updated for the Modified LPA. Because the main elements of the IBR Modified LPA are similar to those in the CRC LPA (i.e., multimodal river crossings and interchange improvements), this information provides a reasonable assumption of the construction activities that would be required.

The construction of bridges over the Columbia River sets the sequencing for other Program components. Accordingly, construction of the Columbia River bridges and immediately adjacent highway connections and improvement elements would be timed early to aid the construction of other components. Demolition of the existing Interstate Bridge would take place after the new Columbia River bridges were opened to traffic.

Electronic tolling infrastructure would be constructed and operational on the existing Interstate Bridge by the start of construction on the new Columbia River bridges. The toll rates and policies for tolling (including pre-completion tolling) would be determined after a more robust analysis and public process by the OTC and WSTC (refer to Section 1.1.8, Tolling).

1.2.1 Construction Components and Duration

Table 1-4 provides the estimated construction durations and additional information of Modified LPA components. The estimated durations are shown as ranges to reflect the potential for Program funding to be phased over time. In addition to funding, contractor schedules, regulatory restrictions on in-water work and river navigation considerations, permits and approvals, weather, materials, and equipment could all influence construction duration and overlap of construction of certain components. Certain work below the ordinary high-water mark of the Columbia River and North

Portland Harbor would be restricted to minimize impacts to species listed under the Endangered Species Act and their designated critical habitat.

Throughout construction, active transportation facilities and three lanes in each direction on I-5 (accommodating personal vehicles, freight, and buses) would remain open during peak hours, except for short intermittent restrictions and/or closures. Advanced coordination and public notice would be given for restrictions, intermittent closures, and detours for highway, local roadway, transit, and active transportation users (refer to the Transportation Technical Report, for additional information). At least one navigation channel would remain open throughout construction. Advanced coordination and notice would be given for restrictions or intermittent closures to navigation channels as required.

Table 1-4. Construction Activities and Estimated Duration

Component	Estimated Duration	Notes
Columbia River bridges	4 to 7 years	• Construction is likely to begin with the main river bridges. • General sequence would include initial preparation and installation of foundation piles, shaft caps, pier columns, superstructure, and deck.
North Portland Harbor bridges	4 to 10 years	• Construction duration for North Portland Harbor bridges is estimated to be similar to the duration for Hayden Island interchange construction. The existing North Portland Harbor bridge would be demolished in phases to accommodate traffic during construction of the new bridges.
Hayden Island interchange	4 to 10 years	• Interchange construction duration would not necessarily entail continuous active construction. Hayden Island work could be broken into several contracts, which could spread work over a longer duration.
Marine Drive interchange	4 to 6 years	• Construction would need to be coordinated with construction of the North Portland Harbor bridges.
SR 14 interchange	4 to 6 years	• Interchange would be partially constructed before any traffic could be transferred to the new Columbia River bridges.
Demolition of the existing Interstate Bridge	1.5 to 2 years	• Demolition of the existing Interstate Bridge could begin only after traffic is rerouted to the new Columbia River bridges.
Three interchanges north of SR 14	3 to 4 years for all three	• Construction of these interchanges could be independent from each other and from construction of the Program components to the south.

Component	Estimated Duration	Notes
		• More aggressive and costly staging could shorten this timeframe.
Light-rail	4 to 6 years	• The light-rail crossing would be built with the Columbia River bridges. Light-rail construction includes all of the infrastructure associated with light-rail transit (e.g., overhead catenary system, tracks, stations, park and rides).
Total construction timeline	9 to 15 years	• Funding, as well as contractor schedules, regulatory restrictions on in-water work and river navigation considerations, permits and approvals, weather, materials, and equipment, could all influence construction duration.

1.2.2 Potential Staging Sites and Casting Yards

Equipment and materials would be staged in the study area throughout construction generally within existing or newly purchased right of way, on land vacated by existing transportation facilities (e.g., I-5 on Hayden Island), or on nearby vacant parcels. However, at least one large site would be required for construction offices, to stage the larger equipment such as cranes, and to store materials such as rebar and aggregate. Criteria for suitable sites include large, open areas for heavy machinery and material storage, waterfront access for barges (either a slip or a dock capable of handling heavy equipment and material) to convey material to the construction zone, and roadway or rail access for landside transportation of materials by truck or train.

Two potential major staging sites have been identified (see Figure 1-8 and Figure 1-23). One site is located on Hayden Island on the west side of I-5. A large portion of this parcel would be required for new right of way for the Modified LPA. The second site is in Vancouver between I-5 and Clark College. Other staging sites may be identified during the design process or by the contractor. Following construction of the Modified LPA, the staging sites could be converted for other uses.

In addition to on-land sites, some staging activities for construction of the new Columbia River and North Portland Harbor bridges would take place on the river itself. Temporary work structures, barges, barge-mounted cranes, derricks, and other construction vessels and equipment would be present on the river during most or all of the bridges' construction period. The IBR Program is working with USACE and USCG to obtain necessary clearances for these activities.

A casting or staging yard could also be required for construction of the overwater bridges if a precast concrete segmental bridge design is used. A casting yard would require access to the river for barges, a slip or a dock capable of handling heavy equipment and material, a large area suitable for a concrete batch plant and associated heavy machinery and equipment, and access to a highway or railway for delivery of materials. As with the staging sites, casting or staging yard sites may be identified as the design progresses or by the contractor and would be evaluated via a NEPA re-evaluation or supplemental NEPA document for potential environmental impacts at that time.

1.3 No-Build Alternative

The No-Build Alternative illustrates how transportation and environmental conditions would likely change by the year 2045 if the Modified LPA is not built. This alternative makes the same assumptions as the Modified LPA regarding population and employment growth through 2045, and it assumes that the same transportation and land use projects in the region would occur as planned.

Regional transportation projects included in the No-Build Alternative are those in the financially constrained 2018 *Regional Transportation Plan* (2018 RTP) adopted in December 2018 by the Metro Council (Metro 2018) and in March 2019 (RTC 2019) by the Southwest Washington Regional Transportation Council (RTC) Board of Directors is referred to as the 2018 RTP in this report. The 2018 RTP has a planning horizon year of 2040 and includes projects from state and local plans necessary to meet transportation needs over this time period; financially constrained means these projects have identified funding sources. The Transportation Technical Report lists the projects included in the financially constrained 2018 RTP.

The implementation of regional and local land use plans is also assumed as part of the No-Build Alternative. For the IBR Program analysis, population and employment assumptions used in the 2018 RTP were updated to 2045 in a manner consistent with regional comprehensive and land use planning. In addition to accounting for added growth, adjustments were made within Portland to reallocate the households and employment based on the most current update to Portland's comprehensive plan, which was not complete in time for inclusion in the 2018 RTP.

Other projects assumed as part of the No-Build Alternative include major development and infrastructure projects that are in the permitting stage or partway through phased development. These projects are discussed as reasonably foreseeable future actions in the IBR Cumulative Effects Technical Report. They include the Vancouver Waterfront project, Terminal 1 development, the Renaissance Boardwalk, the Waterfront Gateway Project, improvements to the levee system, several restoration and habitat projects, and the Portland Expo Center.

In addition to population and employment growth and the implementation of local and regional plans and projects, the No-Build Alternative assumes that the existing Interstate Bridge would continue to operate as it does today. As the bridge ages, needs for repair and maintenance would potentially increase, and the bridge would continue to be at risk of mechanical failure or damage from a seismic event.

2. METHODS

This chapter describes the approach used to assess noise and vibration impacts from the Modified LPA, including:

- An introduction to noise and vibration.
- A description of the study area, relevant laws, and regulations.
- Methods for collecting data, assessing impacts, and evaluating possible mitigation measures.

The Noise and Vibration Technical Report focuses on analyzing potential noise and vibration impacts and mitigation measures related to the human and built environment. Impact assessments for the natural environment, including potential impacts to fish and wildlife, can be found in the Ecosystems Technical Report.

2.1 Introduction to Noise and Vibration

Generally, highway projects that meet the criteria for noise analyses do not require vibration analyses. Because the Modified LPA includes an extension of LRT, an analysis of both noise and vibration is being conducted. The Modified LPA is a Type I project as defined in 23 Code of Federal Regulations (CFR) § 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise."

2.1.1 Noise

Noise, or sound, is any change in air pressure the human ear can detect, from barely perceptible to levels that can cause hearing damage. In the human ear these changes in air pressure are translated to sound. The greater the change in air pressure, the louder the sound. For example, a quiet whisper in the library creates a relatively small change in the room air pressure, whereas air pressure changes are much greater in the front row of a rock concert.

This section discusses how noise is evaluated (its definition, transmission characteristics, and measurement) and provides typical noise levels for reference.

2.1.1.1 Decibel Scale

Sound is measured in terms of both loudness and frequency. The unit used to measure the loudness of sound is called a decibel (dB). The dB scale is a logarithmic conversion of air pressure level variations (measured in a unit called a pascal) to a unit of measure with a more convenient numbering system. A 10 dB increase is perceived by the human ear as doubling the sound (Figure 2-1).

The adjusted dB scale, referred to as the A-weighted dB (dBA) scale, provides an accurate "single number" measure of what the human ear can hear. This analysis uses dBA as the unit of measure.

Figure 2-1. Human Perception of Sound Levels

Noise Source or Activity	Sound Level (dBA)	Subjective Impression	Relative Loudness (human judgment of different sound levels)
Jet aircraft takeoff from carrier (50 feet)	140	Threshold of pain	64 times as loud
50 horse power siren (100 feet)	130		32 times as loud
Loud rock concert near stage, Jet takeoff (200 feet)	120	Uncomfortably loud	16 times as loud
Float plane takeoff (100 feet)	110		8 times as loud
Jet takeoff (2,000 feet)	100	Very loud	4 times as loud
Heavy truck or motorcycle (25 feet)	90		2 times as loud
Garbage disposal (2 feet)	80	Moderately loud	Reference loudness
Typical at-grade light rail vehicle	70		½ as loud
Moderately busy department store	60		1/4 as loud
Typical televison show (10 feet) Typical quiet office environment	50		1/8 as loud
Bedroom or quiet living room	40	Quiet	1/16 as loud
Quiet library, soft whisper (15 feet)	30	Very quiet	1/32 as loud
High quality recording studio	20	Just audible	1/64 as loud
Acoustic Test Chamber	10		1/128 as loud
	0	Threshold of hearing	

Sources: Beranek (1988) and U.S. EPA (1971).

2.1.1.2 Typical Noise Levels

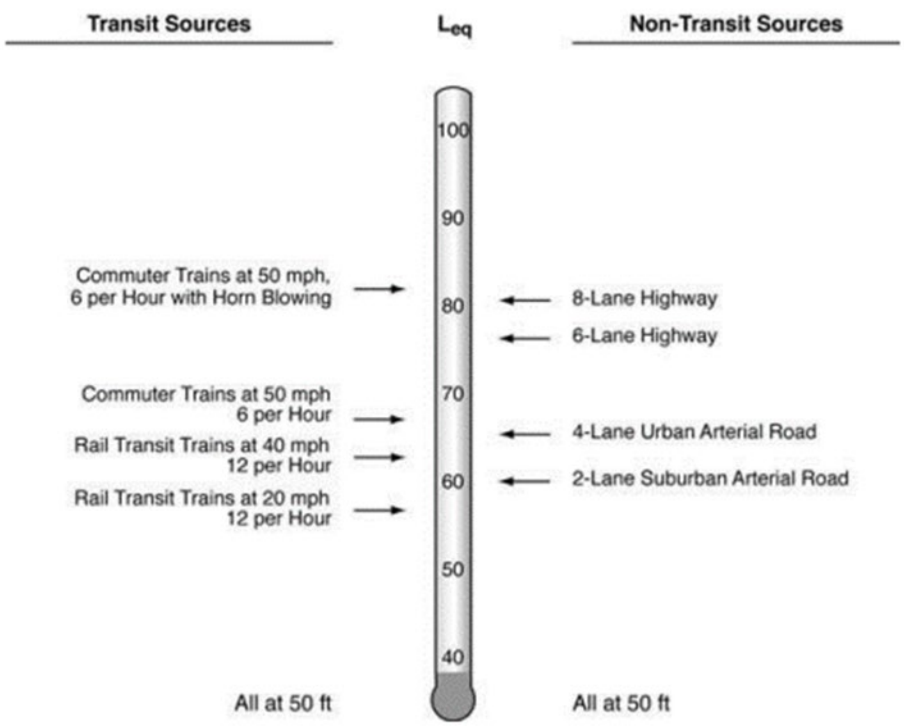
In most neighborhoods, nighttime noise levels are noticeably lower than daytime levels. In a quiet rural area at night, noise levels from crickets or wind rustling leaves on the trees can range between 32 and 35 dBA. As residents start their days and local traffic increases, the same rural area can have noise levels ranging from 50 to 60 dBA. Noise levels in urban neighborhoods are louder than those in rural areas. Noise levels during the day in a noisy urban area are frequently as high as 70 to 80 dBA. Nighttime noise levels in urban areas are generally much quieter than daytime noise levels and can range from 40 to 50 dBA (FTA 2018).

Long-term, or continuous, exposure to very loud noises can damage the human ear. To protect against hearing loss in the workplace, the Washington State Department of Labor and Industries has established an 8-hour continuous exposure limit of 85 dBA (Washington Administrative Code [WAC]

296-817-300). Noise levels exceeding 85 dBA over continuous periods can result in permanent hearing loss. Noise levels above 110 dBA become first intolerable, then extremely painful.

Figure 2-2 shows noise levels for typical transportation sources, followed by a description of a normal human response to noise levels.

Figure 2-2. Typical Hourly Noise Levels (L_{eq} [h])



Source: FTA 2018

Public response to noise depends greatly on the range over which the noise varies in an environment. For example, people generally find a moderately high, constant noise level more tolerable than a quiet background level interrupted by high-level noise intrusions. Considering this subjective response, it is often useful to look at a statistical distribution of noise levels over a given time period. Such distributions identify the noise level exceeded and the percentage of time exceeded, allowing a more complete description of the range of noise levels during the given measurement period.

2.1.1.3 Measuring Noise

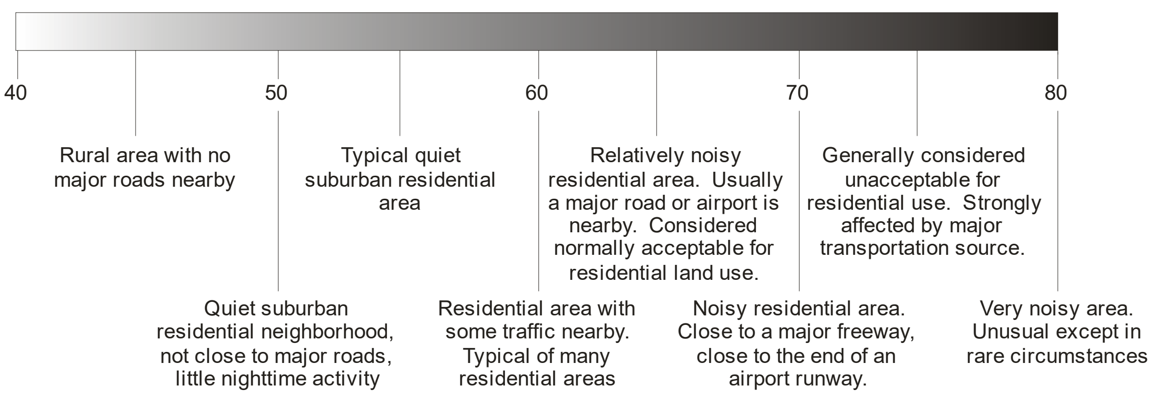
Noise levels from most sources tend to vary with time. For example, noise levels increase when a car approaches, then reach a maximum peak as it passes, and decrease as the car moves farther away. In this example, noise levels within a 1-minute timeframe may range from 45 dBA as the vehicle approaches, to 65 dBA as it passes by, and return to 45 dBA as it moves away. To account for the variance in loudness over time, a commonly used noise measurement is the equivalent sound level, or

L_{eq}. The L_{eq} is defined as the energy average noise level, in dBA, for a specific time period (for example, 1 minute). Returning to the example of the passing car, assume the energy average noise level is 60 dBA during the entire time the car could be heard as it passed by. In this example, the noise level would be stated as 60 dBA L_{eq}. The same approach is used to determine the L_{eq} for other time periods such as hourly (L_{eq} [h]) or over a 24-hour period (L_{eq} [24h]).

Another noise level descriptor is the day-night equivalent sound level, L_{dn}, also abbreviated DNL, which is defined as the 24-hour L_{eq}, but with a 10 dB penalty assessed to noise events occurring at night (defined as 10:00 p.m. to 7:00 a.m.). The effect of this penalty is a noise event during the nighttime hours is equivalent to 10 events during the daytime hours. This strongly weights L_{dn} toward nighttime noise to reflect most people being more easily annoyed by noise during nighttime hours, when background noise is lower and most people are sleeping.

Most urban and suburban neighborhoods have an L_{dn} in the range of 50 to 70 dBA. An L_{dn} of 70 dBA is a relatively noisy environment found at buildings on a busy surface street, close to a freeway or near a busy airport, and would usually be considered unacceptable for residential land use without special measures taken to enhance outdoor-indoor sound insulation. Residential neighborhoods not near major sound sources are usually in the range of L_{dn} 55 to 60 dBA. If there is a freeway or moderately busy arterial nearby, or any nighttime noise sources, the L_{dn} is usually in the range of 60 to 65 dBA. Figure 2-3. defines typical community noise levels in terms of L_{dn}.

Figure 2-3. Typical Community Noise Levels in L_{dn}



Source: FTA 2018

2.1.1.4 Noise Propagation

Several factors determine how sound levels decrease, or attenuate, over a distance. Two general categories apply to noise sources: 1) a point source (for example, a church bell) and 2) a line source (such as constant flowing traffic on a busy highway).

A single-point noise source will attenuate at a rate of 6 dB each time the distance from the source doubles. Thus, a point source producing a noise level of 60 dB at a distance of 50 feet attenuates to 54 dB at 100 feet and to 48 dB at 200 feet. A line source such as a highway, however, generally reduces at a rate of approximately 3 dB each time the distance doubles. Using the example above, a line source measured at 60 dB at 50 feet would attenuate to 57 dB at 100 feet and to 54 dB at 200 feet.

Attenuation of point and line sources is influenced by the physical surroundings between the source and the receiver. For example, interactions of sound waves with the ground often result in slightly higher attenuation (called ground absorption effects) than the reduction factors given in the preceding paragraph. Other factors affecting the attenuation of sound with distance include existing structures, topography, dense foliage, ground cover, and atmospheric conditions (such as wind, temperature, and relative humidity).

2.1.2 Vibration

Vibration consists of oscillatory waves propagating from the source through the ground to adjacent buildings and is typically referred to as ground-borne vibration. Two types of vibration are reviewed and analyzed for this assessment: vibration from LRT operations and vibration from construction activities. Vibration from highway use is rare; vibration-sensitive uses would need to be in very close proximity to highway traffic. Therefore, highway vibration is not assessed.

2.1.2.1 Transit Vibration

On steel-wheel/steel-rail train systems, ground-borne vibration is created by the interaction of the steel wheels rolling on the steel rails. Although the vibration is sometimes noticeable outdoors, it is almost exclusively an indoor problem. The primary concerns are vibration and radiated noise can be intrusive and annoying to building occupants. The building vibration caused by ground-borne vibration may be perceived as motion of building surfaces causing rattling of windows, items on shelves, or pictures hanging on walls. Ground-borne vibration can also be perceived as a low-frequency rumbling noise, which is referred to as ground-borne noise.

Factors influencing the amplitudes of ground-borne vibration include vehicle suspension parameters, condition of wheels and rails, type of track, track support system, type of building foundation, and the properties of the soil and rock layers vibrations propagate through. Special track work can also cause vibration and noise issues. Use of continuously welded rail (track) eliminates wheel impacts at rail joints and results in significantly lower vibration levels than rail with jointed construction. All TriMet light-rail lines use continuously welded rail track, and rail maintenance (such as rail grinding) is performed on a regular basis.

Ground-borne vibration is different from airborne noise in that it is not a widespread environmental problem and is generally limited to localized areas near rail systems, construction sites, and some industrial operations. Road traffic rarely creates perceptible ground-borne vibration except when there are bumps, potholes, or other discontinuities in the road surface. When traffic causes phenomena such as rattling of windows, the cause is more likely to be acoustic excitation than ground-borne vibration. The unusual situations where traffic or other existing sources are causing intrusive vibration can be an indication of geologic conditions causing higher than normal levels of train vibration.

2.1.2.2 Construction Vibration

Vibration from construction activities is caused by general equipment operations and is usually highest during blasting, pile driving, soil compacting, jack-hammering, and demolition. As with the light-rail, construction vibration is sometimes noticeable outdoors, but it is almost exclusively an indoor problem. Although it is possible for ground-borne vibration from activities such as blasting and pile driving to cause building damage, vibration from most construction activities is almost never of sufficient amplitude to cause even minor cosmetic damage to buildings. See Figure 2-4 for information on typical levels of ground-borne vibration. The primary concern is vibration can be intrusive and annoying to building occupants (FTA 2018).

2.1.2.3 Measuring Vibration

Vibration is an oscillatory motion described by displacement, velocity, or acceleration of the oscillations. Ground-borne vibration for transit projects is usually characterized in terms of the vibration velocity because, over the frequency range relevant to ground-borne vibration (about 1 to 200 hertz), both human and building response tends to be more proportional to velocity than either displacement or acceleration. Vibration velocity is usually stated in terms of either inches per second or decibels. The following equation defines the relationship between vibration velocity in inches per second and decibels:

$$Lv = 20 \times \log (V/Vref)$$

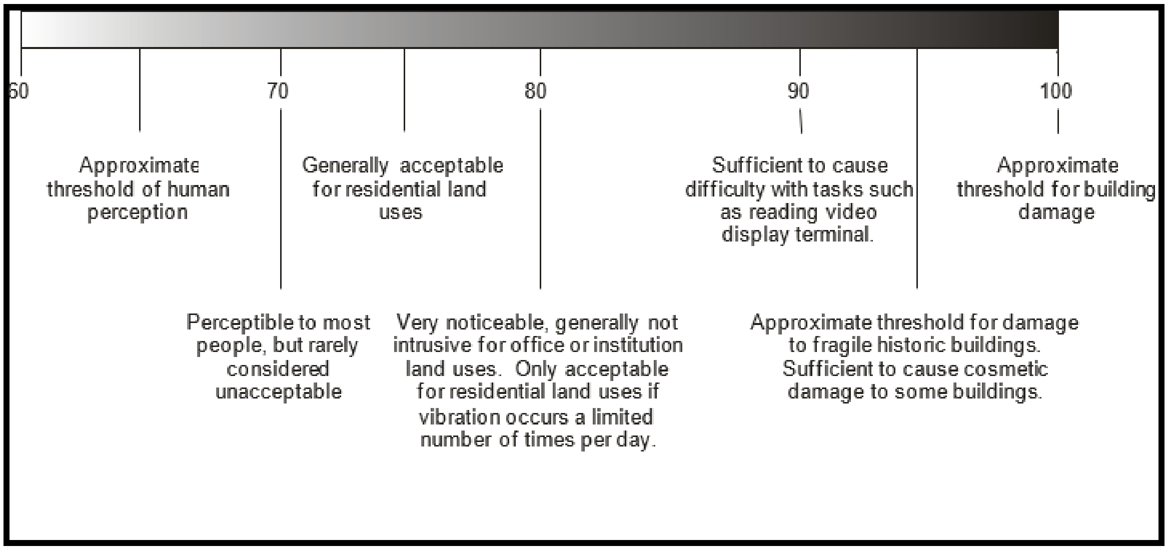
V is the root mean square (RMS) velocity amplitude in inches per second, Vref is 10^{-6} inches per second, and Lv is the RMS velocity level in decibels. The abbreviation VdB is used here for “vibration decibels” to minimize confusion with noise decibels.

Train vibration is virtually always characterized in terms of the RMS amplitude. RMS is a widely used but sometimes confusing method of characterizing vibration and other oscillating phenomena. It represents the average energy over a short time interval; typically, a 1-second interval is used to evaluate human response to vibration. RMS vibration velocity is considered the best available measure of potential human annoyance from ground-borne vibration.

The U.S. Department of Transportation has guidelines for vibration levels from construction-related activities and recommends the maximum peak particle velocity (PPV) levels remain below 0.5 inches per second at the nearest structures. The PPV represents the maximum instantaneous peak in the velocity of an object’s vibratory motion about the equilibrium position. It is used to define the thresholds of potential building damage from vibration since it is thought to be more directly correlated to peak stresses in building components than RMS vibration. The relationship between PPV and RMS depends on the shape and duration of a specific waveform. The RMS amplitude is always less than the PPV and in ground-borne vibration. PPV amplitude is usually two to five times greater than RMS amplitude.

Figure 2-4 gives a general idea of the effects of different levels of vibration on humans and buildings. Existing background building vibration is usually in the range of 40 to 50 VdB, well below the range of human perception. Although the perceptibility threshold is about 65 VdB, human response to vibration is usually not significant unless the RMS vibration velocity level exceeds 70 VdB. This is a typical level 50 feet from an LRT system. Buses and trucks rarely create vibration that exceeds 70 VdB unless there are large bumps or potholes in the road. The vibration analysis is presented in Chapter 4 of this report.

Figure 2-4. Typical Levels of Ground-Borne Vibration



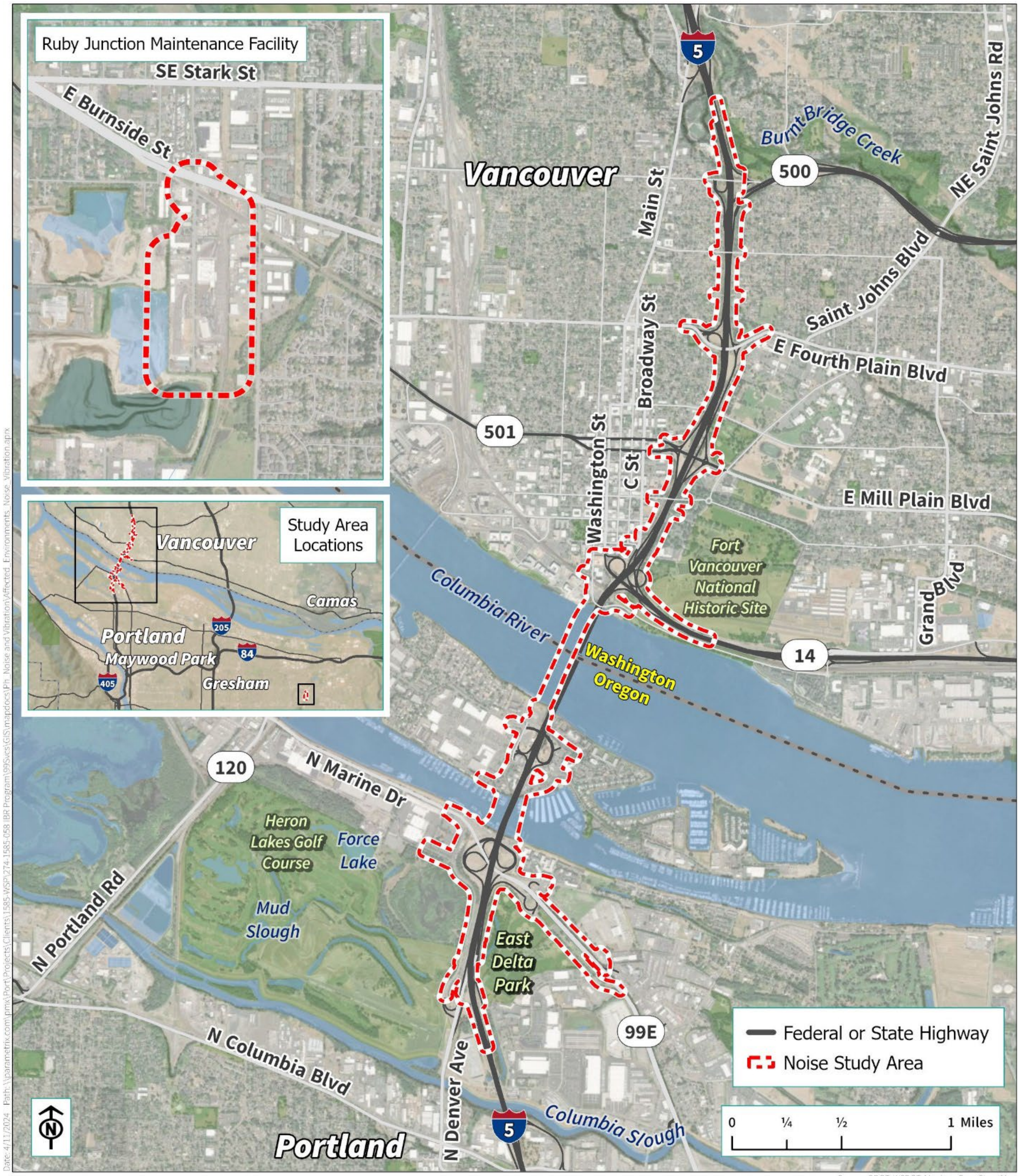
Source: FTA 2018

2.2 Study Area

The noise and vibration study area for the Modified LPA includes a 5-mile segment of I-5, approximately between the SR 500 interchange in Washington and the I-5/Columbia Boulevard interchange in Oregon, and the area around TriMet's existing Ruby Junction Maintenance Facility in Gresham, Oregon (Figure 2-5). This study area includes temporary construction easements established directly adjacent to the proposed construction areas, staging areas and casting yards, and potential park-and-ride locations in downtown Vancouver.

As defined in the Washington State Department of Transportation (WSDOT) Traffic Noise Policy and Procedures and the Oregon Department of Transportation (ODOT) Noise Manual, the noise study area must be large enough to include all receptors located within project limits that may experience traffic noise impacts (WSDOT 2020; ODOT 2021). The noise analysis of the Modified LPA focused on areas within 500 feet of improvements from I-5 and 200 feet from local roads and transit lines. For vibration impacts, the analysis focused on areas within 200 feet. The noise and vibration study area shown in Figure 2-5 includes these distances.

Figure 2-5. Noise and Vibration Study Area



2.3 Relevant Laws and Regulations

Federal, state, and local governments regulate and provide guidance for acceptable noise and vibration levels to ensure the public's health and wellbeing. For highways and transit systems, the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), ODOT, and WSDOT have developed guidance for assessing noise and vibration impacts.

This methodology complies with the following local, state, and federal policies:

- FHWA Procedures for Abatement of Highway Traffic Noise and Construction Noise, 23 CFR § 772, 2010.2010.
- FTA Transit Noise and Vibration Impact Assessment Manual, Final Report September 2018.
- ODOT Noise Manual and Noise Manual Interim Update. July 2021.
- WSDOT Traffic Noise Policy and Procedures, March 2020.
- City of Portland Municipal Code Title 18, Noise Control. July 2018.
- City of Portland City Code Title 33.262, Off-Site Impacts, May 2018 for both noise and vibration.
- City of Gresham Article 7.20 Noise Control Code.
- Vancouver Municipal Code (VMC) Title 20.520, Noise Impact Overlay District, February 2021 for new residential structures.

The noise and vibration impact analyses address the following elements:

- Regulations and policies governing evaluation and mitigation of noise and vibration impacts.
- Appropriate level of noise and vibration analysis.
- Existing noise and vibration conditions in areas potentially affected by the Modified LPA.
- Construction and operational impacts of the Modified LPA (short term, long term, and cumulative).
- Potential and appropriate mitigation measures.
- Mitigated level of noise and/or vibration.

2.3.1 Federal Highway Administration Traffic Noise Impact Criteria

FHWA requires noise analyses for federally funded projects that 1) involve construction of a new highway, 2) substantially change the horizontal or vertical alignment, or 3) increase the number of through traffic lanes on an existing highway. FHWA refers to these as Type 1 projects. FHWA Type 1 projects, as well as Oregon and Washington State policies, also require the review and consideration of noise abatement for projects that substantially alter the ground contours surrounding a state highway.

FHWA has published traffic noise criteria to determine when noise mitigation must be considered for a federally funded highway project. This analysis compared the traffic noise levels in the study area with the Modified LPA to the FHWA traffic noise abatement criteria defined in 23 CFR § 772. Table 2-1 shows the FHWA traffic noise abatement criteria used.

Table 2-1. Federal Highway Administration Traffic Noise Abatement Criteria

Activity Category	Hourly L_{eq} (dBA)	Description of Activity
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Residential (single and multi-family units)
C	67 (exterior)	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E	72 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities no included in A-D or F. Includes undeveloped land permitted for these activities
F	N/A	Agriculture, airports, bus yards, emergency services, industrial logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	N/A	Undeveloped lands that are not permitted

Note: The noise abatement criteria for Categories B, C, and E also apply to undeveloped land with building permits.
L_{eq}(h) = A-weighted (dBA) hourly equivalent steady state sound levels used for impact determination and are not design standards for abatement; N/A = not applicable

The abatement criteria applicable to residences, churches, schools, recreational uses, and similar areas are an exterior hourly L_{eq} that approaches or exceeds 67 dBA. The abatement criteria applicable to other developed lands (such as hotels, offices and restaurants) are an exterior L_{eq} that approaches or exceeds 72 dBA. The FHWA also requires noise abatement to be considered if future noise levels are projected to result in a “substantial increase” over existing noise levels. ODOT and WSDOT both define a substantial increase as 10 dBA over existing noise levels. Land use categories F and G do not have abatement criteria thresholds.

2.3.2 Federal Transit Administration Traffic Noise Impact Criteria

The criteria for noise transit impacts from transit operations are taken from the FTA Transit Noise and Vibration Impact Assessment, Final Report, September 2018. The criteria in the FTA guidance manual are founded on well-documented research on community reaction to noise and are based on change in noise exposure using a sliding scale. The FTA's use of a sliding scale when assessing noise impacts is what is known as "ambient-based" criteria. The amount that transit operations are allowed to change the overall ambient noise environment is reduced with increasing levels of existing noise.

The FTA Noise Impact Criteria group noise-sensitive land uses into the following three categories:

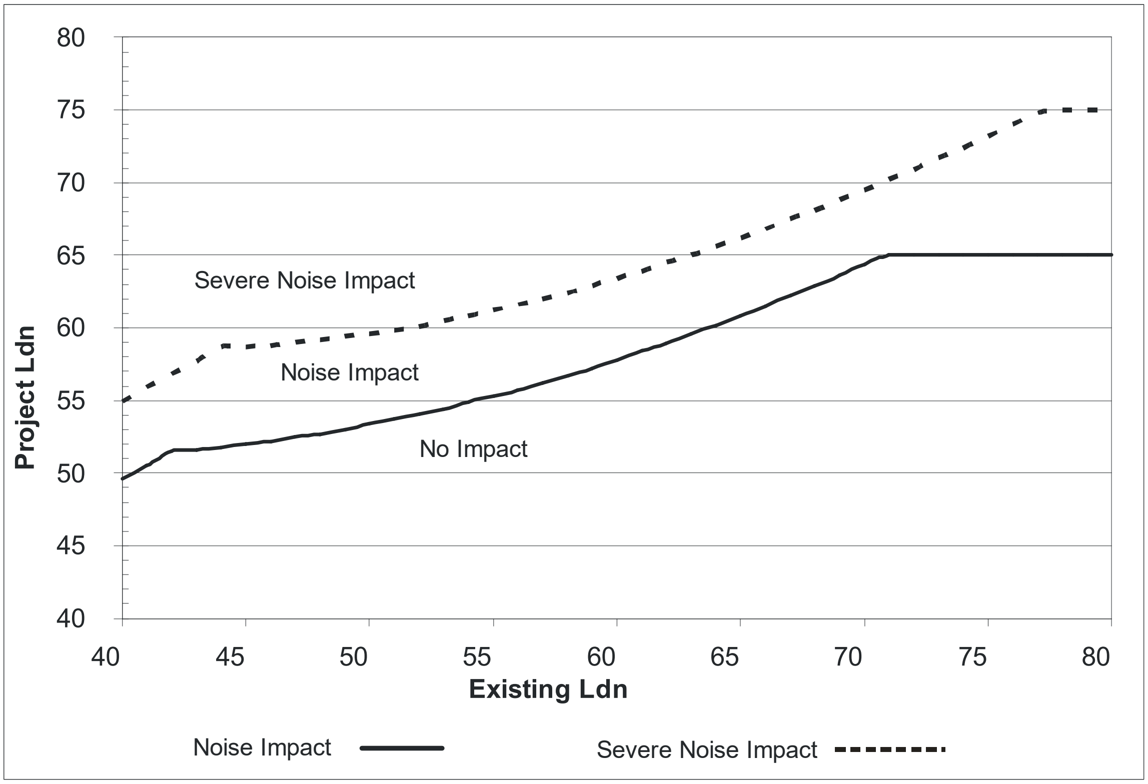
- Category 1: Buildings or parks where quiet is an essential element of their purpose.
- Category 2: Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.
- Category 3: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches, office buildings, and other commercial and industrial land use.

The L_{dn} is used to characterize noise exposure for residential areas (Category 2). For other noise-sensitive land uses, such as school buildings (Categories 1 and 3), noise is characterized by the maximum 1-hour L_{eq} during the period the facility is in use.

FTA's criteria include two impact levels, as shown in Figure 2-6 and summarized below:

- **Severe:** Project-generated noise in this range is likely to cause a high level of community annoyance. Alternative project alignments should be considered in an effort to avoid severe impacts.
- **Impact:** In this range, often called a moderate impact, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-indoor sound insulation, and the cost-effectiveness of mitigating noise to more acceptable levels.

Figure 2-6. Federal Transit Administration Transit Noise Impact Criteria



The FTA's noise impact criteria, or thresholds, for fixed guideway transit operations are summarized in Table 2-2. The first column shows the existing noise exposure, and the remaining columns show the additional noise exposure from transit operations necessary for the two levels of impact. The project noise exposure would be the combination of the existing noise exposure and the noise exposure from transit operations.

Table 2-2. Federal Transit Administration Noise Impact Criteria

Existing Noise Exposure (dBA) (L_{eq} or L_{dn}) [a]	Project Noise Exposure Impact Thresholds, L_{dn} or L_{eq} [a] (All Noise Levels in dBA)			
	Category 1 or 2 Sites		Category 3 Sites	
	Impact	Severe Impact	Impact	Severe Impact
<43	Ambient + 10	Ambient + 15	Ambient + 15	Ambient + 20
43–44	52	>58	57	>63
45	52	>58	57	>63
46–47	53	>59	58	>64
48	53	>59	58	>64

Existing Noise Exposure (dBA) (L_{eq} or L_{dn}) [a]	Project Noise Exposure Impact Thresholds, L_{dn} or L_{eq} [a] (All Noise Levels in dBA)			
	Category 1 or 2 Sites		Category 3 Sites	
	Impact	Severe Impact	Impact	Severe Impact
49–50	54	>59	59	>64
51	54	>60	59	>65
52–53	55	>60	60	>65
54	55	>61	60	>66
55	56	>61	61	>66
56	56	>62	61	>67
57–58	57	>62	62	>67
59–60	58	>63	63	>68
61–62	59	>64	64	>69
63	60	>65	65	>70
64	61	>65	66	>70
65	61	>66	66	>71
66	62	>67	67	>72
67	63	>67	68	>72
68	63	>68	68	>73
69	64	>69	69	>74
70	65	>69	70	>74
71	66	>70	71	>75
72–73	66	>71	71	>76
74	66	>72	71	>77
75	66	>73	71	>78
76–77	66	>74	71	>79
>77	66	>75	71	>80

Source: FTA 2018

a L_{dn} is used for land uses where nighttime sensitivity is a factor. Daytime L_{eq} is used for land uses involving only daytime activities.

dBA = A-weighted decibels; L_{dn} = day-night equivalent sound level; L_{eq} = equivalent sound level

Table 2-3 presents the information from Figure 2-6 in terms of the allowable increase in cumulative noise exposure (noise from existing sources plus project noise) as a function of existing noise exposure. As the existing noise exposure increases, the amount of the allowable increase in the overall noise exposure caused by the project decreases.

Table 2-3. Federal Transit Administration Impact Criteria by Allowable Cumulative Increase

Existing Ambient Noise Level (dBA) (L_{eq} or L_{dn}) [a]	Allowable Cumulative Noise Level Increases, L_{eq} or L_{dn} [a] (All Noise Levels in dBA)			
	Category 1 And 2 Sites		Category 3 Sites	
	Impact	Severe Impact	Impact	Severe Impact
45	8	>14	12	>19
46	7	>13	12	>18
47	7	>12	11	>17
48	6	>12	10	>16
49	6	>11	10	>16
50	5	>10	9	>15
51	5	>10	8	>14
52	4	>9	8	>14
53	4	>8	7	>13
54	3	>8	7	>12
55	3	>7	6	>12
56	3	>7	6	>11
57	3	>6	6	>10
58	2	>6	5	>10
59	2	>5	5	>9
60	2	>5	5	>9
61	1.9	>5	4	>9
62	1.7	>4	4	>8
63	1.6	>4	4	>8
64	1.5	>4	4	>8
65	1.4	>4	3	>7
66	1.3	>4	3	>7
67	1.2	>3	3	>7

Existing Ambient Noise Level (dBA) (L_{eq} or L_{dn}) [a]	Allowable Cumulative Noise Level Increases, L_{eq} or L_{dn} [a] (All Noise Levels in dBA)			
	Category 1 And 2 Sites		Category 3 Sites	
	Impact	Severe Impact	Impact	Severe Impact
68	1.1	>3	3	>6
69	1.1	>3	3	>6
70	1.0	>3	3	>6
71	1.0	>3	3	>6
72	0.8	>3	2	>6
73	0.6	>2	1.8	>5
74	0.5	>2	1.5	>5
75	0.4	>2	1.2	>5

Source: FTA 2018.

a L_{dn} is used for land uses where nighttime sensitivity is a factor; Daytime L_{eq} is used for land use involving only daytime activities.

Category Definitions:

Category 1: Buildings or parks where quiet is an essential element of their purpose.

Category 2: Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.

Category 3: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries and churches.

dBA = A-weighted decibels; L_{dn} = day-night equivalent sound level; L_{eq} = equivalent sound level

2.3.3 Federal Transit Administration Vibration Criteria

The FTA has developed impact criteria for acceptable levels of ground-borne noise and vibration that apply to the LRT components of the Modified LPA. Experience with ground-borne vibration from rail systems and other common vibration sources suggests that:

- Ground-borne vibrations from transit trains are characterized by RMS vibration velocity amplitude. A 1-second RMS time constant is assumed. This contrasts with vibration from blasting and other construction procedures that have the potential to cause building damage. When looking at potential for building damage, ground-borne vibration is usually expressed in terms of the PPV.
- The threshold of vibration perception for most humans is around 65 VdB; levels in the 70 to 75 VdB range are often noticeable but acceptable, and levels greater than 80 VdB are often considered unacceptable.
- For urban transit systems with 10 to 20 trains per hour throughout the day, limits for acceptable levels of residential ground-borne vibration are usually between 70 and 75 VdB.
- Regarding human annoyance, there is some relationship between the number of events and the degree of annoyance caused by the vibration. More frequent vibratory events, or events in

longer duration, are expected to be more will be more annoying to building occupants. Because of the limited amount of information available, there is no clear basis for defining this tradeoff. To account for most commuter rail systems having fewer daily operations than the typical urban transit line, the criteria in the FTA guidance manual include an 8 VdB higher impact threshold if there are fewer than 70 trains per day.

- Ground-borne vibration from any type of train operations are rarely high enough to cause any sort of building damage, even minor cosmetic damage. The only real concern is that the vibration will be intrusive to building occupants or interfere with vibration-sensitive equipment.

Table 2-4 summarizes the FTA impact criteria for ground-borne vibration and ground-borne noise. These criteria are based on previous standards, criteria, and design goals, including American National Standards Institute (ANSI) S3.29 and the noise and vibration guidelines of the American Public Transit Association.

Table 2-4. Federal Transit Administration Ground-Borne Vibration and Ground-Borne Noise Impact Criteria

Land Use Category	Ground-Borne Vibration Impact Levels (VdB Re 1 µ-inch/sec)			Ground-Borne Noise Impact Levels (dBA Re 20 µPa)		
	Frequent [a] Events	Occasional [b] Events	Infrequent [c] Events	Frequent [a] Events	Occasional [b] Events	Infrequent [c] Events
Category 1: Buildings where low ambient vibration is essential for interior operations	65 VdB [d]	65 VdB [d]	65 VdB [d]	N/A [e]	N/A [e]	N/A [e]
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: FTA 2018

a “Frequent Events” are defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

b “Occasional Events” are defined as 30 to 70 vibration events per day. Most commuter trunk line fall into this category.

c “Infrequent Events” is defined as fewer than 30 vibration events per day. Most commuter rail branch lines fall into this category.

d This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC system and stiffened floors. Vibration-sensitive equipment is not sensitive to ground-borne noise.

e Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

dB Re 20 µPa = decibels relative to 20 micropascals; dBA = A-weighted decibels; HVAC = heating, ventilation, and air conditioning; N/A = not applicable; VdB = vibration decibels; VdB Re 1 µ-inch/sec = vibration decibels relative to 1 micro-inch per second

Some buildings, such as concert halls, TV and recording studios, and theaters, can be very sensitive to vibration and noise but do not fit into one of the three categories. Because of the sensitivity of these buildings, they usually warrant special attention. Table 2-5 presents the FTA criteria for acceptable levels of ground-borne vibration and noise for special buildings.

Table 2-5. Federal Transit Administration Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for Special Buildings

Type of Special Building or Room	Ground-Borne Vibration Impact Levels (VdB Re 1 µ-inch/sec)		Ground-Borne Noise Impact Levels (dBA Re 20 µPa)	
	Frequent [a] Events	Infrequent [b] Events	Frequent [a] Events	Infrequent [b] Events
Concert Halls	65 VdB	65 VdB	25 dBA	25 dBA
TV Studios	65 VdB	65 VdB	25 dBA	25 dBA
Recording Studios	65 VdB	65 VdB	25 dBA	25 dBA
Auditoriums	72 VdB	80 VdB	30 dBA	38 dBA
Theaters	72 VdB	80 VdB	35 dBA	43 dBA

Source: FTA 2018

Note: If the building will rarely be occupied when the trains are operating, there is no need to consider impact. As an example, consider locating a commuter rail line next to a concert hall. If no commuter trains will operate after 7 p.m., it should be rare that the trains interfere with the use of the hall.

a "Frequent Events" are defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.

b "Infrequent Events" are defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.

dB Re 20 µPa = decibels relative to 20 micropascals; dBA = A-weighted decibels; VdB = vibration decibels; VdB Re 1 µ-inch/sec = vibration decibels relative to 1 micro-inch per second

2.3.4 State Noise Criteria

The following sections discuss applicable noise regulations in Oregon and Washington. Oregon and Washington do not have specific regulations that limit ground or structural vibrations.

2.3.4.1 Oregon State Department of Transportation Noise Criteria

ODOT noise criteria was used to assess potential noise impacts from highway improvements included in the IBR Program. ODOT is responsible for implementing the FHWA regulations in Oregon. Under ODOT policy, outlined in the ODOT Noise Manual 2021 Interim Update (July 2021), a traffic noise impact occurs if either sound levels reaching ODOT's Noise Abatement Approach Criteria (NAAC) (2 dBA below the FHWA Noise Abatement Criteria [NAC]) or with a substantial increase of 10 dBA above existing levels (ODOT 2021). Table 2-6 shows the noise impact criteria used for highway projects in Oregon. These criteria are applied to the peak traffic noise impact hour.

Table 2-6. Oregon Department of Transportation Noise Abatement Approach Criteria

Activity Category	Hourly L_{eq} (dBA)	Description of Activity
A	55 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	65 (exterior)	Residential (single and multi-family units)
C	65 (exterior)	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	50 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E	70 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A–D or F. Includes undeveloped land permitted for these activities
F	N/A	Agriculture, airports, bus yards, emergency services, industrial logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	N/A	Undeveloped lands that are not permitted.

Note: The noise abatement criteria for Categories B, C, and E also apply to undeveloped land with building permits.
dBA = A-weighted decibels; L_{eq} = equivalent sound level; N/A = not applicable

2.3.4.2 Oregon Department of Environmental Quality Noise Control Regulations

DEQ noise control regulations were used to assess potential noise impacts from highway and transit improvements included in the IBR Program. Oregon Administrative Rule (OAR) 340-35 sets allowable noise levels for individual vehicles and for industrial and commercial uses. Maximum allowable noise levels for in-use vehicles are determined by vehicle type, operating conditions, and model year. The regulations also set noise standards for new and existing industrial and commercial noise sources.

Park-and-ride lots and maintenance facilities are two examples where the Oregon Department of Environmental Quality standards apply to the Modified LPA. The noise regulations for new and existing industrial and commercial noise sources limit allowable statistical sound levels (L_{XX}), discrete frequency sounds, and impulsive sounds. L_{XX} is a statistical noise level descriptor, where “xx” is a percentage of the measurement time, usually 1 hour. The statistical noise descriptors used in the Oregon regulations and summarized in Table 2-7 are L_1, L_{10}, and L_{50}, defined as follows:

- L_1: The sound level exceeded 1% of the time. This is a measure of the loudest sound levels during the measurement period. Example: During a 1-hour measurement, an L_1 of 90 dBA means the sound level will be 90 dBA or louder for 0.6 minutes, or 36 seconds.
- L_{10}: The sound level exceeded 10% of the time. This is a measure of the louder sound levels during the measurement period. Example: During a 1-hour measurement, an L_{10} of 85 dBA means the sound level will be 85 dBA or louder for 6 minutes.
- L_{50}: The sound level exceeded 50% of the time. Example: During a 1-hour measurement, an L_{50} of 50 dBA means the sound level will be 50 dBA or louder for 30 minutes.

Table 2-7. Oregon Department of Environmental Quality New Industrial and Commercial Noise Source Standards

Statistical Descriptor	Existing Noise Source (dBA)		New Noise Source (dBA)		New Source In Quiet Area (dBA) [a]	
	7 a.m.–10 p.m.	10 p.m.–7 a.m.	7 a.m.–10 p.m.	10 p.m.–7 a.m.	7 a.m.–10 p.m.	10 p.m.–7 a.m.
L_1	75	60	75	60	60	55
L_{10}	60	55	60	55	55	50
L_{50}	55	50	55	50	50	45

Source: OAR 340-35-035, Tables 7, 8, and 9.

a "Quiet Area" means any land or facility where the qualities of serenity, tranquility, and quiet are of extraordinary significance and serve an important public need, such as, without being limited to, a wilderness area, national park, state park, game reserve, wildlife breeding area, or amphitheater.

dBA = A-weighted decibels; L_1 = sound level exceeded 1% of the time; L_{10} = sound level exceeded 10% of the time; L_{50} = sound level exceeded 50% of the time; OAR = Oregon Administrative Rules

2.3.4.3 Washington State Department of Transportation Noise Criteria

WSDOT noise criteria was used to assess potential noise impacts from highway improvements included in the IBR Program. WSDOT's NAC further clarify the FHWA traffic noise criteria. WSDOT clarifies the meaning of "approaches" by requiring noise abatement to be considered when predicted project-related noise levels approach the FHWA criteria level within 1 dBA. Therefore, noise abatement must be considered for residential land uses with projected noise levels of 66 dBA L_{eq} or higher, and for land uses such as hotels, offices or restaurants with noise levels of 71 dBA L_{eq} or higher.

Table 2-8 provides WSDOT's Noise Abatement Criteria, which identifies noise levels in L_{eq} that are considered an impact on various land use activity categories. Where a noise impact was identified as part of the Modified LPA, an analysis of potential noise mitigation was studied following procedures outlined in WSDOT's Traffic Noise Policy and Procedures (WSDOT 2020).

Table 2-8. Washington State Department of Transportation Noise Abatement Criteria

Activity Category	Hourly L_{eq}(h) (dBA) at Evaluation Location [a]	Description of Activity Category
A	56 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	66 (exterior)	Residential (single and multi-family units)
C	66 (exterior)	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	51 (interior)	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E	71 (exterior)	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F. Includes undeveloped land permitted for these activities.
F	N/A	Agriculture, airports, bus yards, emergency services, industrial logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	N/A	Undeveloped lands that are not permitted.

a L_{eq}(h) are A-weighted decibel (dBA) hourly equivalent steady state sound levels used for impact determination and are not design standards for abatement.

WSDOT also divides "substantial increase" into two tiers, with increases over existing sound levels by 10 dBA defined as a Tier 1 substantial exceedance and increases over existing sound levels by 15 dBA as a Tier 2 substantial exceedance. Noise levels of 80 dBA L_{eq} and higher for outdoor activity areas are defined as "a severe exceedance of the NAC." An NAC exceedance is also considered severe if future design year noise levels are predicted to increase by 30 dBA or higher over existing noise levels.

2.3.4.4 Washington State Noise Control Ordinance

The Washington Noise Control Ordinance was used to assess potential noise impacts from highway and transit improvements included in the IBR Program. WAC 173-60 identifies how property line noise standards are used to assess potential noise impacts from park-and-ride lots and garages and transit noise sources that are not in the public right of way to adjoining residential uses.

WAC 173-60-040 outlines the Maximum Environmental Noise Levels for residential, commercial, industrial and construction areas. However, WAC 173-60-110 states that:

> *The department conceives the function of noise abatement and control to be primarily the role of local government and intends actively to encourage local government to adopt measures for noise abatement and control. Wherever such measures are made effective and are being actively enforced, the department does not intend to engage directly in enforcement activities.*

State regulatory noise limitations apply (together with local noise regulations) to construction, and industrial, commercial, and residential noise sources. This regulation exempts mobile noise sources, including freight rail, aircraft in flight, and vehicles traveling in public right of way, as well as safety warning devices (e.g., bells). For stationary noise sources, with noises originating from outside public roadways and rights of way, the regulation defines three different Environmental Designations for Noise Abatement (EDNAs) based on land use (summarized for this study as residential, commercial, and industrial) and states the maximum noise levels for each, as shown in Table 2-9. Noise regulations are taken from Chapter 173-60 WAC, "Maximum Environmental Noise Levels." The regulations define the maximum allowable noise level from one EDNA to another EDNA.

Although WAC 173-60-040 does not define the maximum noise-level descriptor, the EDNA allowable noise levels are interpreted to mean a 1 hour L_{eq}. For example, the noise caused by a park-and-ride garage or lot, both considered a commercial property, must be less than a L_{eq} of 57 dBA at the closest residential property line. From 10 p.m. to 7 a.m., the maximum allowable sound levels shown in Table 2-9 are reduced by 10 dBA in Class A EDNAs (residential zones). WAC 173-60-040 contains short-term exemptions to the property line noise standards, as shown in Table 2-9, based on the minutes per hour that the noise limit is exceeded. These exceedances are outlined in Table 2-10.

Table 2-9. Washington State's Environmental Designations for Noise Abatement Regulation

EDNA Source of Noise	EDNA Receiver of Noise (Maximum Allowable Sound Level, L_{eq}, in dBA[a])		
	Residential	Commercial	Industrial
Class A Residential	55	57	60
Class B Commercial	57	60	65
Class C Industrial	60	65	70

Source: Washington Administrative Code Chapter 173-60-040

a Between 10 p.m. and 7 a.m., the levels given above are reduced by 10 dBA in Class A EDNAs. Maximum allowable noise levels are interpreted to mean a 1-hour L_{eq}.

dBA = A-weighted decibel; EDNA = Environmental Designation for Noise Abatement; L_{eq} = equivalent sound level

Table 2-10. Washington State Exemptions for Short-term Noise Exceedances

Statistical Descriptor [a]	Short-term Duration in Minutes (% per Hour)	Exceedance of Maximum Sound Level
L_{25}	15 (25% of 1 hour)	+5 dBA
$L_{8.3}$	5 (8.3% of 1 hour)	+10 dBA
$L_{2.5}$	1.5 (2.5% of 1 hour)	+15 dBA

Source: Washington Administrative Code 173-60-040
a L_{25}, $L_{8.3}$, and $L_{2.5}$ are the noise levels that are exceeded 25%, 8.3%, and 2.5% of the time (1 hour, in this case).
dBA = A-weighted decibels

2.3.5 Local Noise and Vibration Ordinances

Local ordinances were used to assess potential noise and vibration impacts from the construction of highway and transit improvements included in the IBR Program. The City of Portland and the City of Vancouver have zoning and planning regulations that require new noise-sensitive uses constructed in certain noise-impacted areas to use noise-reducing construction techniques.

Daytime construction noise is exempt in Portland, up to 85 dBA with exemptions for impact tools. The City of Portland has restrictive noise ordinances that apply to industrial and commercial noise sources and to construction from 6 p.m. to 7 a.m. and all day on Sundays. The full ordinances are in the City of Portland Municipal Code Title 18, Noise Control. Under the City's noise control ordinance, virtually all major construction projects require a noise variance if work is planned during nighttime hours or on Sundays. Projects of this size typically require coordination with the City of Portland's Noise Review Board, which often imposes additional restrictions on construction. Noise variances are reviewed for approval by the City of Portland Noise Control Program Office. The City of Portland (Chapter 33.262, Off-Site Impacts) restricts continuous, frequent, or repetitive vibrations that exceed 0.002 g (gravitational constant) peak. Only vibrations from temporary construction and vehicles that leave the site (such as trucks, trains, airplanes, and helicopters) are exempt. Vibrations lasting less than 5 minutes per day are also exempt. Vibrations from primarily on-site vehicles and equipment are not exempt. The City of Gresham and Multnomah County do not have vibration ordinances.

The City of Vancouver has incorporated the state regulations shown in Tables 2-9 and 2-10, above, into the VMC, with the exception that the residential-to-residential maximum allowable sound level is omitted. In addition, the VMC includes prohibitions against off-site vibration impacts that are discernible without instruments at the property line and construction activity between 8 p.m. and 7 a.m. The ordinances do not apply to public streets and sidewalks, rail maintenance yards, or essential public facilities such as the interstate highway system or intercity passenger rail. This code would apply to rail transit stops and stations and to park-and-ride lots.

In addition to local regulations and ordinances regarding noise and vibration, the Cities of Portland and Vancouver have established policies and goals in their adopted local plans pertaining to noise and vibration.

2.4 Data Collection Methods

As part of the noise abatement analyses, sound level measurements are recorded to validate the FHWA Traffic Noise Model (Version 2.5). These sound level measurements are not used to establish the existing noise levels in the study area. Once the model is validated with the sound measurement data, the existing sound levels are established by modeling the worst noise hour traffic volumes.

The ODOT Noise Manual requires a comparison between peak vehicular hour and peak truck hour to determine the worst noise hour (ODOT 2011). WSDOT's preferred method for determining traffic noise levels is to model the higher of the AM/PM peak hour traffic and vehicle mix. It is possible that noise-sensitive areas can be affected differently such that the worst noise hour is not the same for all noise-sensitive areas. The worst noise hour was determined on an area by area basis by which traffic hour causes the most impact. Appendix C includes details on traffic development for use in the traffic noise modeling and analysis.

Worst-hour or loudest hour traffic from 2019 was used to model existing conditions and future year 2045 traffic was used to model future build and no-build conditions. Appendix K presents a comparison of noise levels by area for each traffic condition modeled, which included AM Peak Hour, AM Peak Truck Hour, PM Peak Hour, and PM Peak Truck Hour. The traffic conditions that resulted in the highest number of traffic impacts by area—thus, the traffic condition used to analyze each area—are as follows:

- Portland – PM Peak Hour
- Downtown Vancouver – PM Peak Hour
- Fort Vancouver – PM Peak Hour
- Vancouver north of E Mill Plain Boulevard and south of E Fourth Plain Boulevard, east and west of I-5 – PM Peak Hour
- Vancouver north of E Mill Plain Boulevard and south of I Fourth Plain Boulevard, east and west of I-5 – PM Peak Hour

Existing vibration levels are typically not measured in establishing the impact thresholds. The FTA ground-borne vibration and ground-borne noise criteria are used to assess potential impacts from operation of the light-rail vehicles. Rubber-tired vehicles, such as buses, rarely have vibration issues, and if they do it is usually due to poorly maintained pavement and potholes.

The methods and equipment used to collect the noise data are described in the following sections.

2.4.1 Noise Data Collection Methods

Noise monitoring was performed from April to September 2022 at 58 locations within the study area. Two of the 58 monitoring sites were near the Ruby Junction Maintenance Facility in Gresham, Oregon. Of the 58 monitoring sites, 12 were long term (24 to 48 hours) and the other 46 were short term (15 minutes) monitoring sites. The long-term sites are required for analysis of transit operation noise and, therefore, were primarily located along the proposed LRT alignment and near transit facilities, and at residential and land use activities where sleep occurs. Prior to construction, if noise levels exceed allowance, long-term measurements will be performed to obtain a noise variance from the Portland Noise Control Program Office.

The short-term sites are used primarily for traffic noise and to support the LRT analysis, and land uses with daytime activities such as schools, libraries, offices and places of worship.

Additional noise measurements were conducted to characterize the contribution from structure-borne noise from the existing Interstate Bridge and predict structure-borne noise from the Columbia River and North Portland Harbor bridges that are part of the Modified LPA.

All noise measurements were taken in accordance with the ANSI procedures for community noise measurements. The measurement locations were at least 5 feet from any solid structure to prevent acoustical reflections and at a height of 5 feet off the ground, as required by ANSI standards. The equipment used for noise monitoring included Larson Davis Type 720 and 820 sound level meters and Svantek 971 sound level meters. All meters were calibrated prior to and after the measurement period using handheld or software-based equipment calibration. Complete system calibration is performed on an annual basis by Odin Metrology, Inc. All measurement systems meet or exceed the requirements for an ANSI Type I noise measurement system.

Traffic counts were performed at 15-minute intervals along I-5 from the vantage point of the following overpasses: Discovery Historic Loop Trail, E 33rd Street, E 29th Street, E Fourth Plain Boulevard, E Evergreen Boulevard, and the Confluence Land Bridge, and at several locations in the vicinity of I-5 or nearby roadways where traffic was included in noise modeling. Local traffic was also counted near each monitoring station.

2.4.2 Noise Measurement Locations and Levels

In Portland, short-term measurements were taken at 12 sites between Hayden Island and Delta Park. Long-term measurements were performed at seven sites in Oregon between the Rodeway Inn, Holiday Inn, houseboats on the Columbia River located east and west of I-5, the Residence Inn, and two sites in Gresham near the Ruby Junction Maintenance Facility.

In Vancouver, short-term measurements were performed at six sites in the downtown Vancouver area. In addition, short-term measurements were conducted at five sites on the Vancouver National Historic Reserve (VNHR), 12 sites north of Fort Vancouver on the east side of I-5, and 11 sites north of Mill Plain Boulevard on the west side of I-5. Long-term measurements in Washington were conducted at sites along Columbia Street at W 4th Street, at the Normandy Apartments, and at the Vancouver Community Library for the LRT alignment and potential Park and Ride locations.

Table 2-11 summarizes the measured noise levels, and Figure 2-7, Figure 2-8, and Figure 2-9 show the locations and noise levels on aerial photos. The measured L_{eq} is listed for all measurement locations; however, the L_{dn} is only provided for measurements conducted at FTA Category 2 land uses located along the LRT alignment and potential park-and-ride locations. Appendix D includes detailed measurement sheets that include measurement dates and times. Graphs of the long-term measurement data are in Appendix E, Long Term Noise Measurement Graphs.

Table 2-11. Noise Measurement Summary

Area	Receptor# [a]	Location	Analysis Type [b]	Type [c]	L_{eq} [d] (dBA)	L_{dn} [e] (dBA)
Vancouver, north of E 15th St./Mill Plain Blvd.	ST-1	Leverich Community Park Trail	Traffic	Short	67	
	ST-2	Discovery Middle School	Traffic	Short	77	
	ST-3	Leverich Community Park Disc Golf/ Picnic	Traffic	Short	57	
	ST-4	Residence, 3700 Block H St.	Traffic	Short	56	
	ST-5	Residence, 3600 Block K St.	Traffic	Short	67	
	ST-6	Residence, 3600 Block I St.	Traffic	Short	62	
	ST-7	Residence, 900 Block E 34th St.	Traffic	Short	67	
	ST-8	Residence, 3300 Block K St.	Traffic	Short	63	
	ST-9	Residence, 900 Block E 30th St.	Traffic	Short	63	
	ST-10	Residence, 2900 Block K St.	Traffic	Short	66	
	ST-11	Residence, 2700 Block K St.	Traffic	Short	66	
	ST-12	Residence, 900 Block E 27th St.	Traffic	Short	65	
	ST-13	Vancouver Barracks National Cemetery	Traffic	Short	62	
	ST-14	Arnada Park Benches	Traffic	Short	63	
	ST-15	Vancouver Barracks National Cemetery Entrance	Traffic	Short	71	
	ST-16	Residence, 800 Block E 22nd St.	Traffic	Short	67	
	ST-17	Fort Vancouver Garden and Veterans Museum	Traffic	Short	59	

Area	Receptor# [a]	Location	Analysis Type [b]	Type [c]	L_{eq} [d] (dBA)	L_{dn} [e] (dBA)
	ST-18	Clark College Athletic Field	Traffic	Short	61	
	ST-19	Apartments, 1800 Block W Reserve St.	Traffic	Short	70	
	ST-20	Residence, 600 Block E 15th St.	Traffic	Short	67	
	ST-21	Marshall Park, Horseshoes	Traffic	Short	68	
	ST-22	Apartments, 500 Block E 15th St.	Traffic	Short	65	
	ST-23	Marshall Park, south walking path	Traffic	Short	63	
Vancouver, south of E 15th St./Mill Plain Blvd.	ST-24	Apartments, 500 Block E 13th St.	Traffic	Short	67	
	ST-25	Comfort Inn & Suites Vancouver	Traffic	Short	64	
	ST-26	Fort Vancouver, 600 Block Officers Row	Traffic	Short	70	
	ST-27 LT-1	Vancouver Community Library	Both	Short & Long	69	77
	ST-28	Fort Vancouver, 600 Block Barnes St.	Traffic	Short	71	
	ST-29 LT-2	Apartments Parking, 300 Block E 7th St.	Both	Short & Long	74	83
	LT-3	Columbia St and W 4th St.	Transit	Long	77	77
	ST-30	Parking, 300 Block Washington St.	Traffic	Short	72	
	ST-31	Fort Vancouver, Reconstructed Village Houses	Traffic	Short	63	
	ST-32	Vancouver Waterfront Trail	Traffic	Short	65	
	ST-33	Old Apple Tree Park	Traffic	Short	68	
	ST-34	Confluence Land Bridge	Traffic	Short	75	
Portland	ST-35 LT-4	Rodeway Inn & Suites Portland – Jantzen Beach	Both	Short & Long	68	72
	ST-36 LT-5	Holiday Inn Portland – Columbia	Both	Short & Long	58	81
	ST-37	Oxford Suites Portland – Jantzen Beach	Traffic	Short	64	
	ST-38	Multi-Unit Residential, 11900 Block N Jantzen Beach Ave.	Traffic	Short	59	

Area	Receptor# [a]	Location	Analysis Type [b]	Type [c]	L_{eq} [d] (dBA)	L_{dn} [e] (dBA)
	LT-6	Jantzen Beach houseboats, Row E	Transit	Long	67	68
	ST-39 LT-7	Jantzen Beach houseboats, Row A	Both	Short & Long	69	71
	ST-40 LT-8	Houseboats east of I-5, 1st Row	Both	Short & Long	66	72
	LT-9	Houseboats north of N Pier 99 St., 1st Row	Transit	Long	73	74
	ST-41	Parking, 1500 Block N Pier 99 St.	Traffic	Short	70	
	ST-42	Parking, 1400 Block N Pier 99 St.	Traffic	Short	68	
	LT-10	Residence Inn by Marriott Portland North Pool	Transit	Long	66	66
	ST-43	Newport Apartments, N Marine Dr.	Traffic	Short	70	
	ST-44	Delta Park, DeMarini Baseball Field	Traffic	Short	64	
	ST-45	Delta Park, Baseball Field #7	Traffic	Short	61	
	ST-46	Delta Park, Soccer Field #4	Traffic	Short	69	
Gresham	LT-11	Mobile Home Park 19700 Block, north of Ruby Junction Maintenance Facility	Transit	Long	71	70
	LT-12	Adjacent to southwest of Ruby Junction Transit Facility	Transit	Long	69	67

a Noise monitoring number
b Measurements for traffic, light-rail or both
c Long-term (24+ hours) or short-term (15–20 minutes) measurement period
d Peak traffic hour L_{eq} for the measured noise levels
e 24-hour L_{dn} noise level
Blvd. = Boulevard; dBA = A-weighted decibels; L_{eq} = equivalent sound level; St. = Street

Noise levels in the study area ranged from 56 to 77 dBA L_{eq}, with 24-hour L_{dn} noise levels ranging from 66 to 83 dBA.

In the Portland area, short-term measured noise levels at the residential floating home docks ranged from 66 to 69 dBA L_{eq}, with the louder noise levels at docks nearest to I-5.

Noise levels in downtown Vancouver Washington ranged from 63 to 75 dBA L_{eq}, with the 75 dBA level near the SR 14 and I-5 ramps. Noise levels in the VNHR ranged from 63 to 71 dBA L_{eq}. North of Fort Vancouver, at Marshall Park and outdoor areas on the western side Clark College and VA Medical Center campuses, measured peak hour L_{eq} noise levels ranged from 61 to 68 dBA.

The residential areas in north Vancouver have noise levels ranging from 56 to 77 dBA L_{eq}. The highest noise levels were recorded at locations near openings in noise walls or with no noise walls, where noise levels typically ranged from 66 to 77 dBA L_{eq}. Second- and third-row receivers with shielding from I-5 have noise levels that ranged from 56 to 62 dBA L_{eq}.

Noise measurement and modeling data conducted to characterize the contribution from structure-borne noise from the existing bridge and from the bridges planned for construction as part of the Modified LPA are presented in Appendix H.

Figure 2-7. Noise Measurement Locations – North Portland and Gresham

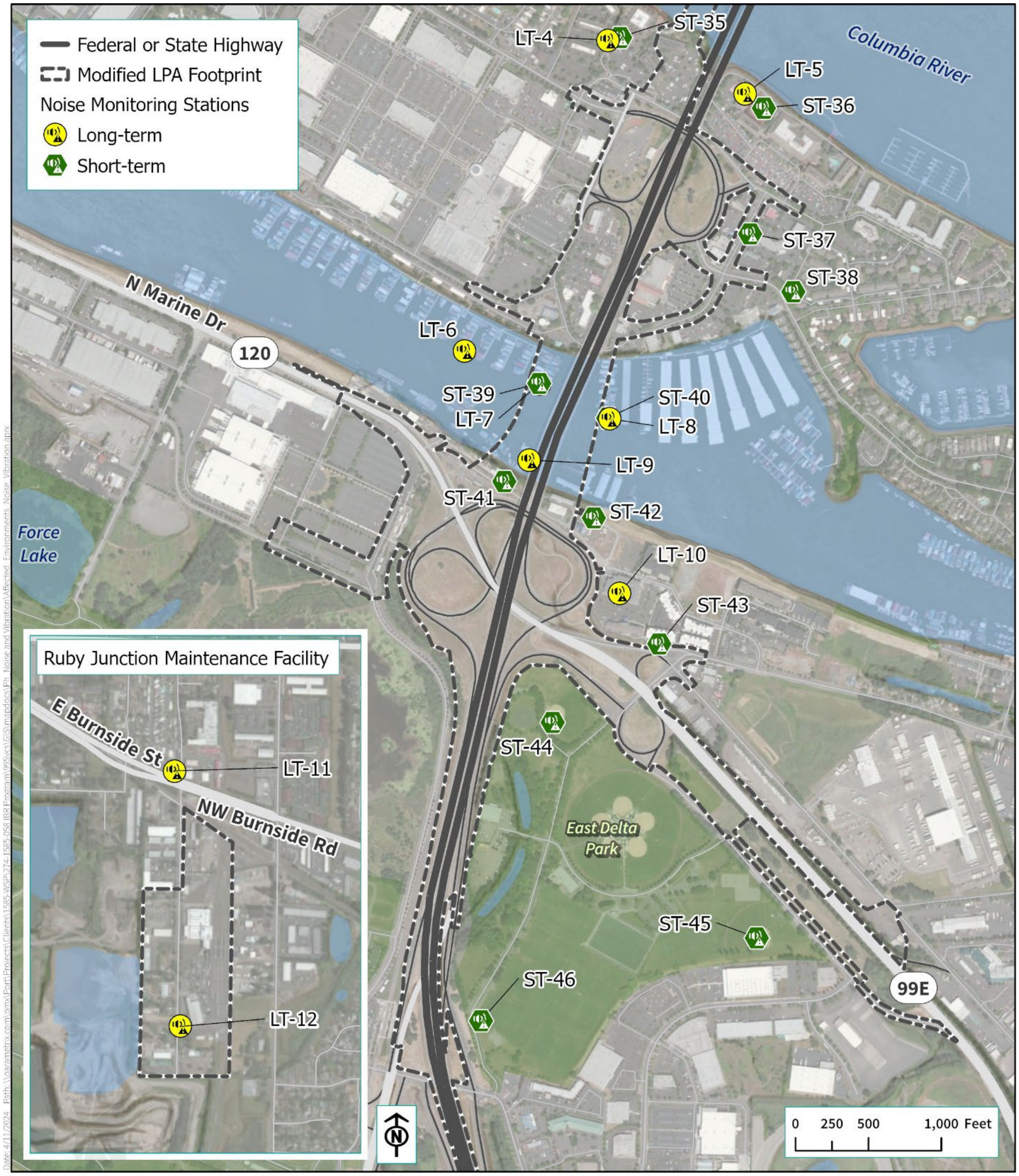


Figure 2-8. Noise Measurement Locations – Downtown Vancouver and Fort Vancouver

Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Figure 2-9. Noise Measurement Locations – North Vancouver

2.4.2.1 Traffic Noise Model Validation

Existing traffic noise levels were also modeled, as previously described, to test the agreement of calculated and measured noise levels. Table 2-12 provides the results of the noise model validation, which compares the difference between the short-term noise measurement taken in the field at a receptor location to the result of the noise model.

Traffic volumes and speeds as observed during the noise measurements were used as input to the model. Speeds were estimated by driving through the corridor and making visual observations. Speed measurements with a radar gun were attempted but not able to be conducted because of the physical constraints of each location, which included measuring speeds at extreme angles and from locations that were unsafe for on-site staff. Typical I-5 speeds range from 55 to 65 miles per hour (mph). Traffic counts used for validation are provided in Appendix D.

Table 2-12. Noise Model Validation Results

Receptor # [a]	Measured [b]	Modeled [c]	Difference between Measured and Modeled [d]
ST-1	67.1	65.3	-1.8
ST-2	77.2	76.7	-0.5
ST-3	57.4	58.1	0.7
ST-4	56.1	56.7	0.6
ST-5	67.1	67.1	0.0
ST-6	62.2	60.6	-1.6
ST-7	67.2	66.0	-1.2
ST-8	62.5	61.3	-1.2
ST-9	63.2	61.4	-1.8
ST-10	66.1	64.8	-1.3
ST-11	66.0	65.2	-0.8
ST-12	64.7	63.4	-1.3
ST-13	62.0	63.7	1.7
ST-14	63.0	62.3	-0.7
ST-15	70.8	70.8	0.0
ST-16	66.9	66.0	-0.9

Receptor # [a]	Measured [b]	Modeled [c]	Difference between Measured and Modeled [d]
ST-17	59.1	60.2	1.1
ST-18	60.9	62.1	1.2
ST-19	69.9	71.6	1.7
ST-20	67.0	69.0	2.0
ST-21	68.0	69.7	1.7
ST-22	64.6	63.9	-0.7
ST-23	62.8	61.8	-1.0
ST-24	66.5	65.8	-0.7
ST-25	63.7	64.4	0.7
ST-26	68.4	66.8	-1.6
ST-27	69.5	71.1	1.6
ST-28	69.3	67.5	-1.8
ST-29	73.6	75.4	1.8
ST-30	72.3	71.1	-1.2
ST-31	62.5	60.9	-1.6
ST-32	64.6	62.6	-2.0
ST-33	67.7	68.6	0.9
ST-34	75.0	76.8	1.8
ST-35	67.5	65.2	-2.3
ST-36	57.9	56.4	-1.5
ST-37	64.1	61.1	-3.0
ST-38	58.8	56.0	-2.8
ST-39	68.8	67.9	-0.9
ST-40	66.2	68.4	2.2
ST-41	69.8	70.7	0.9

Receptor # [a]	Measured [b]	Modeled [c]	Difference between Measured and Modeled [d]
ST-42	68.0	65.3	-2.7
ST-43	69.6	69.3	-0.3
ST-44	63.8	63.1	-0.7
ST-45	61.0	58.2	-2.8
ST-46	68.0	67.1	-0.9

a ST = short-term
b Measured noise levels
c Modeled noise levels from Federal Highway Administration Traffic Noise Model
d Difference, modeled minus measured

If the deviation for modeled and measured noise levels is +/- 2 dBA or less, it is considered acceptable for modeling of future traffic noise by WSDOT, and within +/- 3 dBA is considered acceptable by ODOT. This level of agreement corresponds to a 2 to 3 dBA change in noise levels being recognized as barely perceptible to a person with normal hearing. The modeled and measured noise results agree with each state's noise policy as all sites located in Washington were validated within +/- 2 dBA and all sites located in Oregon were validated within +/- 3 dBA. Short-term measurements were used for model validation. Following model validation, sites were added to the model to predict noise levels at optimal outdoor use locations.

2.4.3 Light-Rail Noise Levels

Noise impact from light-rail operations is a function of the speed and length of the light-rail vehicle trains, the type of track, the number of trains in the daytime and nighttime hours, and the distance of the tracks from sensitive receptors. In areas where the trains would operate in a right of way shared with vehicular traffic, noise from warning horns and bells used to warn the public of approaching trains can be a significant noise source. Audible warning signals used before every street/rail at-grade crossing, would be included. The steel wheels rolling on steel rails are usually the major source of noise from light-rail vehicles, although the motor ventilation system is sometimes a significant noise source at specific frequencies. Because the noise originates close to the ground, substantial noise mitigation can be achieved with relatively low noise walls. For example, on elevated structures, where noise walls can be located within a few feet of the transit vehicles, walls that are only 3.5 to 4 feet high can provide up to 10 dBA reduction in wayside noise from the rail/wheel noise sources of the vehicles.

Reference pass-by noise level measurements were conducted for the TriMet light-rail vehicles operating along the Blue Line near SW Terman Road just west of the Millikan Way MAX Station, along the ballast and tie segment of the alignment. Measurements were performed using the methods outlined in International Standard (ISO) 3095:2005 (E), Railway Applications, – Acoustics – Measurement of noise emitted by rail bound vehicles, Second Edition, 2005-08-15. Measurements were taken during normal revenue service between 8:15 a.m. and 9:35 a.m. on July 14, 2010. Fourteen pass-by measurements were taken, including 10 westbound trains and four eastbound trains. Only those pass-by noise readings that were 10 dBA over the ambient noise level, as required for accurate noise measurements, were used to determine the reference level. Speeds for the passbys were verified using a radar gun; the average speed was 39 mph.

The noise and speed measurements were used to calculate a reference level for a two-car light-rail vehicle operating at 40 mph at a distance of 50 feet. The overall average pass-by noise level normalized to 40 mph and 50 feet was 79.1 dBA. This level was used as the reference level in the noise modeling.

The following approach will be used to develop the projections of impact and the recommended mitigation measures for light-rail vehicle operations:

1. Existing noise levels will be measured and summarized.
2. The vibration force density level and L_{max} reference noise level for the light-rail will be provided by TriMet and used in the contract specifications for light-rail acquisition.
3. A reference level of 79.1 dBA was used for a two-car light-rail vehicle operating at 40 mph at a distance of 50 feet.
4. Sensitive receivers along the Modified LPA's transit alignment will be grouped into clusters of one to fifteen buildings that are close together and would be approximately the same distance from the tracks, and would therefore experience the same noise exposure. The conditions surrounding the clusters, such as train speed and track type, would also be the same for all receivers within a given cluster.
5. Noise exposure projections were developed for each receiver cluster. The projections incorporate the train speed, expected number and length of trains during the daytime (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) hours, and distance of the receptors to the tracks. The train schedules used for the noise projections assumes:
6. Peak hour headways of 7.5 minutes, off-peak headways of 15 minutes.

Light-rail vehicle speeds are provided in Table 2-13.

Table 2-13. Light-Rail Vehicle Speeds

Route Information	Assumed Speed (mph)	Distance between Stations (miles)	Station Locations
Expo Center: • Station Area • Limited Speed Curve • Limited Speed Curve • Limited Speed Curve	 12 15 15 20	0.41	Expo Center to Hayden Island, Northbound

Route Information	Assumed Speed (mph)	Distance between Stations (miles)	Station Locations
Hayden Island: • Station Area • Limited Speed Curve • Limited Speed Curve • Limited Speed Curve	 12 40 40 40	0.89	Hayden Island to Columbia St./ Columbia Way Northbound
Columbia St/Columbia Way: • Station Area • Limited Speed Curve • Limited Speed Curve • Limited Speed Curve	 12 40 40 40	0.53	Columbia St./Columbia Way to Evergreen Blvd., Northbound
Evergreen Blvd: • Station Area	12	0.04	Evergreen Blvd. to McLoughlin Blvd./I-5, Northbound

Blvd. = Boulevard; I-5 = Interstate 5; mph = miles per hour; St. = Street

The estimated number of hourly light-rail trips north of Expo Center is provided in Table 2-14.

Table 2-14. Hourly Light-Rail Train Trips North of Expo Center

Estimated Number of Light-Rail Train Trips Per Hour North of Expo Center				
	Weekday		Weekend	
Hour Beginning At	Northbound	Southbound	Northbound	Southbound
4 a.m.	1	0	1	0
5 a.m.	2	2	2	2
6 a.m.	6	6	4	4
7 a.m.	11	11	4	4
8 a.m.	6	6	4	4
9 a.m.	4	4	4	4
10 a.m.	4	4	4	4
11 a.m.	4	4	4	4
12 p.m.	4	4	4	4
1 p.m.	4	4	4	4

Estimated Number of Light-Rail Train Trips Per Hour North of Expo Center				
	Weekday		Weekend	
Hour Beginning At	Northbound	Southbound	Northbound	Southbound
2 p.m.	4	4	4	4
3 p.m.	4	4	4	4
4 p.m.	6	6	4	4
5 p.m.	11	11	4	4
6 p.m.	6	6	4	4
7 p.m.	4	4	4	4
8 p.m.	4	4	4	4
9 p.m.	4	4	4	4
10 p.m.	4	4	4	4
11 p.m.	2	2	2	2
12 a.m.	2	2	2	2
1 a.m.	0	1	0	1
Subtotals	97	97	75	75
Total	194		150	
Total Daytime	168			
Total Nighttime	26			

The projections also include adjustments based on the track type. These adjustments are added to the predicted reference noise levels used to predict potential noise impacts.

Graphical representations of projected L_{dn} and L_{max} vs. distance assuming a train speed of mph.

The noise projections were compared to the impact thresholds of the FTA criteria shown in Table 2-2. As shown in Figure 2-6, the horizontal scale is existing L_{dn}, which were estimated for each cluster from the noise survey results, and the vertical scale is the L_{dn} caused by the project. Figure 2-6 shows that:

- If the existing L_{dn} is 65 dBA, there is no impact as long as the project L_{dn} is less than 61 dBA.
- With a 65 dBA L_{dn}, there is moderate impact if the project L_{dn} will be between 61 and 66 dBA. The FTA requires that mitigation be evaluated for all areas where moderate impacts are

projected, although consideration of factors such as cost-effectiveness can be incorporated into the decision about whether to specify mitigation for a particular area.

- With a 65 dBA L_{dn}, there is severe impact if the project L_{dn} exceeds 66 dBA. The FTA considers severe impact to be a "significant adverse effect" in the context of NEPA. Noise impacts in the severe range represent the most compelling need for mitigation.
- Noise mitigation options will be required at all locations where the projected levels of noise exposure exceed the FTA severe noise impact thresholds. Where the moderate impact thresholds are exceeded, mitigation options will be considered when reasonable. The goal of providing noise mitigation is to gain substantial noise reduction, not simply to reduce the predicted levels to just below the "severe" impact threshold. To determine whether the mitigation is reasonable, the evaluation of specific mitigation measures will include the noise reduction potential, the cost, the effect on transit operations and maintenance, and any other relevant factors, such as any new environmental impacts that may be caused by the implementation of a noise reduction measure.

2.5 Ground-Borne Vibration Modeling

An analysis of operational vibration levels at sensitive receivers was completed using the FTA General Vibration Analysis procedure. A general outline of the procedures follows below.

- Receivers of Interest: Identify cluster of sensitive receivers and select closest receiver to Project alignment.
- Project Vibration: Identify the project vibration sources that are within the FTA screening distances. For these sources, determine the source reference vibration levels at the distance between the source and receiver, for the appropriate project operating parameters.
- Vibration Impact Assessment: Assess vibration impact at each receiver of interest using the impact criteria defined in Section 2.3.3.
- Mitigation of Vibration Impact: Where the assessment shows an exceedance of the FTA vibration impact thresholds, evaluate alternative mitigation measures. Then loop back to modify the project-vibration computations, thereby accounting for the adopted mitigation, and reassess the remaining vibration impact.

2.6 Transit Operations Vibration Model

2.6.1 Light-Rail Vehicle Operations Vibration Model

The FTA General Assessment procedures outlined in Section 6 of the FTA Guidance Manual General Assessment were used to model the train vibrations. The General Assessment is an extension of the screening procedure and uses generalized data to develop a curve of vibration level as a function of distance from the track. The ground-borne vibration levels at specific buildings are estimated by reading values from the curve and applying adjustments to account for factors such as track support system, vehicle speed, type of building, and track and wheel condition. The general level deals only with the overall vibration velocity level and does not consider the frequency spectrum of the vibration.

The General Assessment is a method to estimate overall levels of ground-borne vibration for comparison to the FTA impact criteria. For projects where no measurements were conducted to determine the line-source transfer mobility of the ground and the force density level of the train, the General Assessment approach will be sufficient for the environmental impact assessment. Where there are potential impacts, a detailed analysis can be undertaken during final design to accurately define the level of impact and design mitigation measures. A detailed analysis usually would be required when designing special track support systems such as floating slabs or ballast mats.

2.6.2 Maintenance and Storage Facility Noise Modeling

2.6.2.1 Train Movement on Tracks

Train movements within the Ruby Junction Maintenance Facility would generate noise from steel wheels rolling on steel rails. Trains would travel at low speeds of 5 mph on tangent track and 5 mph or less or curved section of track within the facility. Train movement noise within the Ruby Junction Maintenance Facility was calculated using the same formulas for calculating light-rail noise.

2.6.2.2 Crossovers

Turnouts and crossovers require that two rails cross; the special fixture used where two rails cross is referred to as a "frog." Standard frogs have gaps where the two rails cross and the wheels must "jump" across the gap. The wheels striking the ends of the gap increases noise levels near special trackwork by approximately 5 dB.

2.6.2.3 Wheel Squeal

The Ruby Junction Maintenance Facility would include tight curves that may generate wheel squeal. The analysis assumes that LRT activity on tight curves within the facility would add 10 dBA to wheel squeal.

2.6.2.4 Vehicular Traffic

Employee parking would be on site at the Ruby Junction Maintenance Facility. Employee trips would not double traffic volumes along a roadway and therefore would not result in a substantial permanent increase in noise levels. As such, employee trips have not been further assessed in this analysis.

2.6.2.5 Combined Noise Level

Noise levels from Ruby Junction Maintenance Facility noise sources was combined and used to assess impacts at receivers. The combined L_{dn} was calculated using the following FTA methodology.

- L_{dn} (total) = 10 x LOG ($^{\Sigma}$All sources $10^{(Ldn/10)}$)
- L_{dn} (total) = Total L_{dn} from all sources combined.

2.6.2.6 Audible Warnings at Stations Noise Model

Audible noise warnings, such as quacker noise, are not included as a separate noise source because at speeds greater than 35 mph the noise from the quacker adds less than 1 dB to the noise exposure caused by light-rail train operations. However, where the trains are coming into a station with speeds less than 35 mph, 1 dBA has been included for quacker noise. The train horn would not be a regularly occurring noise source and only sounded during emergencies. As such, with its infrequent use, the train horn is not included in the analysis.

2.6.2.7 Special Trackwork

Standard frogs have gaps where the two rails cross and the wheels must "jump" across the gap. The wheels striking the ends of the gap increases noise levels near special trackwork by approximately 5 dB. A 5-dB adjustment has been applied for receivers within 300 feet of a crossover.

2.7 Summary of Noise and Vibration Analysis Methods

This section summarizes the methods used to analyze noise and vibration within the study area. Table 2-15 summarizes the noise and vibration sources and the appropriate criteria used in this analysis.

Table 2-15. Summary of Applicable Regulations and Information Sources

Regulation	Citation	Trigger(s)	Information Sources Used
National Environmental Policy Act (NEPA)	National Environmental Policy Act of 1969, as amended.	All federal actions must be analyzed for environmental impacts, including noise pollution.	NEPA provides broad authority and responsibility for evaluating and mitigating adverse environmental effects, including highway traffic noise. NEPA directs the federal government to use all practical means and measures to promote the general welfare and foster a healthy environment.
Procedures for Abatement of Highway Traffic Noise and Construction Noise	23 CFR § 772 WSDOT Traffic Noise Policy and Procedures (WSDOT 2020). ODOT Noise Manual 2011, and Interim Update June 2020 (ODOT 2011, 2020).	Noise levels from a roadway with significantly modified horizontal or vertical alignment or the addition of through travel lanes require analysis and consideration of abatement.	• Existing and future traffic volumes for each affected roadway link with vehicle classification splits. • Design drawings for the Modified LPA that include existing and future ground elevations for nearby noise receivers and areas between the Modified LPA alignment and receptors. Locations of traffic control devices. • Future posted speeds for links. • Direct measurement of existing noise levels and concurrent traffic counts are needed to validate the prediction model. • Traffic noise modeling results to determine impacts and abatement.

Regulation	Citation	Trigger(s)	Information Sources Used
Procedures for Abatement of Highway Traffic Noise and Construction Noise	23 CFR § 772	Evaluate and discuss construction noise and vibration impacts.	Information on expected construction duration and staging, typical types and numbers of construction equipment, and information on traffic rerouting during construction.
Transit Noise and Vibration Impact Assessment	FTA-VA-90-1003-06	Evaluate potential noise and vibration impacts related to the proposed extension of light-rail operations.	• Hourly and daily light-rail headways, number of cars per train, speeds, total number of trains during daytime and nighttime hours. • Design drawings for the Modified LPA that include existing and future ground elevations for nearby noise receivers and areas between the Modified LPA alignment and receivers. • Measured existing noise levels. • Direct measurement of light-rail noise levels.
Washington Administrative Code (WAC)	WAC 173-60-040	Evaluate and discuss construction noise impacts in Washington State.	The City of Vancouver uses the WAC for construction noise. Under this regulation, construction noise is exempt during weekdays and Saturdays between 7:00 a.m. and 10:00 p.m. Construction outside those hours would likely require a noise variance from the City of Vancouver.
City of Portland Noise Control Ordinance	City of Portland Code and Charter, Title 18 Noise Control.	Evaluate and discuss construction noise impacts in Oregon.	The City of Portland noise control ordinance exempts construction noise during weekdays and Saturdays between 7:00 a.m. and 6:00 p.m. Construction outside those hours would likely require a noise variance from the City of Portland.
City of Portland Title 33.262 Off-Site Impacts	City of Portland Code and Charter, Title 33.262.060 Vibration	Evaluate and discuss vibration impacts in Oregon.	The City of Portland uses 33.262.060 Vibration to limit vibration levels which exceed 0.002g peak. Vibrations from temporary construction and vehicles leaving the site are exempt. Vibrations of less than 5 minutes per day are also exempt.

CFR = Code of Federal Regulations; LPA = Locally Preferred Alternative; ODOT = Oregon Department of Transportation; WSDOT = Washington State Department of Transportation

2.7.1 Long-Term Operational Impacts Approach

Long-term operational impacts were evaluated through a three-dimensional modeling analysis using the FHWA Traffic Noise Model, Version 2.5. Noise modeling for the Modified LPA includes the double-deck configuration and the one auxiliary lane option, where the required three-dimensional design geometry was developed and available. For the other bridge configurations and design options, where there would be minor changes in the design geometry of a section of the study area, the principles of noise propagation were applied to provide a qualitative analysis of whether the design option would be expected to result in a minor change to the modeled noise levels.

The predicted noise levels for each location were compared to the ODOT and WSDOT noise impact criteria and the 10 dBA relative increase over existing criteria. Noise levels were predicted at discrete locations.

Traffic noise levels are affected by vehicle classification mix and vehicle speed. Roadways in the study area are potentially expected to experience congested conditions over substantial periods of the day. Because lower traffic speeds associated with congestion conditions equate to lower noise levels, peak traffic hours are generally not the same as peak noise impact hours. All long-term operation impacts were assessed using the peak noise impact hour, which approximates the worst-case traffic noise hour.

2.7.2 Mitigation Measures Approach

The noise analysis used the FHWA and FTA criteria to evaluate whether mitigation measures are warranted with the Modified LPA. This technical report discusses potential changes to mitigation effectiveness between preliminary engineering and final design, and the potential to affect the design or inclusion of mitigation.

The mitigation analysis for traffic noise impacts follows ODOT and WSDOT policy and procedures. This technical report discusses a range of potential mitigation measures. Where appropriate, preliminary noise barrier placements were analyzed. A graphic of these noise barrier locations is provided. The effectiveness and cost-effectiveness of noise barriers is evaluated following ODOT and WSDOT guidance.

For fixed guideway and stationary transit noise source mitigation this technical report discusses noise barrier methods, building insulation methods under consideration, and identifies preliminary noise barrier locations.

This report discusses sensitive receptors or areas that do not qualify for mitigation, for both highway and transit sources, and explains why these areas are not recommended for mitigation and evaluates potential options to address noise concerns at areas that do not qualify for noise mitigation.

Vibration mitigation measures are discussed generally. The discussion focuses on the general types of mitigation that may be appropriate at impact locations and typical reductions for various mitigation measures.

Finally, the report discusses typical construction noise mitigation measures and mitigation typically required by local permitting and variance processes.

2.8 Coordination

The IBR Program noise and vibration discipline team worked directly with federal, state, and local agencies and community groups. The team coordinated with the FHWA, FTA, ODOT, WSDOT, City of Portland, and City of Vancouver. The team also attended meetings with land use planners associated with the IBR Program for additional information on neighborhoods, which was used to select the noise monitoring and modeling locations.

The IBR Program noise and vibration discipline team coordinated with Jim Laughlin of WSDOT's Air Quality, Acoustics, and Energy Program for information related to the methods required for a noise study in the state of Washington. The IBR Program noise and vibration discipline team worked with Daniel Burgin of ODOT's Noise Program Coordinator to confirm the methods required for a noise study in the state of Oregon.

The IBR Program noise and vibration discipline team also coordinated with the IBR Program team to obtain the following information:

- Project design drawings, providing details on the Modified LPA alignment and profiles.
- Information about potential displacement of public facilities, residents, or commercial uses.
- Information on existing land uses in the study area, including noise-sensitive receptors such as residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, auditoriums, and office space. Research was conducted to identify locations where building permits have been issued for development within the study area.
- Details on traffic data, including volumes, speeds, and vehicle types for major roadways within the study area.
- Coordination regarding potential noise effects on parks and historic properties.
- Coordination regarding potential noise and vibration effects on wildlife.

3. AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes existing land uses and noise levels in the study area. Existing peak noise hour predictions were performed using 2019 traffic volumes, noise measurements taken in 2022, and the posted speed limits. The noise levels projections were performed using the FHWA Traffic Noise Model – Traffic Noise Model - version 2.5.

3.1.1 Noise Environment

A detailed reconnaissance of the study area was conducted to identify noise-sensitive properties within 500 feet of proposed improvements.

The noise environment in the study area has long been characterized by typical urban noise sources and noise levels. Sources of noise include traffic on I-5, SR 14, SR 500, Martin Luther King Jr. Boulevard, Marine Drive, and various arterials and other roadways. Air traffic associated with the Portland International Airport as well as Pearson Field are also substantial sources of noise that have increased over time. Marine vessels on the river and trains on two rail lines, as well as industrial uses and the Portland International Raceway, further add to the cumulative noise environment.

In the future, projected growth in both air and freight rail traffic could increase noise levels in the study area. Land use plans for the City of Vancouver and Hayden Island would increase residential and commercial construction activities, which could be a substantial, intermittent source of noise over the next couple of decades. Highway noise would also be expected to increase over time as population and employment growth lead to increased auto trips. This projected highway noise increase is reflected in the IBR Program's traffic noise analysis, which is based on the region's projected increase in population and employment through 2045. Similarly, increased transit service could increase noise and vibration effects from LRT.

3.2 Land Use

The FHWA noise standard, which is documented in 23 CFR § 772, requires identification of all existing activities, developed lands, new development with an approved building permit, undeveloped lands, and non-residential land uses (see Table 2-2). The noise impact criterion levels depend on the existing land use or planned and permitted future land use. For example, if an area is zoned for commercial land use, but there are residential units in the area, the noise study evaluates the residential land use. While land use zoning maps are used to determine the general boundaries of various land uses, the study area was surveyed to determine the actual land uses to apply the appropriate noise impact criterion levels. As noted above, noise standards consider existing land uses and new development with an approved building permit. It is possible that future land uses may change consistent with the adopted zoning, comprehensive plan designations, and local land use plans.

Sections 3.2.1 through 3.2.5 summarize the land uses in the study area based on FHWA and FTA criteria. Figure 3-1 through Figure 3-3 provide an aerial view with sensitive land uses identified.

3.2.1 Portland Land Use

In Portland (Delta Park to the Interstate Bridge), land uses are residential and commercial. Most of the land uses near the highway or LRT alignments on Hayden Island are commercial with open space and industrial land near the Expo Center, Delta Park, and the Vanport Wetlands. Delta Park is located along the east side of I-5 between N Marine Drive and N Victory Boulevard and includes a variety of recreational uses include baseball and soccer fields, volleyball courts, and batting cages. South of Delta Park, there are several commercial establishments along N Whitaker Road.

A group of floating homes is located along the southern edge of Hayden Island, on both sides of I-5, and apartment complexes are located east of I-5 and north of N Marine Drive. There is also a large group of single and multi-family residential units east of I-5 along N Hayden Drive and N Tomahawk Drive, and a large, manufactured home park and the Jantzen Beach recreational vehicle (RV) park located west of I-5. Other uses near the study area where people sleep include the Holiday Inn, Roadway Inn & Suites, the Oxford Suites, Residence Inn by Marriott, Fairfield Inn & Suites, and the Courtyard by Marriott.

3.2.2 Gresham Ruby Junction Area Land Use

Land use in the area surrounding the Ruby Junction Maintenance Facility includes a mix of commercial, warehouses, heavy and light industrial, and residential use. Single-family residences are located just south and southeast of the operations facility on NW Eleven Mile Avenue and SE 202nd Avenue. Residences are along located two blocks west of the site at SE 196th Avenue and a mobile home park is located north of NW Burnside Road between SE 197th Avenue and SE 199th Avenue.

3.2.3 Downtown Vancouver Land Use

Land use in downtown Vancouver includes residential, hotels, parks, and commercial. On the east side of I-5, along SR 14, is Waterfront Park (part of the Fort Vancouver National Historic Site), Old Apple Tree Park, and the Confluence Land Bridge, a foot bridge from Fort Vancouver to the Waterfront Park.

The core of downtown Vancouver has both commercial and residential land uses. There are several existing and new condominiums and apartments along Washington and Columbia Streets, and the Smith Tower at the intersection of Washington Street and W 6th Street. There are also hotels and apartments along the western side of I-5 between E 6th Street and E 15th Street. The Vancouver Community Library, which includes outdoor use space, is located in the southwest corner of E Evergreen Boulevard and I-5. The Academy Chapel, located in the northwest corner of E Evergreen Boulevard and I-5, includes a chapel, several commercial businesses, and mixed-use development located further from I-5 on C Street.

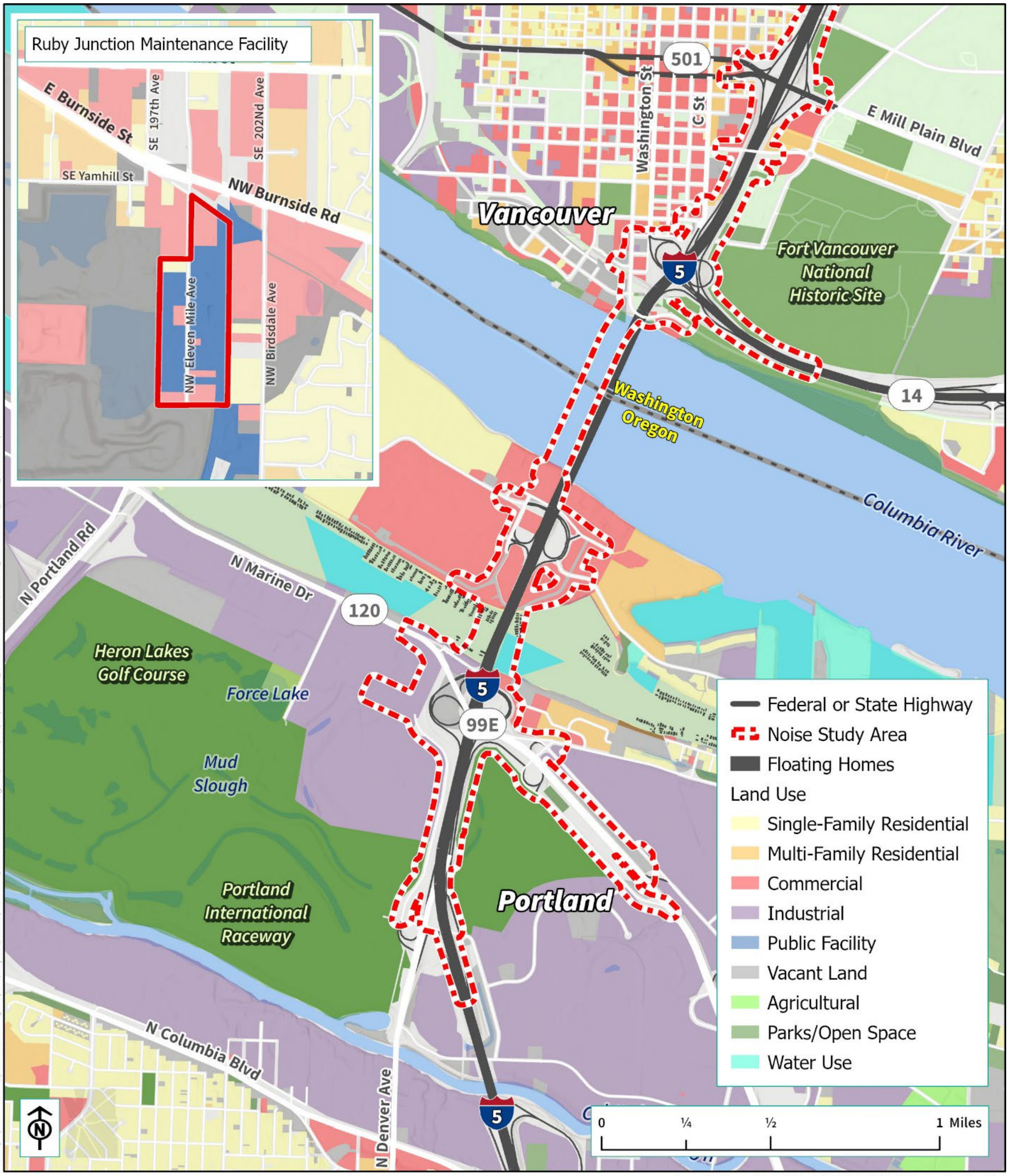
3.2.4 Fort Vancouver Land Use

The VNHR is a 366-acre management area created by Congress in 1996 that includes the 252-acre Vancouver National Historic Reserve Historic District, which itself encompasses several nationally significant sites that contribute to its National Register of Historic Places status, including the Fort Vancouver National Historic Site, the Officers Row National Historic District (including the Grant House, the O. O. Howard House, and the Marshall House), the Vancouver Barracks National Historic District, the Pearson Air Museum, the Jack Murdock Aviation Center, Pearson Airfield, Old Apple Tree Park, and Waterfront Park. Noise-sensitive land uses within the VNHR include recreational areas, locations of historic interpretation, and residential units. The VNHR also includes museum spaces, public offices, nonprofit and private-sector offices, businesses, and shops.

3.2.5 North Vancouver Land Use

Land use in northern Vancouver is primarily residential along both sides of I-5. Single-family homes occupy most of the area west of I-5, from E 15th Street north to SR 500, and on the east side from E Fourth Plain Boulevard north to SR 500. Between E 15th Street and McLoughlin Boulevard several single-family residential houses were converted to commercial and office. Other noise-sensitive land uses include two local churches, Marshall Park, Arnada Park, Leverich Park, Burnt Bridge Creek and Discovery Trails, Discovery Middle School, the Vancouver Barracks National Cemetery, and the Portland and Vancouver Veterans Affairs Hospital campus.

Figure 3-1. Land Use – North Portland



Source: Clark County, Portland Metro RLIS, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

Figure 3-2. Land Use - Downtown Vancouver and Fort Vancouver

Figure 3-3. Land Use - North Vancouver

Source: Clark County, Portland Metro RLIS, ODOT, WSDOT, ESRI, Mapbox, OpenStreetMap

3.3 Noise Modeling Locations

For the traffic noise analysis, noise levels were modeled at 875 locations representing approximately 1,204 noise-sensitive land uses within the study area. For the LRT analysis, noise levels were modeled at 16 locations included within the 875 total locations included above to assess highway noise, representing 52 noise-sensitive land uses. Some of the modeling locations used for the traffic noise analysis were also used for the transit analysis. The noise modeling locations are shown on Figure 3-4 through Figure 3-10.

3.4 Residential Equivalents

WSDOT uses residential equivalency factors for parks and other non-residential noise-sensitive areas. The factor is based on the maximum number of people expected to use a facility during the period of time the facility is available for use. The residential equivalency factor for parks, churches, schools, cemeteries, and other shared-use areas were calculated based on information from the appropriate authority and site inspections. ODOT's method of calculating a number of "equivalent residential receptors" for each receptor was used to calculate usage at parks and other shared-use areas in Oregon. Residential equivalencies calculations are provided in Appendix G.

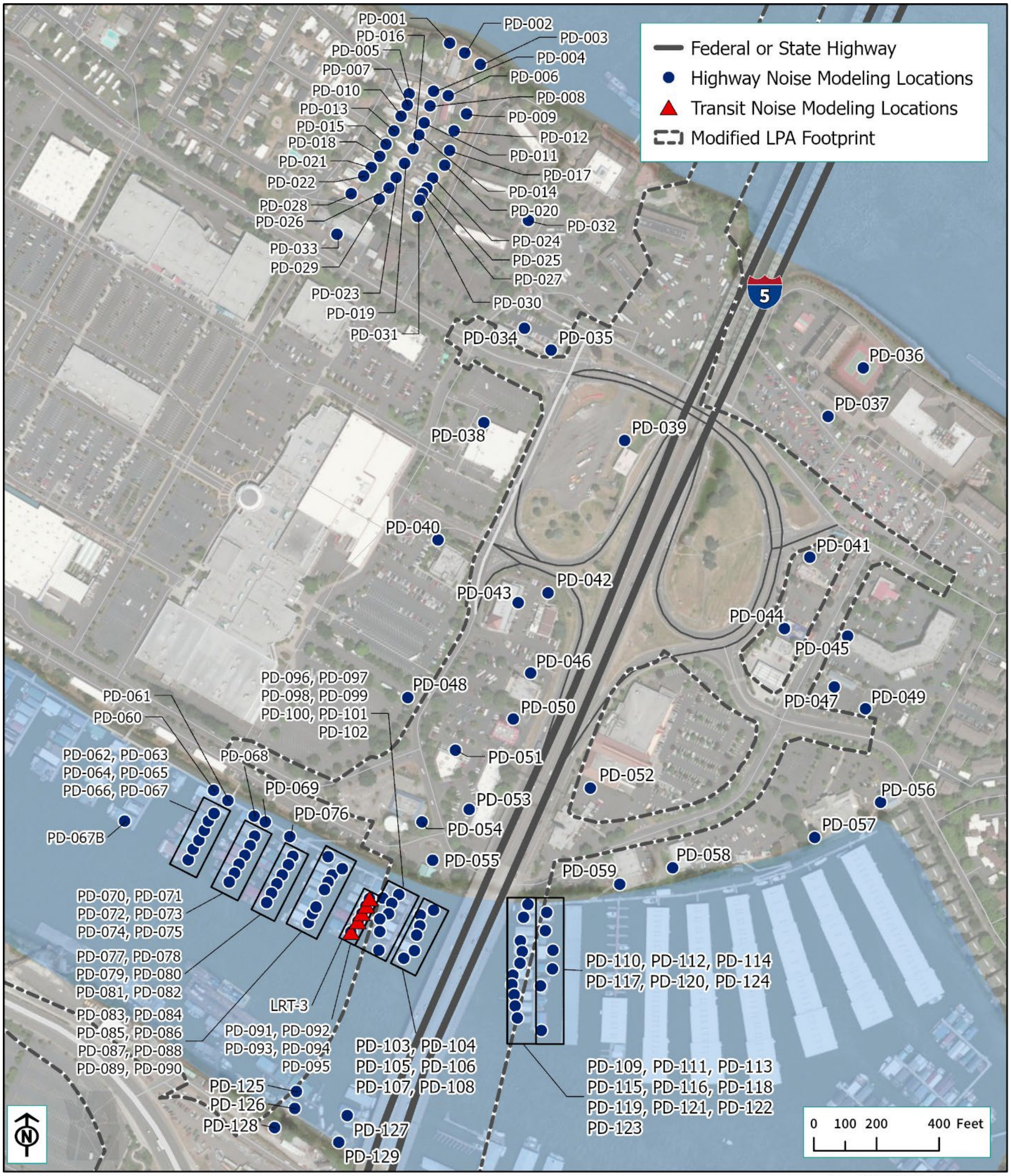
3.5 Regional Traffic Noise Conditions

As shown in the noise modeling, existing noise levels in the study area are dominated by traffic on I-5 and currently range from 45 to 75 dBA L_{eq}. Currently, an estimated 160 noise-sensitive land uses approach or exceed the applicable traffic noise criteria. This number includes single- and multi-family residences, along with several hotels and the residential equivalents for parks, trails, and one school and office. Of the exceedances identified in the study area, 50 are located on the Portland side and 110 are in Vancouver.

Figure 3-4. Noise Modeling Locations – North Portland Mainland

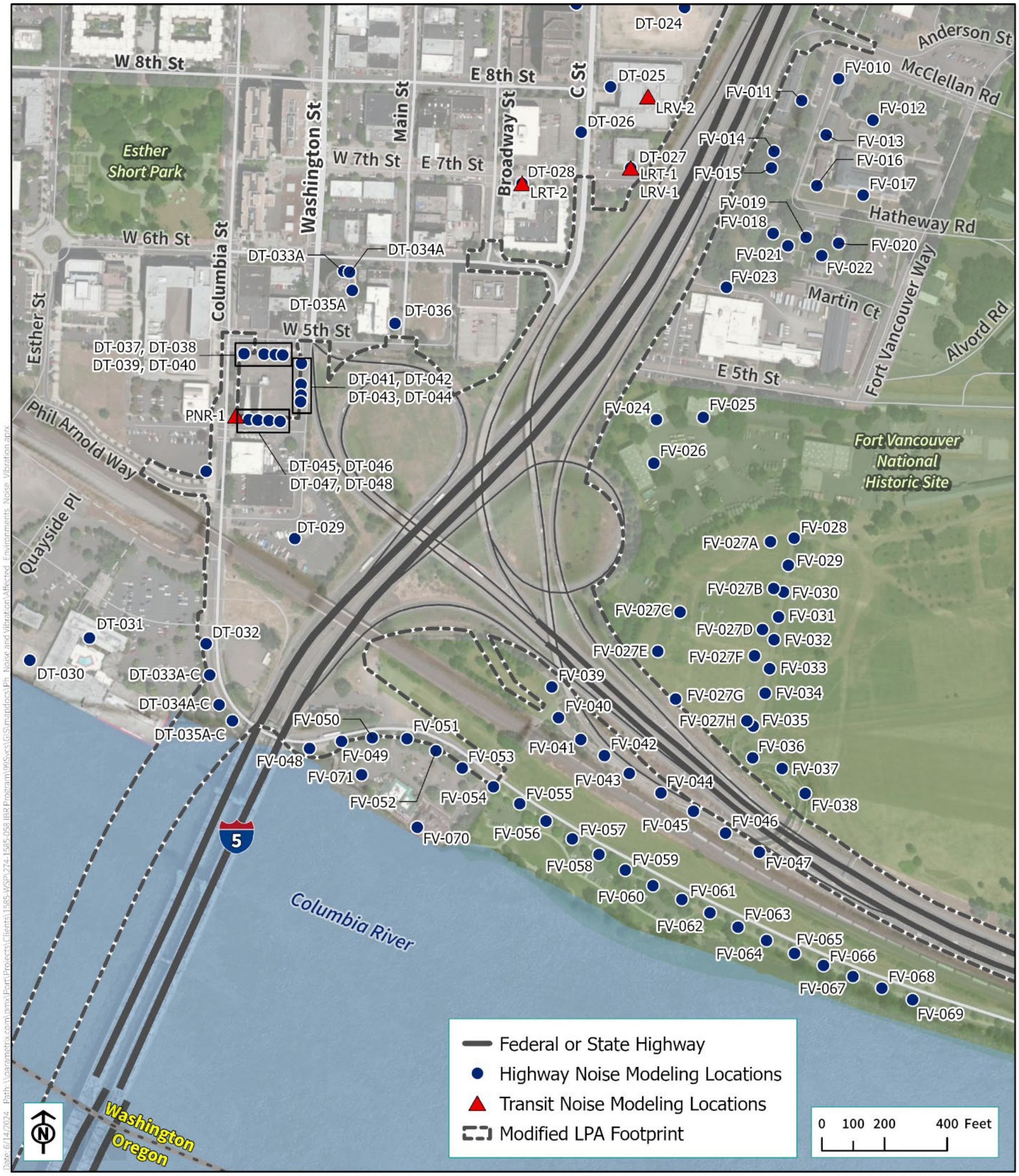
Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Figure 3-5. Noise Modeling Locations – North Portland Hayden Island



Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Figure 3-6. Noise Modeling Locations – Downtown Vancouver and Fort Vancouver (I-5/SR 14 Interchange)



Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Figure 3-7. Noise Modeling Locations – Downtown Vancouver and Fort Vancouver (E 8th Street to E McLoughlin Boulevard)

Figure 3-8. Noise Modeling Locations – North Vancouver (E. McLoughlin Boulevard to E 30th Street)

Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Figure 3-9. Noise Modeling Locations – North Vancouver (E 30th Street to E 39th Street)

Figure 3-10. Noise Modeling Locations – North Vancouver (E 39th Street to North Study Area Terminus)

Source: ODOT, WSDOT, Mapbox, OpenStreetMap

3.6 Delta Park to Mill Plain District

The following summarizes noise levels for Portland, downtown Vancouver, and the Fort Vancouver area. Separate discussions are provided for Portland and Vancouver because each has different applicable state traffic noise criteria and analysis methods. Worst-hour or loudest hour traffic from 2019 was used to model existing conditions.

3.6.1 Portland Existing Modeled Traffic Noise Levels

Current noise levels approach or exceed the ODOT NAAC at 50 locations adjacent to I-5. There are approximately 19 floating homes that approach or exceed the ODOT NAAC, with noise levels of 65 to 69 dBA L_{eq}. Existing noise levels at multi-level apartment units located along N Marine Drive also approach or exceed the ODOT NAAC along with one commercial property on N Hayden Island Drive. Apartment units in this area have private outdoor patios facing N Marine Drive, with noise levels ranging from 65 to 71 dBA L_{eq} (Sites PD-136A to PD-138C, PD-144A to PD-149C, and PD-155A to PD-173C). Table 3-1 summarizes the existing modeled noise levels and corresponding number of existing noise exceedances.

Table 3-1. Existing Traffic Noise Levels in Study Area - Portland

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-001	1	Residential	B (65)	54	0
PD-002	1	Residential	B (65)	55	0
PD-003	1	Residential	B (65)	56	0
PD-004	1	Residential	B (65)	49	0
PD-005	1	Residential	B (65)	47	0
PD-006	1	Residential	B (65)	49	0
PD-007	1	Residential	B (65)	47	0
PD-008	1	Residential	B (65)	47	0
PD-009	1	Residential	B (65)	48	0
PD-010	1	Residential	B (65)	47	0
PD-011	1	Residential	B (65)	48	0
PD-012	1	Residential	B (65)	47	0
PD-013	1	Residential	B (65)	47	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-014	1	Residential	B (65)	48	0
PD-015	1	Residential	B (65)	46	0
PD-016	1	Residential	B (65)	50	0
PD-017	1	Residential	B (65)	47	0
PD-018	1	Residential	B (65)	46	0
PD-019	1	Residential	B (65)	49	0
PD-020	1	Residential	B (65)	47	0
PD-021	1	Residential	B (65)	46	0
PD-022	1	Residential	B (65)	48	0
PD-023	1	Residential	B (65)	49	0
PD-024	1	Residential	B (65)	47	0
PD-025	1	Residential	B (65)	49	0
PD-026	1	Residential	B (65)	51	0
PD-027	1	Residential	B (65)	49	0
PD-028	1	Residential	B (65)	52	0
PD-029	1	Residential	B (65)	52	0
PD-030	1	Residential	B (65)	49	0
PD-031	1	Residential	B (65)	52	0
PD-032	1	Hotel	E (70)	60	0
PD-033	0	Commercial	F	62	0
PD-034	1	Restaurant	E (70)	60	0
PD-035	1	Restaurant	E (70)	**70**	1
PD-036	1	Recreation	C (65)	53	0
PD-037	1	Hotel	E (70)	64	0
PD-038	0	Commercial	F	64	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-039	0	Commercial	F	67	0
PD-040	1	Restaurant	E (70)	68	0
PD-041	1	Restaurant	E (70)	66	0
PD-042	1	Restaurant	E (70)	68	0
PD-043	0	Commercial	F	62	0
PD-044	1	Restaurant	E (70)	64	0
PD-045	1	Hotel	E (70)	60	0
PD-046	1	Restaurant	E (70)	67	0
PD-047	0	Commercial	F	58	0
PD-048	1	Restaurant	E (70)	61	0
PD-049	1	Restaurant	E (70)	58	0
PD-050	1	Restaurant	E (70)	66	0
PD-051	1	Restaurant	E (70)	59	0
PD-052	0	Commercial	F	68	0
PD-053	1	Restaurant	E (70)	62	0
PD-054	1	Restaurant	E (70)	64	0
PD-055	1	Commercial	E (70)	66	0
PD-056	1	Fire House	B (65)	54	0
PD-057	0	Commercial	F	56	0
PD-058	0	Commercial	F	58	0
PD-059	0	Commercial	F	64	0
PD-060	1	Residential	B (65)	55	0
PD-061	1	Residential	B (65)	56	0
PD-062	1	Residential	B (65)	57	0
PD-063	1	Residential	B (65)	58	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-064	1	Residential	B (65)	58	0
PD-065	1	Residential	B (65)	58	0
PD-066	1	Residential	B (65)	58	0
PD-067	1	Residential	B (65)	58	0
PD-067B	1	Residential	B (65)	57	0
PD-068	1	Residential	B (65)	56	0
PD-069	1	Residential	B (65)	56	0
PD-070	1	Residential	B (65)	59	0
PD-071	1	Residential	B (65)	59	0
PD-072	1	Residential	B (65)	59	0
PD-073	1	Residential	B (65)	59	0
PD-074	1	Residential	B (65)	60	0
PD-075	1	Residential	B (65)	60	0
PD-076	1	Residential	B (65)	58	0
PD-077	1	Residential	B (65)	61	0
PD-078	1	Residential	B (65)	61	0
PD-079	1	Residential	B (65)	61	0
PD-080	1	Residential	B (65)	61	0
PD-081	1	Residential	B (65)	61	0
PD-082	1	Residential	B (65)	62	0
PD-083	1	Residential	B (65)	59	0
PD-084	1	Residential	B (65)	62	0
PD-085	1	Residential	B (65)	62	0
PD-086	1	Residential	B (65)	62	0
PD-087	1	Residential	B (65)	62	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-088	1	Residential	B (65)	63	0
PD-089	1	Residential	B (65)	63	0
PD-090	1	Residential	B (65)	63	0
PD-091	1	Residential	B (65)	61	0
PD-092	1	Residential	B (65)	64	0
PD-093	1	Residential	B (65)	64	0
PD-094	1	Residential	B (65)	64	0
PD-095	1	Residential	B (65)	64	0
PD-096	1	Residential	B (65)	61	0
PD-097	1	Residential	B (65)	53	0
PD-098	1	Residential	B (65)	53	0
PD-099	1	Residential	B (65)	53	0
PD-100	1	Residential	B (65)	53	0
PD-101	1	Residential	B (65)	52	0
PD-102	1	Residential	B (65)	64	0
PD-103	1	Residential	B (65)	**67**	1
PD-104	2	Residential	B (65)	**65**	2
PD-105	1	Residential	B (65)	**67**	1
PD-106	1	Residential	B (65)	**67**	1
PD-107	1	Residential	B (65)	**67**	1
PD-108	1	Residential	B (65)	**66**	1
PD-109	1	Residential	B (65)	**67**	1
PD-110	1	Residential	B (65)	64	0
PD-111	1	Residential	B (65)	**69**	1
PD-112	1	Residential	B (65)	64	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-113	1	Residential	B (65)	**68**	1
PD-114	1	Residential	B (65)	57	0
PD-115	1	Residential	B (65)	**68**	1
PD-116	1	Residential	B (65)	**68**	1
PD-117	1	Residential	B (65)	55	0
PD-118	1	Residential	B (65)	**69**	1
PD-119	1	Residential	B (65)	**69**	1
PD-120	1	Residential	B (65)	59	0
PD-121	1	Residential	B (65)	**68**	1
PD-122	1	Residential	B (65)	**68**	1
PD-123	1	Residential	B (65)	**68**	1
PD-124	1	Residential	B (65)	**65**	1
PD-125	1	Office	E (70)	65	0
PD-126	1	Residential	B (65)	64	0
PD-127	1	Residential	B (65)	64	0
PD-128	1	Residential	B (65)	**66**	1
PD-129	1	Residential	B (65)	63	0
PD-130	1	Park/Rest Area	C (65)	53	0
PD-130B	0	Undeveloped	G	53	0
PD-130C	0	Undeveloped	G	54	0
PD-130D	0	Undeveloped	G	55	0
PD-130E	0	Undeveloped	G	56	0
PD-131	0	Commercial	F	67	0
PD-132	0	Commercial	F	64	0
PD-133	5	Patio at Multi-Family	B (65)	45	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-135	5	Hotel	E (70)	50	0
PD-136A	1	Residential	B (65)	51	0
PD-136B	1	Residential	B (65)	53	0
PD-136C	1	Residential	B (65)	56	0
PD-137A	1	Residential	B (65)	52	0
PD-137B	1	Residential	B (65)	53	0
PD-137C	1	Residential	B (65)	56	0
PD-138A	1	Residential	B (65)	52	0
PD-138B	1	Residential	B (65)	54	0
PD-138C	1	Residential	B (65)	56	0
PD-144A	1	Residential	B (65)	53	0
PD-144B	1	Residential	B (65)	54	0
PD-144C	1	Residential	B (65)	55	0
PD-145A	1	Residential	B (65)	50	0
PD-145B	1	Residential	B (65)	51	0
PD-145C	1	Residential	B (65)	53	0
PD-146	1	Hotel	E (70)	55	0
PD-147A	2	Residential	B (65)	49	0
PD-147B	2	Residential	B (65)	50	0
PD-147C	2	Residential	B (65)	52	0
PD-148A	2	Residential	B (65)	49	0
PD-148B	2	Residential	B (65)	50	0
PD-148C	2	Residential	B (65)	52	0
PD-149A	2	Residential	B (65)	48	0
PD-149B	2	Residential	B (65)	49	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-149C	2	Residential	B (65)	51	0
PD-155A	2	Residential	B (65)	59	0
PD-155B	2	Residential	B (65)	60	0
PD-155C	2	Residential	B (65)	60	0
PD-156A	2	Residential	B (65)	54	0
PD-156B	2	Residential	B (65)	55	0
PD-156C	2	Residential	B (65)	56	0
PD-157A	1	Residential	B (65)	**65**	1
PD-157B	1	Residential	B (65)	**66**	1
PD-157C	1	Residential	B (65)	**66**	1
PD-158A	1	Residential	B (65)	**65**	1
PD-158B	1	Residential	B (65)	**66**	1
PD-158C	1	Residential	B (65)	**66**	1
PD-159A	1	Residential	B (65)	**65**	1
PD-159B	1	Residential	B (65)	**66**	1
PD-159C	1	Residential	B (65)	**67**	1
PD-160A	1	Residential	B (65)	**66**	1
PD-160B	1	Residential	B (65)	**66**	1
PD-160C	1	Residential	B (65)	**67**	1
PD-161A	1	Residential	B (65)	**66**	1
PD-161B	1	Residential	B (65)	**67**	1
PD-161C	1	Residential	B (65)	**67**	1
PD-162A	2	Residential	B (65)	57	0
PD-162B	2	Residential	B (65)	58	0
PD-162C	2	Residential	B (65)	62	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-163A	2	Residential	B (65)	62	0
PD-163B	2	Residential	B (65)	63	0
PD-163C	2	Residential	B (65)	63	0
PD-164A	1	Residential	B (65)	52	0
PD-164B	1	Residential	B (65)	54	0
PD-164C	1	Residential	B (65)	55	0
PD-165A	1	Residential	B (65)	52	0
PD-165B	1	Residential	B (65)	53	0
PD-165C	1	Residential	B (65)	54	0
PD-166A	1	Residential	B (65)	51	0
PD-166B	1	Residential	B (65)	53	0
PD-166C	1	Residential	B (65)	54	0
PD-167A	2	Residential	B (65)	62	0
PD-167B	2	Residential	B (65)	62	0
PD-167C	2	Residential	B (65)	63	0
PD-168A	1	Residential	B (65)	**68**	1
PD-168B	1	Residential	B (65)	**68**	1
PD-168C	1	Residential	B (65)	**68**	1
PD-169A	1	Residential	B (65)	**69**	1
PD-169B	1	Residential	B (65)	**69**	1
PD-169C	1	Residential	B (65)	**69**	1
PD-170A	1	Residential	B (65)	**69**	1
PD-170B	1	Residential	B (65)	**69**	1
PD-170C	1	Residential	B (65)	**69**	1
PD-171A	1	Residential	B (65)	**69**	1

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-171B	1	Residential	B (65)	**69**	1
PD-171C	1	Residential	B (65)	**69**	1
PD-172A	1	Residential	B (65)	**69**	1
PD-172B	1	Residential	B (65)	**69**	1
PD-172C	1	Residential	B (65)	**69**	1
PD-173A	2	Residential	B (65)	64	0
PD-173B	2	Residential	B (65)	63	0
PD-173C	2	Residential	B (65)	64	0
PD-174	0	Commercial	F	67	0
PD-175	0	Commercial	F	68	0
PD-176	0	Commercial	F	67	0
PD-177	0	Commercial	F	66	0
PD-178	2	Recreation	C (65)	61	0
PD-179	2	Recreation	C (65)	58	0
PD-180	2	Recreation	C (65)	57	0
PD-181	2	Recreation	C (65)	58	0
PD-182	2	Recreation	C (65)	56	0
PD-183	2	Recreation	C (65)	56	0
PD-184	1	Office	E (70)	54	0
PD-185	1	Park	C (65)	51	0
PD-185B	0	Undeveloped	G	52	0
PD-185C	0	Undeveloped	G	53	0
PD-185D	0	Undeveloped	G	54	0
PD-185E	0	Undeveloped	G	55	0
PD-185F	0	Undeveloped	G	57	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-185G	0	Undeveloped	G	58	0
PD-185H	0	Undeveloped	G	59	0
PD-186	2	Recreation	C (65)	58	0
PD-187	2	Recreation	C (65)	55	0
PD-188	2	Recreation	C (65)	60	0
PD-189	2	Recreation	C (65)	57	0
PD-190	2	Recreation	C (65)	61	0
PD-191	2	Recreation	C (65)	58	0
PD-192	2	Recreation	C (65)	62	0
PD-193	2	Recreation	C (65)	59	0
PD-194	2	Recreation	C (65)	61	0
PD-195	1	Hotel	E (70)	57	0
PD-196	1	Hotel	E (70)	57	0
PD-197	2	Recreation	C (65)	57	0
PD-198	0	Undeveloped	G	64	0
PD-198B	0	Undeveloped	G	61	0
PD-198C	0	Undeveloped	G	60	0
PD-198D	0	Undeveloped	G	58	0
PD-198E	0	Undeveloped	G	57	0
PD-199	0	Undeveloped	G	66	0
PD-199B	0	Undeveloped	G	64	0
PD-199C	0	Undeveloped	G	64	0
PD-199D	0	Undeveloped	G	65	0
PD-200	0	Undeveloped	G	68	0
PD-200B	0	Undeveloped	G	63	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
PD-200C	0	Undeveloped	G	64	0
PD-200D	0	Undeveloped	G	68	0
Totals Units	**278**			**Total Exceedances**	**50**

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences, apartment units, or residential equivalence. Sites PD-060 to PD-127 and PD-129 represent floating homes
c Land use: Residential = single or multi-family; Commercial = commercial/office; Hotel = Hotel/Motel; Park = park lands
d Traffic noise impacts criteria (ODOT Noise Abatement Approach Criteria)
e Existing modeled noise levels from Traffic Noise Model version 2.5 that exceed the ODOT Noise Abatement Approach Criteria in **bold**
f Number of residences, apartment units, or residential equivalence expected to exceed the traffic noise criteria
dBA = A=weighted decibels; ODOT = Oregon Department of Transportation

3.6.2 Downtown Vancouver Existing Modeled Traffic Noise Levels

Sixteen traffic noise modeling locations in downtown Vancouver represent 37 noise-sensitive properties. Land uses in this portion of the study area include multi-family residences, hotels, motels, the Vancouver Waterfront Trail, an elder care facility, the Vancouver Community Library, and the Academy Chapel (a church used for weddings and commercial/office space). Currently, 37 of the 221 noise-sensitive land uses approach or exceed the WSDOT NAC primarily due to I-5 traffic noise. Locations that would undergo noise impacts are mostly clustered at apartment buildings located just southwest of the I-5/E Mill Plain Boulevard interchange, C Street and E 7th Street, and a newly constructed building along Washington Street between West 4th and West 5th Streets.

Existing noise levels approach or exceed the criteria at a common outdoor use area at the Normandy Apartments located at E 7th Street and C Street, with noise levels predicted at 69 dBA L_{eq}. Existing noise levels above the noise impact criteria also occur at two multi-story apartments located at E 13th Street and E Street. Both apartments include private outdoor patios facing I-5 with noise levels ranging from 66 to 72 dBA L_{eq}. Existing noise levels also approach or exceed the criteria at three locations along the Vancouver Waterfront Trail.

The analysis of noise levels in Downtown Vancouver focuses on I-5, SR 14, and the associated ramps, but the Traffic Noise Model also includes local streets that influence noise in this area. Additional noise from downtown traffic operating on local surface streets may result in noise levels that approach or exceed WSDOT noise criteria further from the study area. Table 3-2 summarizes the modeled noise levels and WSDOT NAC exceedance locations.

Table 3-2. Existing Traffic Noise Levels in Study Area - Downtown Vancouver

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
DT-001	1	Office	E (71)	68	0
DT-002	1	Residential	B (66)	**70**	1
DT-003	1	Residential	B (66)	**71**	1
DT-004	1	Residential	B (66)	**70**	1
DT-005	1	Residential	B (66)	**71**	1
DT-006	1	Residential	B (66)	**71**	1
DT-007	1	Residential	B (66)	**72**	1
DT-008	1	Office	E (71)	50	0
DT-009	1	Residential	B (66)	58	0
DT-010	1	Residential	B (66)	61	0
DT-011	1	Residential	B (66)	62	0
DT-012	1	Residential	B (66)	57	0
DT-013	1	Residential	B (66)	62	0
DT-014	1	Residential	B (66)	65	0
DT-015	1	Residential	B (66)	**66**	1
DT-016	1	Residential	B (66)	**68**	1
DT-017	1	Restaurant	E (71)	59	0
DT-018	1	Hotel Pool	C (66)	63	0
DT-019	1	Office	E (71)	68	0
DT-020	1	Church	C (66)	58	0
DT-021	1	Commercial	E (71)	62	0
DT-022	1	Library	C (66)	59	0
DT-023	1	Office	E (71)	58	0
DT-024	0	Undeveloped	G	62	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
DT-025	1	Restaurant	E (71)	56	0
DT-026	1	Office	E (71)	64	0
DT-027	6	Residential	B (66)	**69**	6
DT-028	1	Hotel	E (71)	55	0
DT-029	1	Commercial	E (71)	64	0
DT-030	1	Trail	C (66)	58	0
DT-031	1	Hotel	E (71)	60	0
DT-032	1	Trail	C (66)	65	0
DT-033	1	Trail	C (66)	**67**	1
DT-033A	6	Residential	B (66)	55	0
DT-033B	4	Residential	B (66)	56	0
DT-033C	4	Residential	B (66)	57	0
DT-034	1	Trail	C (66)	**69**	1
DT-034A	5	Residential	B (66)	56	0
DT-034B	4	Residential	B (66)	58	0
DT-034C	4	Residential	B (66)	60	0
DT-035	1	Trail	C (66)	**70**	1
DT-035A	5	Residential	B (66)	47	0
DT-035B	4	Residential	B (66)	59	0
DT-035C	4	Residential	B (66)	61	0
DT-036	82	Elder Care	B (66) / D (51)	60 / 35	0
DT-037	4	Residential	B (66)	56	0
DT-038	4	Residential	B (66)	60	0
DT-039	8	Residential	B (66)	62	0
DT-040	4	Residential	B (66)	63	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
DT-041	4	Residential	B (66)	**71**	4
DT-042	4	Residential	B (66)	**70**	4
DT-043	8	Residential	B (66)	**70**	8
DT-044	4	Residential	B (66)	**69**	4
DT-045	4	Residential	B (66)	63	0
DT-046	4	Residential	B (66)	63	0
DT-047	8	Residential	B (66)	64	0
DT-048	4	Residential	B (66)	64	0
DT-049	0	Undeveloped	B (66)	56	0
Totals Units	**221**			**Total Exceedances**	**37**

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences, apartment units, or residential equivalence
c Land use: Residential = single or multi-family; Commercial = commercial/office; Hotel = hotel/motel; Park = park lands
d Traffic noise impacts criteria (WSDOT NAC)
e Existing modeled noise levels from Traffic Noise Model version 2.5, with exceedances of WSDOT NAC shown in **bold**
f Number of residences, apartment units, or residential equivalence expected to exceed the traffic noise criteria
dBA = A-weighted decibels; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

3.6.3 Fort Vancouver Existing Modeled Traffic Noise Levels

Seventy-seven noise modeling locations in the VNHR and nearby areas represent individual parcels used as residential, commercial/offices and outdoor recreation areas located within the Fort Vancouver Historic District. These 77 locations also represent residential equivalencies for the Fort Vancouver Historic Trading Post Buildings, Fort Vancouver Park Trail, Old Apple Tree Park, Confluence Land Bridge, Waterfront Renaissance Trail, and Waterfront Park. Noise levels in the area currently range from 52 to 75 dBA L_{eq}, with the highest levels at unshielded areas along I-5 and SR 14. Currently, six modeled locations along the Fort Vancouver Park Trail, Confluence Land Bridge Trail, and three modeled locations along the Waterfront Renaissance Trail approach or exceed the WSDOT NAC. The modeled results are listed in Table 3-3.

Table 3-3. Existing Traffic Noise Levels in Study Area - Fort Vancouver

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
FV-001	1	Office	E (71)	55	0
FV-002	1	Historic District/Office	C (66)	65	0
FV-003	1	Historic District/Office	C (66)	63	0
FV-004	1	Historic District/Office	C (66)	62	0
FV-005	1	Historic District/Office	C (66)	60	0
FV-006	1	Historic District/Office	C (66)	56	0
FV-007	1	Historic District/Office	C (66)	54	0
FV-008	1	Historic District/Office	C (66)	61	0
FV-009	1	Historic District/Office	C (66)	54	0
FV-010	12	Historic District/Residence	C (66)/B (66)	60	0
FV-011	0	Historic District/former health care facility	C (66)	57	0
FV-012	1	Historic District/Office	C (66)	53	0
FV-013	1	Historic District/Office	C (66)	54	0
FV-014	2	Historic District/Residence	C 66)/B (66)	61	0
FV-015	2	Historic District/Residence	C (66)/B (66)	61	0
FV-016	1	Historic District/Office	C (66)	56	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
FV-017	1	Historic District/Office	C (66)	52	0
FV-018	2	Historic District/Residence	C (66)/B (66)	61	0
FV-019	2	Historic District/Residence	C (66)/B (66)	58	0
FV-020	2	Historic District/Residence	C (66)/ B (66)	54	0
FV-021	2	Historic District/Residence	C (66)/B (66)	59	0
FV-022	2	Historic District/Residence	C (66)/B (66)	53	0
FV-023	1	Historic District/Office	C (66)	62	0
FV-024	1	Historic District/Office	C (66)	55	0
FV-025	1	Historic District/Office	C (66)	53	0
FV-026	1	Historic District/Office	C (66)	56	0
FV-027A	1	Historic District/FV Village	C (66)	55	0
FV-027B	1	Historic District/FV Village	C (66)	55	0
FV-027C	1	Historic District/FV Village	C (66)	58	0
FV-027D	1	Historic District/FV Village	C (66)	57	0
FV-027E	1	Historic District/FV Village	C (66)	60	0
FV-027F	1	Historic District/FV Village	C (66)	58	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
FV-027G	1	Historic District/FV Village	C (66)	65	0
FV-027H	1	Historic District/FV Village	C (66)	63	0
FV-028	1	Historic District/Trail	C (66)	54	0
FV-029	1	Historic District/Trail	C (66)	55	0
FV-030	1	Historic District/Trail	C (66)	55	0
FV-031	1	Historic District/Trail	C (66)	56	0
FV-032	1	Historic District/Trail	C (66)	57	0
FV-033	1	Historic District/Trail	C (66)	59	0
FV-034	1	Historic District/Trail	C (66)	60	0
FV-035	1	Historic District/Trail	C (66)	64	0
FV-036	1	Historic District/Trail	C (66)	**69**	1
FV-037	1	Historic District/Trail	C (66)	**68**	1
FV-038	1	Historic District/Trail	C (66)	**70**	1
FV-039	1	Historic District/Park	C (66)	63	0
FV-040	1	Historic District/Trail	C (66)	60	0
FV-041	1	Historic District/Trail	C (66)	59	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
FV-042	1	Historic District/Trail	C (66)	60	0
FV-043	1	Historic District/Trail	C (66)	65	0
FV-044	1	Historic District/Trail	C (66)	**66**	1
FV-045	1	Historic District/Trail	C (66)	65	0
FV-046	1	Historic District/Trail	C (66)	**66**	1
FV-047	1	Historic District/Trail	C (66)	**75**	1
FV-048	1	Trail	C (66)	**69**	1
FV-049	1	Trail	C (66)	**68**	1
FV-050	1	Trail	C (66)	**66**	1
FV-051	1	Trail	C (66)	64	0
FV-052	1	Trail	C (66)	62	0
FV-053	1	Trail	C (66)	60	0
FV-054	1	Trail	C (66)	58	0
FV-055	1	Historic District/Trail	C (66)	57	0
FV-056	1	Historic District/Trail	C (66)	57	0
FV-057	1	Historic District/Trail	C (66)	57	0
FV-058	1	Historic District/Trail	C (66)	56	0
FV-059	1	Historic District/Trail	C (66)	56	0
FV-060	1	Historic District/Park	C (66)	56	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
FV-061	1	Historic District/Trail	C (66)	56	0
FV-062	1	Historic District/Trail	C (66)	56	0
FV-063	1	Historic District/Trail	C (66)	56	0
FV-064	1	Historic District/Trail	C (66)	57	0
FV-065	1	Historic District/Trail	C (66)	57	0
FV-066	1	Historic District/Trail	C (66)	57	0
FV-067	1	Historic District/Trail	C (66)	58	0
FV-068	1	Historic District/Trail	C (66)	58	0
FV-069	1	Historic District/Trail	C (66)	59	0
FV-070	1	Restaurant	E (71)	61	0
FV-071	0	Undeveloped	G	66	0
Totals Units	**84**			**Total Exceedances**	**9**

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences, apartment units, or residential equivalence
c Land use: Recreation = athletic field or playfield; Park; Trail, Historic District, Fort Vancouver
d Traffic noise impacts criteria (WSDOT NAC)
e Existing modeled noise levels from Traffic Noise Model version 2.5, with exceedances of WSDOT NAC shown in **bold**
f Number of residences, apartment units, or residential equivalence expected to exceed the traffic noise criteria
dBA = A-weighted decibels; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

3.7 Mill Plain District to North Vancouver

This section addresses the area north of Mill Plain to the northern study area terminus. Due to the large number of noise-sensitive properties, the analysis is split into two sections, one for the east side of I-5 and one for the west side of I-5.

3.7.1 Vancouver East of I-5, North of Mill Plain Existing Modeled Traffic Noise Levels

In the Vancouver area east of I-5 and north of Mill Plain Boulevard, 193 noise modeling locations were placed to represent 246 residences and residential equivalents, two churches, one school and athletic fields, hospital, community center, four parks, and two cemeteries. Existing noise levels at the modeling locations range from 49 to 73 dBA L_{eq}. Currently, 16 locations that represent 17 residential equivalents approach or exceed the WSDOT NAC. Noise levels do not approach or exceed the NAC at the hospital, cemeteries, churches, school, community center, or three of the four parks located in the area; however, existing noise levels exceed the NAC at the nearest outdoor use area at Marshall Park, where a series of horse shoe pits are located near I-5 ramps. The other 16 sites where noise levels approach or exceed the NAC are residences. Table 3-4 summarizes the existing noise levels and locations of existing noise exceedances.

Table 3-4. Existing Traffic Noise Levels in Study Area - Vancouver East of I-5, North of Mill Plain

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VE-001	1	Residential	B (66)	65	0
VE-002	1	Residential	B (66)	64	0
VE-003	1	Residential	B (66)	64	0
VE-004	1	Residential	B (66)	64	0
VE-005	6	Residential/ Recreation	B / C (66)	65	0
VE-006	3	Residential	B (66)	64	0
VE-007	3	Residential	B (66)	64	0
VE-008	1	Residential	B (66)	64	0
VE-009	1	Residential	B (66)	64	0
VE-010	1	Residential	B (66)	64	0
VE-011	1	Residential	B (66)	63	0
VE-012	1	Residential	B (66)	64	0
VE-013	1	Residential	B (66)	64	0
VE-014	1	Residential	B (66)	64	0
VE-015	1	Residential	B (66)	63	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VE-016	1	Recreation	C (66)	60	0
VE-017	1	Recreation	C (66)	60	0
VE-018	1	Recreation	C (66)	60	0
VE-019	1	Recreation	C (66)	59	0
VE-020	1	Recreation	C (66)	59	0
VE-021	1	Recreation	C (66)	58	0
VE-022	1	Recreation	C (66)	59	0
VE-023	1	Recreation	C (66)	59	0
VE-024	1	Residential	B (66)	61	0
VE-025	1	Residential	B (66)	60	0
VE-026	1	Residential	B (66)	60	0
VE-027	1	Residential	B (66)	60	0
VE-028	1	Residential	B (66)	60	0
VE-029	1	Residential	B (66)	61	0
VE-030	1	Residential	B (66)	60	0
VE-031	1	Residential	B (66)	59	0
VE-032	1	Residential	B (66)	61	0
VE-033	1	Residential	B (66)	59	0
VE-034	2	Residential	B (66)	62	0
VE-035	1	Residential	B (66)	60	0
VE-036	1	Residential	B (66)	60	0
VE-037	1	Residential	B (66)	59	0
VE-038	1	Residential	B (66)	56	0
VE-039	1	Residential	B (66)	59	0
VE-040	1	Residential	B (66)	58	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VE-041	2	Residential	B (66)	64	0
VE-042	2	Residential	B (66)	61	0
VE-043	1	Residential	B (66)	59	0
VE-044	1	Residential	B (66)	54	0
VE-045	1	Residential	B (66)	54	0
VE-046	1	Residential	B (66)	52	0
VE-047	1	Residential	B (66)	**66**	1
VE-048	2	Residential	B (66)	60	0
VE-049	2	Residential	B (66)	58	0
VE-050	1	Residential	B (66)	57	0
VE-051	2	Residential	B (66)	58	0
VE-052	1	Residential	B (66)	62	0
VE-053	2	Residential	B (66)	53	0
VE-054	1	Residential	B (66)	58	0
VE-055	1	Residential	B (66)	64	0
VE-056	1	Residential	B (66)	56	0
VE-057	1	Residential	B (66)	58	0
VE-058	1	Residential	B (66)	63	0
VE-059	1	Residential	B (66)	57	0
VE-060	1	Residential	B (66)	57	0
VE-061	1	Residential	B (66)	63	0
VE-062	1	Residential	B (66)	57	0
VE-063	1	Residential	B (66)	63	0
VE-064	2	Residential	B (66)	54	0
VE-065	1	Residential	B (66)	57	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VE-066	1	Residential	B (66)	63	0
VE-067	1	Residential	B (66)	57	0
VE-068	2	Residential	B (66)	55	0
VE-069	1	Residential	B (66)	56	0
VE-070	2	Residential	B (66)	53	0
VE-071	2	Residential	B (66)	51	0
VE-072	1	Residential	B (66)	63	0
VE-073	1	Residential	B (66)	56	0
VE-074	1	Residential	B (66)	54	0
VE-075	1	Residential	B (66)	63	0
VE-076	1	Residential	B (66)	56	0
VE-077	1	Residential	B (66)	53	0
VE-078	1	Residential	B (66)	63	0
VE-079	1	Residential	B (66)	54	0
VE-080	1	Residential	B (66)	51	0
VE-081	1	Residential	B (66)	63	0
VE-082	1	Residential	B (66)	54	0
VE-083	1	Residential	B (66)	52	0
VE-084	1	Residential	B (66)	63	0
VE-085	1	Residential	B (66)	51	0
VE-086	2	Residential	B (66)	51	0
VE-087	1	Residential	B (66)	62	0
VE-088	1	Residential	B (66)	52	0
VE-089	1	Residential	B (66)	51	0
VE-090	1	Residential	B (66)	51	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VE-091	1	Church	C (66)	59	0
VE-092	1	Residential	B (66)	53	0
VE-093	2	Residential	B (66)	51	0
VE-094	1	Residential	B (66)	49	0
VE-095	1	Residential	B (66)	**67**	1
VE-096	1	Residential	B (66)	58	0
VE-097	1	Residential	B (66)	56	0
VE-098	1	Residential	B (66)	65	0
VE-099	1	Residential	B (66)	53	0
VE-100	1	Residential	B (66)	**66**	1
VE-101	1	Residential	B (66)	56	0
VE-102	1	Residential	B (66)	52	0
VE-103	1	Residential	B (66)	62	0
VE-104	2	Residential	B (66)	56	0
VE-105	1	Residential	B (66)	52	0
VE-106	1	Residential	B (66)	62	0
VE-107	2	Residential	B (66)	54	0
VE-108	1	Residential	B (66)	62	0
VE-109	2	Residential	B (66)	55	0
VE-110	1	Residential	B (66)	52	0
VE-110B	1	Residential	B (66)	53	0
VE-111	1	Residential	B (66)	**66**	1
VE-112	2	Residential	B (66)	56	0
VE-113	1	Residential	B (66)	52	0
VE-114	1	Residential	B (66)	63	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VE-115	1	Residential	B (66)	57	0
VE-116	1	Residential	B (66)	51	0
VE-117	1	Residential	B (66)	62	0
VE-118	1	Residential	B (66)	54	0
VE-119	1	Residential	B (66)	53	0
VE-120	1	Residential	B (66)	61	0
VE-121	1	Residential	B (66)	52	0
VE-122	1	Residential	B (66)	52	0
VE-123	3	Residential	B (66)	64	0
VE-124	1	Residential	B (66)	51	0
VE-125	1	Residential	B (66)	52	0
VE-126	1	Residential	B (66)	**66**	1
VE-127	1	Residential	B (66)	54	0
VE-128	1	Residential	B (66)	52	0
VE-129	1	Residential	B (66)	65	0
VE-130	2	Residential	B (66)	57	0
VE-131	1	Residential	B (66)	**66**	1
VE-132	1	Residential	B (66)	57	0
VE-133	2	Residential	B (66)	51	0
VE-134	1	Residential	B (66)	**67**	1
VE-135	2	Residential	B (66)	56	0
VE-136	2	Residential	B (66)	51	0
VE-137	1	Residential	B (66)	**66**	1
VE-138	2	Residential	B (66)	58	0
VE-139	1	Residential	B (66)	52	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VE-140	1	Residential	B (66)	64	0
VE-141	2	Residential	B (66)	59	0
VE-142	1	Residential	B (66)	53	0
VE-143	2	Residential	B (66)	52	0
VE-144	1	Residential	B (66)	64	0
VE-145	2	Residential	B (66)	57	0
VE-146	1	Residential	B (66)	53	0
VE-147	1	Residential	B (66)	52	0
VE-148	1	Residential	B (66)	57	0
VE-149	2	Residential	B (66)	54	0
VE-150	1	Residential	B (66)	**68**	1
VE-151	1	Recreation	C (66)	57	0
VE-152	1	Residential	B (66)	53	0
VE-153	1	Residential	B (66)	**68**	1
VE-154	2	Residential	B (66)	55	0
VE-155	1	Residential	B (66)	**68**	1
VE-155B	1	Residential	B (66)	**66**	1
VE-156	1	Residential	B (66)	54	0
VE-157	2	Residential	B (66)	50	0
VE-158	1	Church	C (66)	57	0
VE-159	1	Residential	B (66)	55	0
VE-160	1	Residential	B (66)	53	0
VE-161	1	Residential	B (66)	**66**	1
VE-162	1	Residential	B (66)	58	0
VE-163	2	Residential	B (66)	**66**	2

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VE-164	1	Residential	B (66)	60	0
VE-165	1	Residential	B (66)	57	0
VE-166	1	Residential	B (66)	56	0
VE-167	1	Residential	B (66)	57	0
VE-168	1	Residential	B (66)	**73**	1
VE-169	2	Residential	B (66)	63	0
VE-170	2	Cemetery	C (66)	64	0
VE-171	2	Cemetery	C (66)	61	0
VE-172	2	Cemetery	C (66)	56	0
VE-173	1	Health Care	C (66)	62	0
VE-174	1	Health Care	C (66)	57	0
VE-175	2	Recreation	C (66)	61	0
VE-176	1	Commercial	E (71)	59	0
VE-177	2	Recreation	C (66)	54	0
VE-178	2	Recreation	C (66)	61	0
VE-179	1	Community Center	C (66)	59	0
VE-180	1	Community Center	C (66)	63	0
VE-181	1	Recreation	C (66)	**70**	1
VE-182	1	Recreation	C (66)	64	0
VE-183	2	Community Garden	C (66)	58	0
VE-184	2	Recreation	C (66)	65	0
VE-185	1	Recreation	C (66)	61	0
VE-186	1	Recreation	C (66)	59	0
VE-187	2	Recreation	C (66)	65	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VE-188	2	Recreation	C (66)	63	0
VE-189	1	Recreation	C (66)	59	0
VE-190	2	Recreation	C (66)	62	0
VE-191	2	Recreation	C (66)	61	0
Totals Units	**246**			**Total Exceedances**	**17**

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences, apartment units, or residential equivalence
c Land use: Residential = single or multi-family; Commercial = commercial/office; Recreation = athletic field or playfield; Cemetery; Church; Community Garden/Center; Health Care = Medical Center
d Traffic noise impacts criteria (WSDOT NAC)
e Existing modeled noise levels from Traffic Noise Model version 2.5, with exceedances of WSDOT NAC shown in **bold**
f Number of residences, apartment units, or residential equivalence expected to exceed the traffic noise criteria
dBA = A-weighted decibels; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

3.7.2 Vancouver West of I-5, North of Mill Plain Existing Modeled Traffic Noise Levels

Noise levels along the west side of I-5, between Mill Plain Boulevard and Discovery Middle School, ranged from 49 to 75 dBA L_{eq}. In this area 288 modeling locations represent 389 residences and residential equivalents, including Discovery Middle School and the Kiggins athletic fields, Arnada Park, one church, and multi-family units located between Mill Plain Blvd/E 15th Street and E 19th Street. Currently, 42 residences, two offices, the Kiggins athletic fields, and an outdoor area on the east side of Discovery School meet or exceed the WSDOT NAC. The outdoor area at the school is not a primary outdoor use location and was provided residential equivalency consistent with its use. Table 3-5 summarizes the existing noise levels and location of existing noise exceedances.

Table 3-5. Existing Traffic Noise Levels in Study Area - Vancouver West of I-5, North of Mill Plain

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-001	2	Recreation	C (66)	64	0
VW-002	2	Recreation	C (66)	**67**	2
VW-003	4	Recreation	C (66)	63	0
VW-004	1	School	C (66)	**66**	1
VW-005	1	School	C (66)	55	0
VW-006	1	School	C (66)	58	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-007	1	Residential	B (66)	58	0
VW-008	1	Residential	B (66)	59	0
VW-009	1	Residential	B (66)	61	0
VW-010	2	Residential	B (66)	**67**	2
VW-011	2	Residential	B (66)	**75**	2
VW-012	4	Residential	B (66)	55	0
VW-013	3	Residential	B (66)	53	0
VW-014	4	Residential	B (66)	53	0
VW-015	2	Residential	B (66)	53	0
VW-016	1	Residential	B (66)	61	0
VW-017	2	Residential	B (66)	**71**	2
VW-018	4	Residential	B (66)	54	0
VW-019	2	Residential	B (66)	50	0
VW-020	1	Residential	B (66)	62	0
VW-021	2	Residential	B (66)	58	0
VW-022	2	Residential	B (66)	61	0
VW-023	1	Residential	B (66)	65	0
VW-024	2	Residential	B (66)	56	0
VW-025	2	Residential	B (66)	58	0
VW-026	2	Residential	B (66)	62	0
VW-027	1	Residential	B (66)	**67**	1
VW-028	2	Residential	B (66)	62	0
VW-029	2	Residential	B (66)	60	0
VW-029B	1	Residential	B (66)	64	0
VW-030	2	Residential	B (66)	62	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-031	1	Residential	B (66)	62	0
VW-032	2	Residential	B (66)	**66**	2
VW-033	1	Residential	B (66)	64	0
VW-034	1	Commercial	E (71)	63	0
VW-035	1	Residential	B (66)	57	0
VW-036	1	Residential	B (66)	55	0
VW-037	1	Residential	B (66)	**66**	1
VW-038	1	Residential	B (66)	65	0
VW-039	2	Residential	B (66)	54	0
VW-040	1	Residential	B (66)	54	0
VW-041	1	Residential	B (66)	56	0
VW-042	1	Residential	B (66)	59	0
VW-043	1	Residential	B (66)	63	0
VW-044	1	Residential	B (66)	52	0
VW-045	2	Residential	B (66)	64	0
VW-046	1	Residential	B (66)	60	0
VW-047	1	Residential	B (66)	54	0
VW-048	1	Residential	B (66)	55	0
VW-049	1	Residential	B (66)	53	0
VW-050	1	Residential	B (66)	57	0
VW-051	1	Residential	B (66)	61	0
VW-052	2	Residential	B (66)	57	0
VW-053	1	Residential	B (66)	65	0
VW-054	1	Residential	B (66)	53	0
VW-055	1	Residential	B (66)	57	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-056	1	Residential	B (66)	63	0
VW-057	1	Residential	B (66)	53	0
VW-058	1	Residential	B (66)	57	0
VW-059	1	Residential	B (66)	63	0
VW-060	1	Residential	B (66)	54	0
VW-061	1	Residential	B (66)	57	0
VW-062	1	Residential	B (66)	64	0
VW-063	1	Residential	B (66)	54	0
VW-064	1	Residential	B (66)	57	0
VW-065	1	Residential	B (66)	62	0
VW-066	1	Residential	B (66)	54	0
VW-067	1	Residential	B (66)	55	0
VW-068	1	Residential	B (66)	61	0
VW-069	1	Residential	B (66)	52	0
VW-070	1	Residential	B (66)	53	0
VW-071	1	Residential	B (66)	59	0
VW-072	1	Residential	B (66)	53	0
VW-073	1	Residential	B (66)	53	0
VW-074	1	Residential	B (66)	55	0
VW-075	1	Residential	B (66)	57	0
VW-076	1	Residential	B (66)	61	0
VW-077	1	Residential	B (66)	63	0
VW-078	1	Residential	B (66)	54	0
VW-079	1	Residential	B (66)	57	0
VW-079B	2	Residential	B (66)	56	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-080	1	Residential	B (66)	63	0
VW-081	1	Residential	B (66)	53	0
VW-082	1	Residential	B (66)	63	0
VW-083	1	Residential	B (66)	53	0
VW-084	2	Residential	B (66)	62	0
VW-085	1	Residential	B (66)	54	0
VW-086	1	Residential	B (66)	55	0
VW-087	1	Residential	B (66)	56	0
VW-088	1	Residential	B (66)	61	0
VW-089	1	Residential	B (66)	54	0
VW-090	1	Residential	B (66)	55	0
VW-091	1	Residential	B (66)	51	0
VW-092	1	Residential	B (66)	54	0
VW-093	1	Residential	B (66)	54	0
VW-094	1	Residential	B (66)	61	0
VW-095	1	Residential	B (66)	52	0
VW-096	1	Residential	B (66)	54	0
VW-097	1	Residential	B (66)	56	0
VW-098	1	Residential	B (66)	60	0
VW-099	1	Residential	B (66)	53	0
VW-100	1	Residential	B (66)	54	0
VW-101	1	Residential	B (66)	53	0
VW-102	1	Residential	B (66)	56	0
VW-103	1	Residential	B (66)	**67**	1
VW-104	1	Residential	B (66)	52	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-105	1	Residential	B (66)	53	0
VW-106	1	Residential	B (66)	53	0
VW-107	1	Residential	B (66)	63	0
VW-108	1	Residential	B (66)	52	0
VW-109	1	Residential	B (66)	54	0
VW-110	1	Residential	B (66)	55	0
VW-111	2	Residential	B (66)	59	0
VW-112	1	Residential	B (66)	53	0
VW-113	1	Residential	B (66)	53	0
VW-114	1	Residential	B (66)	56	0
VW-115	1	Residential	B (66)	52	0
VW-116	1	Residential	B (66)	56	0
VW-117	1	Residential	B (66)	58	0
VW-118	1	Residential	B (66)	65	0
VW-119	1	Residential	B (66)	51	0
VW-120	1	Residential	B (66)	53	0
VW-121	1	Residential	B (66)	54	0
VW-122	1	Residential	B (66)	57	0
VW-123	1	Residential	B (66)	60	0
VW-124	1	Residential	B (66)	63	0
VW-125	1	Residential	B (66)	57	0
VW-126	1	Residential	B (66)	55	0
VW-127	1	Residential	B (66)	56	0
VW-128	1	Residential	B (66)	51	0
VW-128B	1	Residential	B (66)	51	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-129	1	Residential	B (66)	52	0
VW-130	1	Residential	B (66)	54	0
VW-131	1	Residential	B (66)	64	0
VW-132	1	Residential	B (66)	61	0
VW-133	1	Residential	B (66)	53	0
VW-134	1	Residential	B (66)	53	0
VW-135	1	Residential	B (66)	56	0
VW-136	1	Residential	B (66)	52	0
VW-137	1	Residential	B (66)	51	0
VW-138	1	Residential	B (66)	**67**	1
VW-138B	1	Residential	B (66)	62	0
VW-139	2	Residential	B (66)	52	0
VW-140	1	Residential	B (66)	56	0
VW-141	1	Residential	B (66)	61	0
VW-142	1	Residential	B (66)	65	0
VW-143	1	Church	C (66)	52	0
VW-144	1	Residential	B (66)	59	0
VW-145	1	Residential	B (66)	52	0
VW-146	1	Residential	B (66)	53	0
VW-147	2	Residential	B (66)	59	0
VW-148	5	Residential	B (66)	52	0
VW-149	1	Residential	B (66)	53	0
VW-150	1	Residential	B (66)	53	0
VW-151	1	Residential	B (66)	59	0
VW-152	1	Residential	B (66)	**66**	1

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-153	1	Residential	B (66)	62	0
VW-154	1	Residential	B (66)	52	0
VW-155	1	Residential	B (66)	56	0
VW-156	1	Residential	B (66)	64	0
VW-157	1	Residential	B (66)	52	0
VW-158	1	Residential	B (66)	57	0
VW-159	1	Residential	B (66)	64	0
VW-160	1	Residential	B (66)	52	0
VW-161	1	Residential	B (66)	57	0
VW-162	2	Residential	B (66)	63	0
VW-163	1	Residential	B (66)	54	0
VW-164	1	Residential	B (66)	59	0
VW-165	1	Residential	B (66)	51	0
VW-166	1	Residential	B (66)	58	0
VW-167	1	Residential	B (66)	54	0
VW-168	1	Residential	B (66)	55	0
VW-169	1	Residential	B (66)	60	0
VW-170	1	Residential	B (66)	60	0
VW-171	1	Residential	B (66)	62	0
VW-172	1	Residential	B (66)	**66**	1
VW-173	1	Residential	B (66)	64	0
VW-174	1	Residential	B (66)	**67**	1
VW-175	2	Residential	B (66)	64	0
VW-176	1	Residential	B (66)	63	0
VW-177	1	Residential	B (66)	**71**	1

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-178	3	Residence/Recreation	B (66)	55	0
VW-179	1	Residential	B (66)	60	0
VW-180	1	Residential	B (66)	60	0
VW-181	1	Commercial	E (71	57	0
VW-182	2	Residential	B (66)	57	0
VW-183	1	Residential	B (66)	**68**	1
VW-184	1	Residential	B (66)	56	0
VW-185	1	Residential	B (66)	58	0
VW-186	1	Residential	B (66)	**68**	1
VW-187	1	Residential	B (66)	**66**	1
VW-188	1	Residential	B (66)	55	0
VW-189	1	Residential	B (66)	56	0
VW-190	1	Residential	B (66)	**66**	1
VW-191	1	Residential	B (66)	56	0
VW-192	1	Residential	B (66)	65	0
VW-193	1	Residential	B (66)	55	0
VW-194	3	Residential	B (66)	56	0
VW-195	1	Residential	B (66)	64	0
VW-196	1	Office	E (71)	55	0
VW-197	2	Residential	B (66)	53	0
VW-198	3	Residential	B (66)	56	0
VW-199	1	Residential	B (66)	58	0
VW-200	1	Residential	B (66)	59	0
VW-201	1	Residential	B (66)	62	0
VW-202	1	Residential	B (66)	**68**	1

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-203	4	Residential	B (66)	58	0
VW-204	2	Residential	B (66)	57	0
VW-205	1	Residential	B (66)	56	0
VW-206	2	Residential	B (66)	57	0
VW-207	1	Residential	B (66)	57	0
VW-208	1	Residential	B (66)	58	0
VW-209	1	Residential	B (66)	64	0
VW-210	1	Residential	B (66)	58	0
VW-211	2	Residential	B (66)	59	0
VW-212	1	Residential	B (66)	57	0
VW-213	1	Residential	B (66)	59	0
VW-214	1	Residential	B (66)	**71**	1
VW-215	1	Residential	B (66)	57	0
VW-216	1	Residential	B (66)	60	0
VW-217	1	Residential	B (66)	**72**	1
VW-218	1	Residential	B (66)	57	0
VW-219	1	Residential	B (66)	61	0
VW-220	1	Residential	B (66)	**72**	1
VW-221	1	Residential	B (66)	59	0
VW-222	1	Residential	B (66)	58	0
VW-223	1	Residential	B (66)	62	0
VW-224	1	Residential	B (66)	**73**	1
VW-225	1	Residential	B (66)	59	0
VW-226	1	Residential	B (66)	**73**	1
VW-227	1	Residential	B (66)	60	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-228	1	Residential	B (66)	**68**	1
VW-229	1	Residential	B (66)	**73**	1
VW-230	1	Residential	B (66)	**69**	1
VW-231	1	Residential	B (66)	62	0
VW-232	1	Residential	B (66)	**69**	1
VW-233	1	Residential	B (66)	55	0
VW-234	1	Residential	B (66)	57	0
VW-235	1	Residential	B (66)	**70**	1
VW-236	1	Residential	B (66)	59	0
VW-237	1	Residential	B (66)	58	0
VW-238	1	Residential	B (66)	62	0
VW-239	1	Residential	B (66)	65	0
VW-240	6	Residential	B (66)	65	0
VW-241	6	Residential	B (66)	**71**	6
VW-242	1	Residential	B (66)	58	0
VW-243	1	Office	E (71)	59	0
VW-244	1	Residential	B (66)	59	0
VW-245	1	Office	E (71)	60	0
VW-246	1	Residential	B (66)	61	0
VW-247	2	Residential	B (66)	60	0
VW-248	1	Residential	B (66)	**70**	1
VW-249	1	Residential	B (66)	58	0
VW-250	1	Residential	B (66)	58	0
VW-251	1	Residential	B (66)	59	0
VW-252	1	Residential	B (66)	62	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-253	1	Residential	B (66)	58	0
VW-254	1	Residential	B (66)	55	0
VW-255	1	Residential	B (66)	57	0
VW-256	1	Residential	B (66)	60	0
VW-257	1	Residential	B (66)	63	0
VW-258	1	Residential	B (66)	64	0
VW-259	1	Residential	B (66)	**72**	1
VW-260	1	Residential	E (71)	53	0
VW-261	1	Residential	B (66)	58	0
VW-262	3	Residential	B (66)	59	0
VW-263	1	Residential	B (66)	58	0
VW-264	1	Residential	B (66)	59	0
VW-265	1	Residential	B (66)	**68**	1
VW-266	1	Office	E (71)	**72**	1
VW-267	1	Office	E (71)	57	0
VW-268	6	Residential	B (66)	49	0
VW-269	5	Residential	B (66)	62	0
VW-270	1	Office	E (71)	62	0
VW-271	6	Residential	B (66)	52	0
VW-272	1	Residential	B (66)	64	0
VW-273	1	Residential	B (66)	**66**	1
VW-274	6	Residential	B (66)	51	0
VW-275	1	Office	E (71)	**71**	1
VW-276	1	Office	E (71)	68	0
VW-277	1	Office	E (71)	66	0

Receptor [a]	Units [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	Exceedances [f]
VW-278	6	Residential	B (66)	65	0
VW-279	1	Residential	B (66)	**69**	1
VW-280	4	Residential	B (66)	59	0
VW-281	4	Residential	B (66)	62	0
VW-282	1	Recreation	C (66)	59	0
VW-283	1	Recreation	C (66)	62	0
VW-284	1	Recreation	C (66)	61	0
Totals Units	**389**			**Total Exceedances**	**47**

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences, apartment units, or residential equivalence
c Land use: Residential = single or multi-family; Commercial = commercial/office; Recreation = athletic field or playfield; Church
d Traffic noise impacts criteria (WSDOT NAC)
e Existing modeled noise levels from Traffic Noise Model version 2.5, with exceedances of WSDOT NAC shown in **bold**
f Number of residences, apartment units, or residential equivalence expected to exceed the traffic noise criteria
dBA = A-weighted decibels; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

3.8 Existing Noise Levels for Light-Rail Transit Analysis

Existing LRT noise levels are reported using the L_{dn} for residences and the peak hour L_{eq} for other types of land use. Existing noise level data for the light-rail analysis are taken from on-site measurements and following methods in the FTA Transit Noise and Vibration Manual. Locations in the transit corridor used for the traffic noise analysis were also used for the light-rail analysis. The noise levels provided represent primarily residential uses, with some uses such as hotels that include overnight sleeping.

There are several methods described in the FTA manual for determining the existing noise environment. Table 3-6 summarizes the locations for light-rail analysis and the projected noise levels in L_{eq} and L_{dn}. Projected noise levels in downtown Vancouver are provided with sites LT-1 to LT-3; in north Portland with sites LT-4 to LT-10; and in the area around the Ruby Junction Maintenance Facility with sites LT-11 and LT-12.

Existing noise level data for the light-rail analysis were taken from on-site measurements and following methods in the FTA Transit Noise and Vibration Manual. Locations in the transit corridor used for the traffic noise analysis were also used for the light-rail analysis. Existing noise levels ranged from 69 to 77 L_{eq} and 77 to 83 L_{dn} in downtown Vancouver, from 58 to 73 L_{eq} and 66 to 81 L_{dn} at sites in north Portland, and from 69 to 71 L_{eq} and 67 to 70 L_{dn} in the area around the Ruby Junction Maintenance Facility.

Table 3-6. Existing L_{eq} and L_{dn} for Light-Rail Transit Noise Analysis

Receptor [a]	Land Use [b]	Location [c]	L_{eq} [d] (dBA)	L_{dn} [e] (dBA)
LT-1	Library	Vancouver	69	77
LT-2	Residential	Vancouver	74	83
LT-3	Hotel	Vancouver	77	77
LT-4	Hotel	Portland	68	72
LT-5	Hotel	Portland	58	81
LT-6	Residential	Portland	67	68
LT-7	Residential	Portland	69	71
LT-8	Residential	Portland	66	72
LT-9	Residential	Portland	73	74
LT-10	Residential	Portland	66	66
LT-11	Residential	Portland/Gresham	71	70
LT-12	Residential	Portland/Gresham	69	67

a Receptors shown on Figure 3-4 through Figure 3-10
b Land use: Residential; Library, Hotel = Hotel/Motel
c General location of receiver
d Peak hour L_{eq} for institutional land uses
e 24-hour L_{dn} for residential analysis
dBA = A-weighted decibels; L_{dn} = day-night equivalent sound level; L_{eq} = equivalent sound level

4. LONG-TERM EFFECTS

This chapter describes the potential noise effects from the No-Build Alternative and the Modified LPA, organized by subarea. Worst-hour or loudest traffic hour from 2045 was used to model the future No-Build and the Modified LPA. Results from the noise analysis for individual historic properties are discussed in the Historic Built Environment Technical Report.

4.1 Portland Traffic Noise

This section describes the potential noise effects from the No-Build Alternative and the Modified LPA within Portland.

4.1.1 No-Build Alternative Traffic Noise

No-Build Alternative traffic noise levels were predicted for Portland area receptors (PD) as shown in Table 4-1. Forty-nine of the 50 receptors where existing noise levels approach or exceed the ODOT NAAC are predicted to continue to approach or exceed the ODOT traffic noise criteria under the No-Build Alternative. In addition to these 49 receptors, it is predicted that traffic noise levels at 15 more locations near I-5 and N Marine Drive will approach or exceed the ODOT traffic noise criteria under the No-Build Alternative. No-Build Alternative would range from 45 to 70 dBA L_{eq} with a 1 to 2 dBA increase levels over existing conditions at most locations due to an increase in traffic volumes.

An estimated 19 floating homes are predicted to approach or exceed the ODOT NAAC with existing noise levels of 65 to 69 dBA L_{eq}. Under the No-Build Alternative, an additional 10 floating homes would exceed the criteria; noise levels would increase by 1 to 2 dBA at most locations over the existing noise levels due do an increase in traffic volumes in 2045. The majority of the remaining traffic noise levels above the ODOT NAAC are located at the apartment complexes along N Marine Drive. Noise levels are predicted to exceed the ODOT NAAC at the same 30 apartments under the existing conditions and an additional four apartments within the Newport Apartment complex under the No-Build Alternative with levels ranging from 49 to 70 dBA L_{eq} (Sites PD-136A to PD-138C, PD-144A to PD-149C, and PD-155A to PD-173C); most locations are predicted to experience an increase of 1 to 2 dBA over existing noise levels. Traffic noise levels under the No-Build Alternative also approach or exceed the ODOT NAAC at the at one commercial property on N Parker Avenue on Hayden Island.

Table 4-1. No-Build Alternative Traffic Noise Levels - Portland

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-001	1	Residential	B (65)	54	55	1	0
PD-002	1	Residential	B (65)	55	56	1	0
PD-003	1	Residential	B (65)	56	57	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-004	1	Residential	B (65)	49	50	1	0
PD-005	1	Residential	B (65)	47	48	1	0
PD-006	1	Residential	B (65)	49	50	1	0
PD-007	1	Residential	B (65)	47	48	1	0
PD-008	1	Residential	B (65)	47	48	1	0
PD-009	1	Residential	B (65)	48	49	1	0
PD-010	1	Residential	B (65)	47	48	1	0
PD-011	1	Residential	B (65)	48	48	0	0
PD-012	1	Residential	B (65)	47	48	1	0
PD-013	1	Residential	B (65)	47	48	1	0
PD-014	1	Residential	B (65)	48	49	1	0
PD-015	1	Residential	B (65)	46	47	1	0
PD-016	1	Residential	B (65)	50	51	1	0
PD-017	1	Residential	B (65)	47	48	1	0
PD-018	1	Residential	B (65)	46	46	0	0
PD-019	1	Residential	B (65)	49	50	1	0
PD-020	1	Residential	B (65)	47	48	1	0
PD-021	1	Residential	B (65)	46	47	1	0
PD-022	1	Residential	B (65)	48	48	0	0
PD-023	1	Residential	B (65)	49	49	0	0
PD-024	1	Residential	B (65)	47	48	1	0
PD-025	1	Residential	B (65)	49	49	0	0
PD-026	1	Residential	B (65)	51	52	1	0
PD-027	1	Residential	B (65)	49	49	0	0
PD-028	1	Residential	B (65)	52	53	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-029	1	Residential	B (65)	52	53	1	0
PD-030	1	Residential	B (65)	49	50	1	0
PD-031	1	Residential	B (65)	52	52	0	0
PD-032	1	Hotel	E (70)	60	61	1	0
PD-033	0	Commercial	F	62	61	-1	0
PD-034	1	Restaurant	E (70)	60	62	2	0
PD-035	1	Restaurant	E (70)	**70**	69	-1	0
PD-036	1	Recreation	C (65)	53	54	1	0
PD-037	1	Hotel	E (70)	64	65	1	0
PD-038	0	Commercial	F	64	65	1	0
PD-039	0	Commercial	F	67	67	0	0
PD-040	1	Restaurant	E (70)	68	**71**	3	1
PD-041	1	Restaurant	E (70)	66	66	0	0
PD-042	1	Restaurant	E (70)	68	68	0	0
PD-043	0	Commercial	F	62	63	1	0
PD-044	1	Restaurant	E (70)	64	64	0	0
PD-045	1	Hotel	E (70)	60	60	0	0
PD-046	1	Restaurant	E (70)	67	68	1	0
PD-047	0	Commercial	F	58	59	1	0
PD-048	1	Restaurant	E (70)	61	62	1	0
PD-049	1	Restaurant	E (70)	58	59	1	0
PD-050	1	Restaurant	E (70)	66	67	1	0
PD-051	1	Restaurant	E (70)	59	60	1	0
PD-052	0	Commercial	F	68	69	1	0
PD-053	1	Restaurant	E (70)	62	63	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-054	1	Restaurant	E (70)	64	65	1	0
PD-055	1	Commercial	E (70)	66	67	1	0
PD-056	1	Fire House	B (65)	54	55	1	0
PD-057	0	Commercial	F	56	57	1	0
PD-058	0	Commercial	F	58	59	1	0
PD-059	0	Commercial	F	64	65	1	0
PD-060	1	Residential	B (65)	55	56	1	0
PD-061	1	Residential	B (65)	56	57	1	0
PD-062	1	Residential	B (65)	57	59	2	0
PD-063	1	Residential	B (65)	58	59	1	0
PD-064	1	Residential	B (65)	58	59	1	0
PD-065	1	Residential	B (65)	58	59	1	0
PD-066	1	Residential	B (65)	58	60	2	0
PD-067	1	Residential	B (65)	58	60	2	0
PD-067B	1	Residential	B (65)	57	58	1	0
PD-068	1	Residential	B (65)	56	57	1	0
PD-069	1	Residential	B (65)	56	58	2	0
PD-070	1	Residential	B (65)	59	60	1	0
PD-071	1	Residential	B (65)	59	61	2	0
PD-072	1	Residential	B (65)	59	61	2	0
PD-073	1	Residential	B (65)	59	61	2	0
PD-074	1	Residential	B (65)	60	61	1	0
PD-075	1	Residential	B (65)	60	61	1	0
PD-076	1	Residential	B (65)	58	59	1	0
PD-077	1	Residential	B (65)	61	62	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-078	1	Residential	B (65)	61	62	1	0
PD-079	1	Residential	B (65)	61	62	1	0
PD-080	1	Residential	B (65)	61	62	1	0
PD-081	1	Residential	B (65)	61	63	2	0
PD-082	1	Residential	B (65)	62	63	1	0
PD-083	1	Residential	B (65)	59	60	1	0
PD-084	1	Residential	B (65)	62	63	1	0
PD-085	1	Residential	B (65)	62	63	1	0
PD-086	1	Residential	B (65)	62	63	1	0
PD-087	1	Residential	B (65)	62	64	2	0
PD-088	1	Residential	B (65)	63	64	1	0
PD-089	1	Residential	B (65)	63	64	1	0
PD-090	1	Residential	B (65)	63	**65**	2	1
PD-091	1	Residential	B (65)	61	63	2	0
PD-092	1	Residential	B (65)	64	**65**	1	1
PD-093	1	Residential	B (65)	64	**65**	1	1
PD-094	1	Residential	B (65)	64	**65**	1	1
PD-095	1	Residential	B (65)	64	**66**	2	1
PD-096	1	Residential	B (65)	61	62	1	0
PD-097	1	Residential	B (65)	53	54	1	0
PD-098	1	Residential	B (65)	53	54	1	0
PD-099	1	Residential	B (65)	53	54	1	0
PD-100	1	Residential	B (65)	53	55	2	0
PD-101	1	Residential	B (65)	52	53	1	0
PD-102	1	Residential	B (65)	64	**65**	1	1

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-103	1	Residential	B (65)	**67**	**69**	2	1
PD-104	2	Residential	B (65)	**65**	**66**	1	2
PD-105	1	Residential	B (65)	**67**	**68**	1	1
PD-106	1	Residential	B (65)	**67**	**68**	1	1
PD-107	1	Residential	B (65)	**67**	**68**	1	1
PD-108	1	Residential	B (65)	**66**	**67**	1	1
PD-109	1	Residential	B (65)	**67**	**68**	1	1
PD-110	1	Residential	B (65)	64	**65**	1	1
PD-111	1	Residential	B (65)	**69**	**70**	1	1
PD-112	1	Residential	B (65)	64	**65**	1	1
PD-113	1	Residential	B (65)	**68**	**69**	1	1
PD-114	1	Residential	B (65)	57	58	1	0
PD-115	1	Residential	B (65)	**68**	**69**	1	1
PD-116	1	Residential	B (65)	**68**	**69**	1	1
PD-117	1	Residential	B (65)	55	56	1	0
PD-118	1	Residential	B (65)	**69**	**70**	1	1
PD-119	1	Residential	B (65)	**69**	**70**	1	1
PD-120	1	Residential	B (65)	59	60	1	0
PD-121	1	Residential	B (65)	**68**	**69**	1	1
PD-122	1	Residential	B (65)	**68**	**69**	1	1
PD-123	1	Residential	B (65)	**68**	**69**	1	1
PD-124	1	Residential	B (65)	**65**	**66**	1	1
PD-125	1	Office	E (70)	65	66	1	0
PD-126	1	Residential	B (65)	64	**65**	1	1
PD-127	1	Residential	B (65)	64	**65**	1	1

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-128	1	Residential	B (65)	**66**	**67**	1	1
PD-129	1	Residential	B (65)	63	64	1	0
PD-130	1	Park/Rest Area	C (65)	53	54	1	0
PD-130B	0	Undeveloped	G	53	55	2	0
PD-130C	0	Undeveloped	G	54	56	2	0
PD-130D	0	Undeveloped	G	55	57	2	0
PD-130E	0	Undeveloped	G	56	58	2	0
PD-131	0	Commercial	F	67	68	1	0
PD-132	0	Commercial	F	64	65	1	0
PD-133	5	Patio at Multi-Family	B (65)	45	46	1	0
PD-135	5	Hotel	E (70)	50	52	2	0
PD-136A	1	Residential	B (65)	51	53	2	0
PD-136B	1	Residential	B (65)	53	55	2	0
PD-136C	1	Residential	B (65)	56	57	1	0
PD-137A	1	Residential	B (65)	52	54	2	0
PD-137B	1	Residential	B (65)	53	55	2	0
PD-137C	1	Residential	B (65)	56	57	1	0
PD-138A	1	Residential	B (65)	52	54	2	0
PD-138B	1	Residential	B (65)	54	55	1	0
PD-138C	1	Residential	B (65)	56	57	1	0
PD-144A	1	Residential	B (65)	53	54	1	0
PD-144B	1	Residential	B (65)	54	55	1	0
PD-144C	1	Residential	B (65)	55	56	1	0
PD-145A	1	Residential	B (65)	50	51	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-145B	1	Residential	B (65)	51	52	1	0
PD-145C	1	Residential	B (65)	53	54	1	0
PD-146	1	Hotel	E (70)	55	57	2	0
PD-147A	2	Residential	B (65)	49	51	2	0
PD-147B	2	Residential	B (65)	50	52	2	0
PD-147C	2	Residential	B (65)	52	53	1	0
PD-148A	2	Residential	B (65)	49	50	1	0
PD-148B	2	Residential	B (65)	50	52	2	0
PD-148C	2	Residential	B (65)	52	53	1	0
PD-149A	2	Residential	B (65)	48	49	1	0
PD-149B	2	Residential	B (65)	49	51	2	0
PD-149C	2	Residential	B (65)	51	52	1	0
PD-155A	2	Residential	B (65)	59	60	1	0
PD-155B	2	Residential	B (65)	60	61	1	0
PD-155C	2	Residential	B (65)	60	61	1	0
PD-156A	2	Residential	B (65)	54	55	1	0
PD-156B	2	Residential	B (65)	55	56	1	0
PD-156C	2	Residential	B (65)	56	57	1	0
PD-157A	1	Residential	B (65)	**65**	**66**	1	1
PD-157B	1	Residential	B (65)	**66**	**67**	1	1
PD-157C	1	Residential	B (65)	**66**	**67**	1	1
PD-158A	1	Residential	B (65)	**65**	**66**	1	1
PD-158B	1	Residential	B (65)	**66**	**67**	1	1
PD-158C	1	Residential	B (65)	**66**	**67**	1	1
PD-159A	1	Residential	B (65)	**65**	**66**	1	1

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-159B	1	Residential	B (65)	**66**	**67**	1	1
PD-159C	1	Residential	B (65)	**67**	**68**	1	1
PD-160A	1	Residential	B (65)	**66**	**67**	1	1
PD-160B	1	Residential	B (65)	**66**	**67**	1	1
PD-160C	1	Residential	B (65)	**67**	**68**	1	1
PD-161A	1	Residential	B (65)	**66**	**67**	1	1
PD-161B	1	Residential	B (65)	**67**	**68**	1	1
PD-161C	1	Residential	B (65)	**67**	**68**	1	1
PD-162A	2	Residential	B (65)	57	58	1	0
PD-162B	2	Residential	B (65)	58	60	2	0
PD-162C	2	Residential	B (65)	62	63	1	0
PD-163A	2	Residential	B (65)	62	63	1	0
PD-163B	2	Residential	B (65)	63	64	1	0
PD-163C	2	Residential	B (65)	63	64	1	0
PD-164A	1	Residential	B (65)	52	54	2	0
PD-164B	1	Residential	B (65)	54	55	1	0
PD-164C	1	Residential	B (65)	55	57	2	0
PD-165A	1	Residential	B (65)	52	53	1	0
PD-165B	1	Residential	B (65)	53	55	2	0
PD-165C	1	Residential	B (65)	54	56	2	0
PD-166A	1	Residential	B (65)	51	53	2	0
PD-166B	1	Residential	B (65)	53	54	1	0
PD-166C	1	Residential	B (65)	54	55	1	0
PD-167A	2	Residential	B (65)	62	62	0	0
PD-167B	2	Residential	B (65)	62	63	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-167C	2	Residential	B (65)	63	63	0	0
PD-168A	1	Residential	B (65)	**68**	**69**	1	1
PD-168B	1	Residential	B (65)	**68**	**69**	1	1
PD-168C	1	Residential	B (65)	**68**	**69**	1	1
PD-169A	1	Residential	B (65)	**69**	**70**	1	1
PD-169B	1	Residential	B (65)	**69**	**70**	1	1
PD-169C	1	Residential	B (65)	**69**	**70**	1	1
PD-170A	1	Residential	B (65)	**69**	**70**	1	1
PD-170B	1	Residential	B (65)	**69**	**70**	1	1
PD-170C	1	Residential	B (65)	**69**	**70**	1	1
PD-171A	1	Residential	B (65)	**69**	**70**	1	1
PD-171B	1	Residential	B (65)	**69**	**70**	1	1
PD-171C	1	Residential	B (65)	**69**	**70**	1	1
PD-172A	1	Residential	B (65)	**69**	**70**	1	1
PD-172B	1	Residential	B (65)	**69**	**70**	1	1
PD-172C	1	Residential	B (65)	**69**	**70**	1	1
PD-173A	2	Residential	B (65)	64	**65**	1	2
PD-173B	2	Residential	B (65)	63	64	1	0
PD-173C	2	Residential	B (65)	64	**65**	1	2
PD-174	0	Commercial	F	67	68	1	0
PD-175	0	Commercial	F	68	69	1	0
PD-176	0	Commercial	F	67	68	1	0
PD-177	0	Commercial	F	66	66	0	0
PD-178	2	Recreation	C (65)	61	62	1	0
PD-179	2	Recreation	C (65)	58	59	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-180	2	Recreation	C (65)	57	58	1	0
PD-181	2	Recreation	C (65)	58	58	0	0
PD-182	2	Recreation	C (65)	56	57	1	0
PD-183	2	Recreation	C (65)	56	57	1	0
PD-184	1	Office	E (70)	54	55	1	0
PD-185	1	Park	C (65)	51	52	1	0
PD-185B	0	Undeveloped	G	52	53	1	0
PD-185C	0	Undeveloped	G	53	54	1	0
PD-185D	0	Undeveloped	G	54	55	1	0
PD-185E	0	Undeveloped	G	55	56	1	0
PD-185F	0	Undeveloped	G	57	58	1	0
PD-185G	0	Undeveloped	G	58	59	1	0
PD-185H	0	Undeveloped	G	59	60	1	0
PD-186	2	Recreation	C (65)	58	59	1	0
PD-187	2	Recreation	C (65)	55	56	1	0
PD-188	2	Recreation	C (65)	60	61	1	0
PD-189	2	Recreation	C (65)	57	58	1	0
PD-190	2	Recreation	C (65)	61	62	1	0
PD-191	2	Recreation	C (65)	58	59	1	0
PD-192	2	Recreation	C (65)	62	63	1	0
PD-193	2	Recreation	C (65)	59	60	1	0
PD-194	2	Recreation	C (65)	61	61	0	0
PD-195	1	Hotel	E (70)	57	58	1	0
PD-196	1	Hotel	E (70)	57	58	1	0
PD-197	2	Recreation	C (65)	57	58	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [d] (dBA)	No-Build Alternative [e] (dBA)	Change [f] (dBA)	Exceedances [g]
PD-198	0	Undeveloped	G	64	65	1	0
PD-198B	0	Undeveloped	G	61	62	1	0
PD-198C	0	Undeveloped	G	60	61	1	0
PD-198D	0	Undeveloped	G	58	59	1	0
PD-198E	0	Undeveloped	G	57	58	1	0
PD-199	0	Undeveloped	G	66	67	1	0
PD-199B	0	Undeveloped	G	64	65	1	0
PD-199C	0	Undeveloped	G	64	65	1	0
PD-199D	0	Undeveloped	G	65	67	2	0
PD-200	0	Undeveloped	G	68	68	0	0
PD-200B	0	Undeveloped	G	63	64	1	0
PD-200C	0	Undeveloped	G	64	65	1	0
PD-200D	0	Undeveloped	G	68	69	1	0

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences or residential equivalence. Sites PD-060 to PD-127 and PD-129 represent floating homes
c Land use: Residential = single or multi-family; Commercial = commercial/office; Hotel = hotel/motel; Recreation = athletic field or playfield; Park, Trail
d Existing modeled noise levels from FHWA Traffic Noise Model version 2.5 using 2019 traffic and speeds. ODOT NAAC exceedance in **bold**.
e Future No-Build modeled noise levels from FHWA Traffic Noise Model version 2.5 using 2045 traffic and speeds. ODOT NAAC exceedance in **bold**.
f Change in noise, No-Build Alternative minus Existing
g Number of residences, apartment units, or residential equivalence expected to exceed the WSDOT NAC under the No-Build Alternative
dBA = A-weighted decibels; FHWA = Federal Highway Administration; ODOT NAAC = Oregon Department of Transportation Noise Abatement Approach Criteria; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

4.1.2 Modified LPA Traffic Noise

Table 4-2 shows the results of the traffic noise modeling for the Modified LPA along with a comparison to the existing noise levels to assess whether substantial increase impacts would occur. As shown in Table 4-2, under the Modified LPA, noise levels would range from 49 to 71 dBA L_{eq}. Most locations would experience an increase of 2 to 4 dBA over existing conditions, with increases of up to 11 dBA at one location, site PD-007, which represents one mobile home in the Jantzen Beach RV park on Hayden Island. Noise levels would be 2 dBA above to 2 dBA below noise levels under the No-Build Alternative, at most locations. A qualitative analysis of the anticipated change in noise levels with the design options is provided below.

The greatest increase in noise levels under the Modified LPA is predicted at the Jantzen Beach RV park, located at the north end of Hayden Island and west of I-5. Noise levels in this area are predicted to increase 4 to 11 dBA over existing conditions and 4 to 10 dBA above No-Build Alternative noise levels; this is because the Modified LPA shifts the alignment of I-5 closer to homes at the RV park. While noise levels would increase at all of the RV homes, the modeling showed that three of the RV homes may experience a substantial noise increase (defined as an increase of 10 dBA or greater). An existing block wall at the RV park and a nearby hotel building provide some shielding against noise, as modeled. Noise levels under the Modified LPA, with any of the design options, would not approach or exceed ODOT's NAAC impact criteria at the RV park; however, the increase in noise levels would meet the threshold of 10 dBA over existing noise levels, making this a substantial increase.

Other areas that are predicted to experience ODOT NAAC impacts include the floating homes in North Portland Harbor (sites PD-077 to PD-082, PD-084 to PD-095), the apartments located closest to N Marine Drive (PD-157 to PD-161A-C, PD-163A-C, PD-167A-C, PD-168A-C to PD-172A-C, and PD-172A-C), and one soccer field (PD-192) at Delta Park. In the area between Hayden Island and the Oregon mainline, the IBR Program would acquire 34 floating homes to allow for the new Columbia River bridge alignment. Displaced homes are represented by modeled sites PD-096 to PD-127, and PD-129. As shown in the noise modeling results, the floating homes at the end of the dock (represented by modeled sites PD-076 and PD-083) would undergo additional noise shielding from the existing terrain and would not be subject to an NAAC impact. In addition to the houseboat displacements, modeled sites PD-038, PD-039, PD-040, PD-042, PD-043, PD-046, PD-048, PD-050 to PD-055, PD-128, PD-131, and PD-132, which represent a number of commercial businesses and restaurants on N Center Avenue, would be displaced.

The Modified LPA would approach or exceed the ODOT NAAC at 60 residences and one sports field. A substantial increase impact of 10 dBA over existing noise levels is predicted at three residences located at the Jantzen Beach RV park. Figure 4-1 and Figure 4-2 show the location of each traffic noise impact under the Modified LPA.

Recreational boat users on the Columbia River in Oregon are predicted to experience noise levels ranging from 52 to 67 dBA under the Modified LPA. Future noise levels are estimated based on modeled sites located along the shoreline. Estimated noise levels for recreational boat users on the Columbia River in Oregon would change between -1 dBA and 5 dBA compared to existing noise levels due to distance to future bridge alignments and shielding from bridge alignments.

4.1.2.1 Modified LPA Design Options

TWO AUXILIARY LANES IN EACH DIRECTION OF I-5

Highway noise impacts, before and after mitigation, that would result from the Modified LPA with two auxiliary lanes in each direction of I-5 design option would be largely the same as those resulting from the Modified LPA with one auxiliary lane in each direction of I-5 design option. Due to the distance between the nearest noise-sensitive land uses and the additional auxiliary lane, and because no changes in peak hour volumes, posted speed limits, or vehicle mix would occur with the addition of a second auxiliary lane, only slight differences in noise levels (0 to 2 dBA at the closest noise-sensitive uses) are anticipated. These slight differences would occur because a second auxiliary lane would add traffic approximately 16 feet closer to noise-sensitive land uses located east and west of I-5.

SR 14 INTERCHANGE WITHOUT C STREET RAMPS

The Modified LPA with the SR 14 interchange without C Street ramps design option does not extend to Portland. In Portland, traffic noise levels and resulting noise impacts from the SR 14 interchange with or without C Street ramps design option would be the same.

I-5 MAINLINE SHIFTED WEST

The Modified LPA with the I-5 mainline shifted west design option does not extend to Portland. In Portland, traffic noise levels and resulting noise impacts from the I-5 mainline shifted west design option would be the same as those resulting from the Modified LPA with the I-5 mainline centered.

SINGLE-LEVEL FIXED-SPAN CONFIGURATION

The Modified LPA with single-level fixed-span configuration would result in noise and vibration levels similar to those of the Modified LPA with double-deck fixed-span configuration. The single-level fixed-span configuration would result in a slight increase in highway noise and highway noise impacts east and west of the bridges as compared to the double-deck fixed-span configuration. Additional impacts of the single-level fixed-span option would result from the wider bridge spans (99 feet wider) and lower roadway decks (29 feet lower) than the double-deck fixed-span configuration.

Shared-use path users would have more exposure to noise from highway vehicles than with the Modified LPA due to reduced shielding between the shared-use path and highway traffic than included with the Modified LPA.

SINGLE-LEVEL MOVABLE-SPAN CONFIGURATION

The Modified LPA with single-level movable-span configuration would result in noise and vibration levels and impacts similar to those of the Modified LPA with single-level fixed-span configuration.

Table 4-2. Modified LPA Traffic Noise Levels - Portland

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-001	1	Residential	B (65)	54	55	60	6	0
PD-002	1	Residential	B (65)	55	56	60	5	0
PD-003	1	Residential	B (65)	56	57	62	6	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-004	1	Residential	B (65)	49	50	58	9	0
PD-005	1	Residential	B (65)	47	48	56	9	0
PD-006	1	Residential	B (65)	49	50	59	10	1
PD-007	1	Residential	B (65)	47	48	58	11	1
PD-008	1	Residential	B (65)	47	48	54	7	0
PD-009	1	Residential	B (65)	48	49	57	9	0
PD-010	1	Residential	B (65)	47	48	55	8	0
PD-011	1	Residential	B (65)	48	48	57	9	0
PD-012	1	Residential	B (65)	47	48	57	10	1
PD-013	1	Residential	B (65)	47	48	54	7	0
PD-014	1	Residential	B (65)	48	49	57	9	0
PD-015	1	Residential	B (65)	46	47	51	5	0
PD-016	1	Residential	B (65)	50	51	57	7	0
PD-017	1	Residential	B (65)	47	48	56	9	0
PD-018	1	Residential	B (65)	46	46	52	6	0
PD-019	1	Residential	B (65)	49	50	57	8	0
PD-020	1	Residential	B (65)	47	48	56	9	0
PD-021	1	Residential	B (65)	46	47	51	5	0
PD-022	1	Residential	B (65)	48	48	54	6	0
PD-023	1	Residential	B (65)	49	49	56	7	0
PD-024	1	Residential	B (65)	47	48	56	9	0
PD-025	1	Residential	B (65)	49	49	57	8	0
PD-026	1	Residential	B (65)	51	52	56	5	0
PD-027	1	Residential	B (65)	49	49	58	9	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-028	1	Residential	B (65)	52	53	56	4	0
PD-029	1	Residential	B (65)	52	53	59	7	0
PD-030	1	Residential	B (65)	49	50	58	9	0
PD-031	1	Residential	B (65)	52	52	58	6	0
PD-032	1	Hotel	E (70)	60	61	67	7	0
PD-033	0	Commercial	F	62	61	59	-3	0
PD-034	1	Restaurant	E (70)	60	62	65	5	0
PD-035	1	Restaurant	E (70)	**70**	69	67	-3	0
PD-036	1	Recreation	C (65)	53	54	52	-1	0
PD-037	1	Hotel	E (70)	64	65	64	0	0
PD-038	0	Commercial	F	64	65	ACQ	ACQ	0
PD-039	0	Commercial	F	67	67	ACQ	ACQ	0
PD-040	1	Restaurant	E (70)	68	**71**	ACQ	ACQ	0
PD-041	1	Restaurant	E (70)	66	66	66	0	0
PD-042	1	Restaurant	E (70)	68	68	ACQ	ACQ	0
PD-043	0	Commercial	F	62	63	ACQ	ACQ	0
PD-044	1	Restaurant	E (70)	64	64	66	2	0
PD-045	1	Hotel	E (70)	60	60	66	6	0
PD-046	1	Restaurant	E (70)	67	68	ACQ	ACQ	0
PD-047	0	Commercial	F	58	59	64	6	0
PD-048	1	Restaurant	E (70)	61	62	ACQ	ACQ	0
PD-049	1	Restaurant	E (70)	58	59	62	4	0
PD-050	1	Restaurant	E (70)	66	67	ACQ	ACQ	0
PD-051	1	Restaurant	E (70)	59	60	ACQ	ACQ	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-052	0	Commercial	F	68	69	ACQ	ACQ	0
PD-053	1	Restaurant	E (70)	62	63	ACQ	ACQ	0
PD-054	1	Restaurant	E (70)	64	65	ACQ	ACQ	0
PD-055	1	Commercial	E (70)	66	67	ACQ	ACQ	0
PD-056	1	Fire House	B (65)	54	55	59	5	0
PD-057	0	Commercial	F	56	57	59	3	0
PD-058	0	Commercial	F	58	59	60	2	0
PD-059	0	Commercial	F	64	65	67	3	0
PD-060	1	Residential	B (65)	55	56	61	6	0
PD-061	1	Residential	B (65)	56	57	61	5	0
PD-062	1	Residential	B (65)	57	59	62	5	0
PD-063	1	Residential	B (65)	58	59	62	4	0
PD-064	1	Residential	B (65)	58	59	62	4	0
PD-065	1	Residential	B (65)	58	59	63	5	0
PD-066	1	Residential	B (65)	58	60	63	5	0
PD-067	1	Residential	B (65)	58	60	63	5	0
PD-067B	1	Residential	B (65)	57	58	60	3	0
PD-068	1	Residential	B (65)	56	57	62	6	0
PD-069	1	Residential	B (65)	56	58	62	6	0
PD-070	1	Residential	B (65)	59	60	63	4	0
PD-071	1	Residential	B (65)	59	61	64	5	0
PD-072	1	Residential	B (65)	59	61	64	5	0
PD-073	1	Residential	B (65)	59	61	64	5	0
PD-074	1	Residential	B (65)	60	61	64	4	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-075	1	Residential	B (65)	60	61	64	4	0
PD-076	1	Residential	B (65)	58	59	63	5	0
PD-077	1	Residential	B (65)	61	62	**65**	4	1
PD-078	1	Residential	B (65)	61	62	**65**	4	1
PD-079	1	Residential	B (65)	61	62	**65**	4	1
PD-080	1	Residential	B (65)	61	62	**65**	4	1
PD-081	1	Residential	B (65)	61	63	**65**	4	1
PD-082	1	Residential	B (65)	62	63	**66**	4	1
PD-083	1	Residential	B (65)	59	60	64	5	0
PD-084	1	Residential	B (65)	62	63	**67**	5	1
PD-085	1	Residential	B (65)	62	63	**66**	4	1
PD-086	1	Residential	B (65)	62	63	**66**	4	1
PD-087	1	Residential	B (65)	62	64	**66**	4	1
PD-088	1	Residential	B (65)	63	64	**67**	4	1
PD-089	1	Residential	B (65)	63	64	**67**	4	1
PD-090	1	Residential	B (65)	63	**65**	**67**	4	1
PD-091	1	Residential	B (65)	61	63	**70**	9	1
PD-092	1	Residential	B (65)	64	**65**	**70**	6	1
PD-093	1	Residential	B (65)	64	**65**	**70**	6	1
PD-094	1	Residential	B (65)	64	**65**	**70**	6	1
PD-095	1	Residential	B (65)	64	**66**	**70**	6	1
PD-096	1	Residential	B (65)	61	62	ACQ	ACQ	0
PD-097	1	Residential	B (65)	53	54	ACQ	ACQ	0
PD-098	1	Residential	B (65)	53	54	ACQ	ACQ	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-099	1	Residential	B (65)	53	54	ACQ	ACQ	0
PD-100	1	Residential	B (65)	53	55	ACQ	ACQ	0
PD-101	1	Residential	B (65)	52	53	ACQ	ACQ	0
PD-102	1	Residential	B (65)	64	65	ACQ	ACQ	0
PD-103	1	Residential	B (65)	**67**	**69**	ACQ	ACQ	0
PD-104	2	Residential	B (65)	**65**	**66**	ACQ	ACQ	0
PD-105	1	Residential	B (65)	**67**	**68**	ACQ	ACQ	0
PD-106	1	Residential	B (65)	**67**	**68**	ACQ	ACQ	0
PD-107	1	Residential	B (65)	**67**	**68**	ACQ	ACQ	0
PD-108	1	Residential	B (65)	**66**	**67**	ACQ	ACQ	0
PD-109	1	Residential	B (65)	**67**	**68**	ACQ	ACQ	0
PD-110	1	Residential	B (65)	64	**65**	ACQ	ACQ	0
PD-111	1	Residential	B (65)	**69**	**70**	ACQ	ACQ	0
PD-112	1	Residential	B (65)	64	**65**	ACQ	ACQ	0
PD-113	1	Residential	B (65)	**68**	**69**	ACQ	ACQ	0
PD-114	1	Residential	B (65)	57	58	ACQ	ACQ	0
PD-115	1	Residential	B (65)	**68**	**69**	ACQ	ACQ	0
PD-116	1	Residential	B (65)	**68**	**69**	ACQ	ACQ	0
PD-117	1	Residential	B (65)	55	56	ACQ	ACQ	0
PD-118	1	Residential	B (65)	**69**	**70**	ACQ	ACQ	0
PD-119	1	Residential	B (65)	**69**	**70**	ACQ	ACQ	0
PD-120	1	Residential	B (65)	59	60	ACQ	ACQ	0
PD-121	1	Residential	B (65)	**68**	**69**	ACQ	ACQ	0
PD-122	1	Residential	B (65)	**68**	**69**	ACQ	ACQ	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-123	1	Residential	B (65)	**68**	**69**	ACQ	ACQ	0
PD-124	1	Residential	B (65)	**65**	**66**	ACQ	ACQ	0
PD-125	1	Office	E (70)	65	66	ACQ	ACQ	0
PD-126	1	Residential	B (65)	64	**65**	ACQ	ACQ	0
PD-127	1	Residential	B (65)	64	**65**	ACQ	ACQ	0
PD-128	1	Residential	B (65)	**66**	**67**	ACQ	ACQ	0
PD-129	1	Residential	B (65)	63	64	ACQ	ACQ	0
PD-130	1	Park/Rest Area	C (65)	53	54	57	4	0
PD-130B	0	Undeveloped	G	53	55	58	5	0
PD-130C	0	Undeveloped	G	54	56	59	5	0
PD-130D	0	Undeveloped	G	55	57	59	4	0
PD-130E	0	Undeveloped	G	56	58	60	4	0
PD-131	0	Commercial	F	67	68	ACQ	ACQ	0
PD-132	0	Commercial	F	64	65	ACQ	ACQ	0
PD-133	5	Patio at Multi-Family	B (65)	45	46	49	4	0
PD-135	5	Hotel	E (70)	50	52	54	4	0
PD-136A	1	Residential	B (65)	51	53	53	2	0
PD-136B	1	Residential	B (65)	53	55	54	1	0
PD-136C	1	Residential	B (65)	56	57	58	2	0
PD-137A	1	Residential	B (65)	52	54	53	1	0
PD-137B	1	Residential	B (65)	53	55	55	2	0
PD-137C	1	Residential	B (65)	56	57	58	2	0
PD-138A	1	Residential	B (65)	52	54	53	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-138B	1	Residential	B (65)	54	55	55	1	0
PD-138C	1	Residential	B (65)	56	57	58	2	0
PD-144A	1	Residential	B (65)	53	54	56	3	0
PD-144B	1	Residential	B (65)	54	55	56	2	0
PD-144C	1	Residential	B (65)	55	56	57	2	0
PD-145A	1	Residential	B (65)	50	51	52	2	0
PD-145B	1	Residential	B (65)	51	52	53	2	0
PD-145C	1	Residential	B (65)	53	54	55	2	0
PD-146	1	Hotel	E (70)	55	57	58	3	0
PD-147A	2	Residential	B (65)	49	51	50	1	0
PD-147B	2	Residential	B (65)	50	52	52	2	0
PD-147C	2	Residential	B (65)	52	53	54	2	0
PD-148A	2	Residential	B (65)	49	50	50	1	0
PD-148B	2	Residential	B (65)	50	52	51	1	0
PD-148C	2	Residential	B (65)	52	53	54	2	0
PD-149A	2	Residential	B (65)	48	49	49	1	0
PD-149B	2	Residential	B (65)	49	51	51	2	0
PD-149C	2	Residential	B (65)	51	52	53	2	0
PD-155A	2	Residential	B (65)	59	60	61	2	0
PD-155B	2	Residential	B (65)	60	61	61	1	0
PD-155C	2	Residential	B (65)	60	61	62	2	0
PD-156A	2	Residential	B (65)	54	55	56	2	0
PD-156B	2	Residential	B (65)	55	56	57	2	0
PD-156C	2	Residential	B (65)	56	57	58	2	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-157A	1	Residential	B (65)	**65**	**66**	**67**	2	1
PD-157B	1	Residential	B (65)	**66**	**67**	**67**	1	1
PD-157C	1	Residential	B (65)	**66**	**67**	**68**	2	1
PD-158A	1	Residential	B (65)	**65**	**66**	**67**	2	1
PD-158B	1	Residential	B (65)	**66**	**67**	**68**	2	1
PD-158C	1	Residential	B (65)	**66**	**67**	**68**	2	1
PD-159A	1	Residential	B (65)	**65**	**66**	**67**	2	1
PD-159B	1	Residential	B (65)	**66**	**67**	**68**	2	1
PD-159C	1	Residential	B (65)	**67**	**68**	**68**	1	1
PD-160A	1	Residential	B (65)	**66**	**67**	**68**	2	1
PD-160B	1	Residential	B (65)	**66**	**67**	**68**	2	1
PD-160C	1	Residential	B (65)	**67**	**68**	**69**	2	1
PD-161A	1	Residential	B (65)	**66**	**67**	**68**	2	1
PD-161B	1	Residential	B (65)	**67**	**68**	**69**	2	1
PD-161C	1	Residential	B (65)	**67**	**68**	**69**	2	1
PD-162A	2	Residential	B (65)	57	58	60	3	0
PD-162B	2	Residential	B (65)	58	60	61	3	0
PD-162C	2	Residential	B (65)	62	63	64	2	0
PD-163A	2	Residential	B (65)	62	63	64	2	0
PD-163B	2	Residential	B (65)	63	64	**65**	2	2
PD-163C	2	Residential	B (65)	63	64	**65**	2	2
PD-164A	1	Residential	B (65)	52	54	53	1	0
PD-164B	1	Residential	B (65)	54	55	54	0	0
PD-164C	1	Residential	B (65)	55	57	57	2	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-165A	1	Residential	B (65)	52	53	53	1	0
PD-165B	1	Residential	B (65)	53	55	54	1	0
PD-165C	1	Residential	B (65)	54	56	57	3	0
PD-166A	1	Residential	B (65)	51	53	52	1	0
PD-166B	1	Residential	B (65)	53	54	54	1	0
PD-166C	1	Residential	B (65)	54	55	56	2	0
PD-167A	2	Residential	B (65)	62	62	64	2	0
PD-167B	2	Residential	B (65)	62	63	64	2	0
PD-167C	2	Residential	B (65)	63	63	**65**	2	2
PD-168A	1	Residential	B (65)	**68**	**69**	**70**	2	1
PD-168B	1	Residential	B (65)	**68**	**69**	**70**	2	1
PD-168C	1	Residential	B (65)	**68**	**69**	**70**	2	1
PD-169A	1	Residential	B (65)	**69**	**70**	**71**	2	1
PD-169B	1	Residential	B (65)	**69**	**70**	**71**	2	1
PD-169C	1	Residential	B (65)	**69**	**70**	**71**	2	1
PD-170A	1	Residential	B (65)	**69**	**70**	**71**	2	1
PD-170B	1	Residential	B (65)	**69**	**70**	**71**	2	1
PD-170C	1	Residential	B (65)	**69**	**70**	**71**	2	1
PD-171A	1	Residential	B (65)	**69**	**70**	**71**	2	1
PD-171B	1	Residential	B (65)	**69**	**70**	**71**	2	1
PD-171C	1	Residential	B (65)	**69**	**70**	**71**	2	1
PD-172A	1	Residential	B (65)	**69**	**70**	**71**	2	1
PD-172B	1	Residential	B (65)	**69**	**70**	**71**	2	1
PD-172C	1	Residential	B (65)	**69**	**70**	**71**	2	1

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-173A	2	Residential	B (65)	64	**65**	**65**	1	2
PD-173B	2	Residential	B (65)	63	64	**65**	2	2
PD-173C	2	Residential	B (65)	64	**65**	**65**	1	2
PD-174	0	Commercial	F	67	68	69	2	0
PD-175	0	Commercial	F	68	69	70	2	0
PD-176	0	Commercial	F	67	68	69	2	0
PD-177	0	Commercial	F	66	66	68	2	0
PD-178	2	Recreation	C (65)	61	62	62	1	0
PD-179	2	Recreation	C (65)	58	59	60	2	0
PD-180	2	Recreation	C (65)	57	58	59	2	0
PD-181	2	Recreation	C (65)	58	58	59	1	0
PD-182	2	Recreation	C (65)	56	57	58	2	0
PD-183	2	Recreation	C (65)	56	57	58	2	0
PD-184	1	Office	E (70)	54	55	56	2	0
PD-185	1	Park	C (65)	51	52	51	0	0
PD-185B	0	Undeveloped	G	52	53	52	0	0
PD-185C	0	Undeveloped	G	53	54	53	0	0
PD-185D	0	Undeveloped	G	54	55	54	0	0
PD-185E	0	Undeveloped	G	55	56	55	0	0
PD-185F	0	Undeveloped	G	57	58	56	-1	0
PD-185G	0	Undeveloped	G	58	59	57	-1	0
PD-185H	0	Undeveloped	G	59	60	58	-1	0
PD-186	2	Recreation	C (65)	58	59	61	3	0
PD-187	2	Recreation	C (65)	55	56	58	3	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Change Modified LPA vs. Existing [h] (dBA)	Impacts [i]
PD-188	2	Recreation	C (65)	60	61	62	2	0
PD-189	2	Recreation	C (65)	57	58	59	2	0
PD-190	2	Recreation	C (65)	61	62	63	2	0
PD-191	2	Recreation	C (65)	58	59	60	2	0
PD-192	2	Recreation	C (65)	62	63	**65**	3	2
PD-193	2	Recreation	C (65)	59	60	61	2	0
PD-194	2	Recreation	C (65)	61	61	62	1	0
PD-195	1	Hotel	E (70)	57	58	59	2	0
PD-196	1	Hotel	E (70)	57	58	60	3	0
PD-197	2	Recreation	C (65)	57	58	59	2	0
PD-198	0	Undeveloped	G	64	65	66	2	0
PD-198B	0	Undeveloped	G	61	62	63	2	0
PD-198C	0	Undeveloped	G	60	61	62	2	0
PD-198D	0	Undeveloped	G	58	59	60	2	0
PD-198E	0	Undeveloped	G	57	58	59	2	0
PD-199	0	Undeveloped	G	66	67	68	2	0
PD-199B	0	Undeveloped	G	64	65	66	2	0
PD-199C	0	Undeveloped	G	64	65	66	2	0
PD-199D	0	Undeveloped	G	65	67	67	2	0
PD-200	0	Undeveloped	G	68	68	69	1	0
PD-200B	0	Undeveloped	G	63	64	65	2	0
PD-200C	0	Undeveloped	G	64	65	65	1	0
PD-200D	0	Undeveloped	G	68	69	69	1	0

Note: ACQ Property planned for acquisition under the Modified LPA. Receiver was not present with modeling condition.

a Receptors shown on Figure 3-4 through Figure 3-10

b Number of residences or residential equivalents. Sites PD-060 to PD-127 and PD-129 represent floating homes.

c Land use: Residential = single or multi-family; Commercial = commercial/office; Hotel = hotel/motel; Recreation = athletic field or playfield; Park, Trail

d Traffic noise impact criteria (ODOT NAAC)

e Existing modeled noise levels from Traffic Noise Model version 2.5 using existing 2019 traffic volumes and speeds. Exceedances of the ODOT NAAC**.**

f Future No-Build modeled noise levels from Traf shown in **bold** fic Noise Model version 2.5 using future 2045 traffic volumes and speeds. Exceedances of the ODOT NAAC shown in **bold**.

g Future Modified LPA noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds. Exceedances of the ODOT NAAC impacts in **bold**. Substantial impacts of 10 dBA or more shown in gray highlights.

h Change in noise levels, Modified LPA compared to Existing

i Number of impacts under Modified LPA

dBA = A-weighted decibels; FHWA = Federal Highway Administration; LPA = Locally Preferred Alternative; ODOT NAAC = Oregon Department of Transportation Noise Abatement Approach Criteria

Figure 4-1. Modified LPA (2045) Traffic Noise Impact Locations – North Portland Mainland

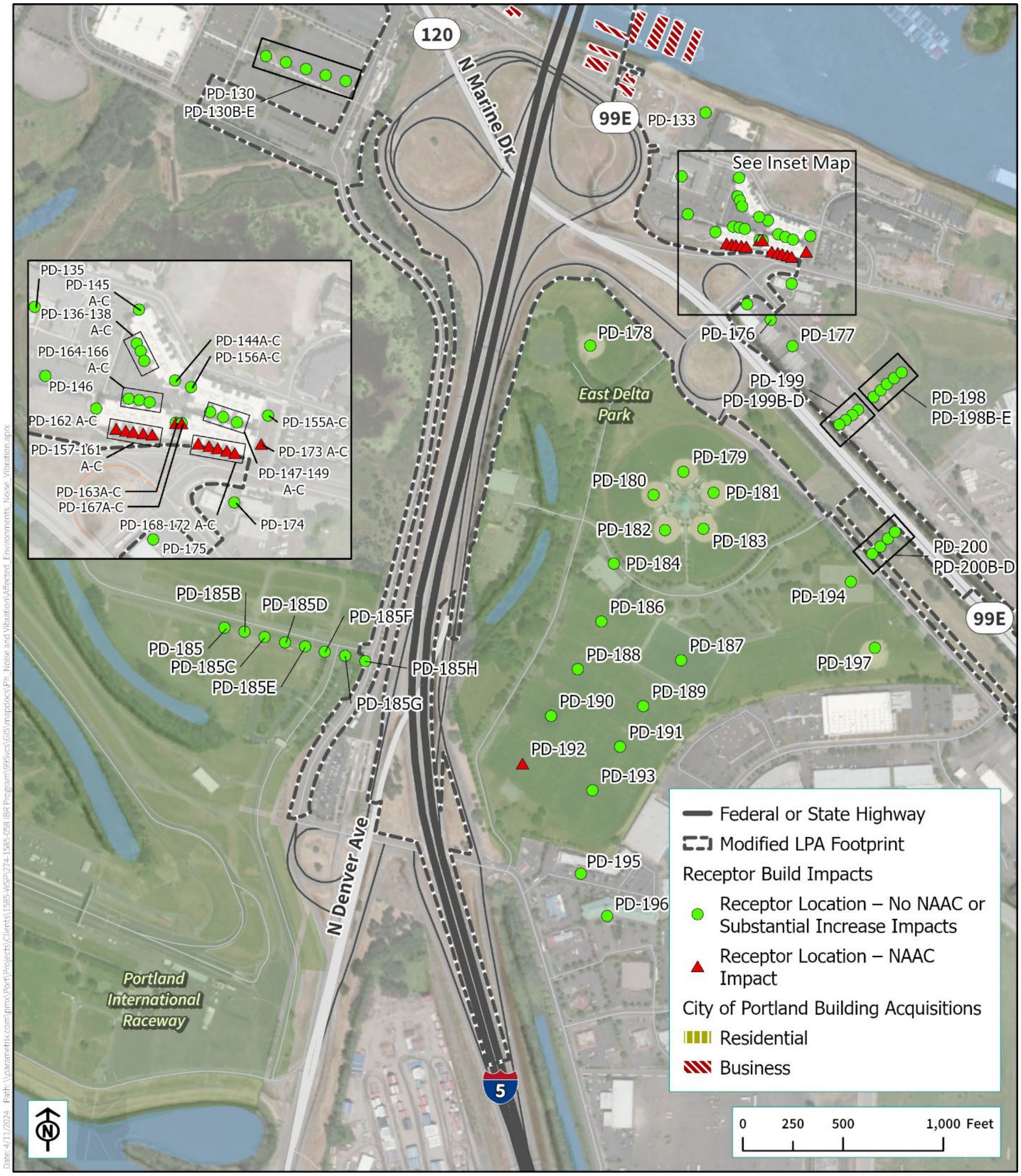
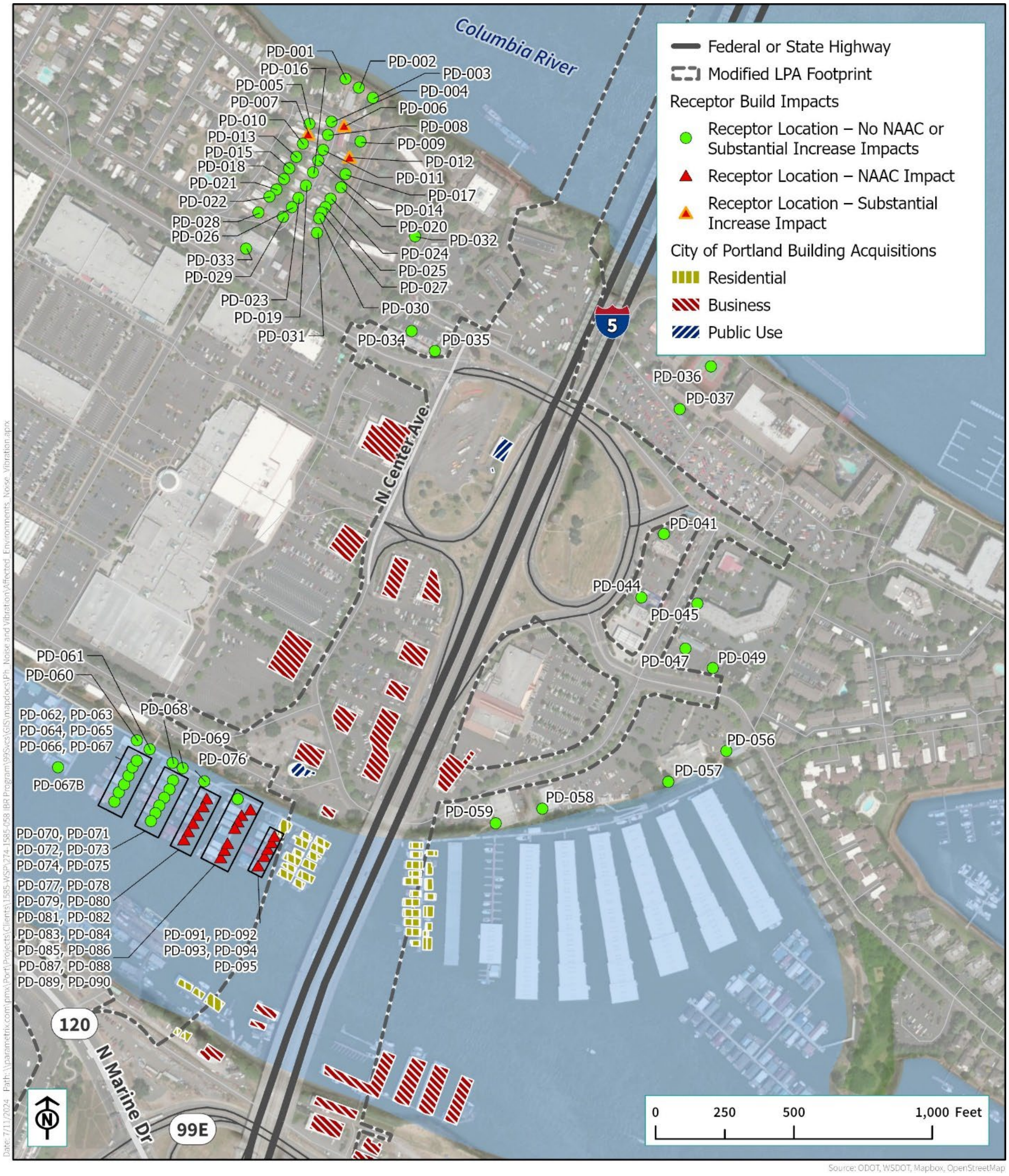


Figure 4-2. Modified LPA (2045) Traffic Noise Impact Locations – North Portland Hayden Island



4.2 Downtown Vancouver Traffic Noise

This section describes the potential noise effects from the No-Build Alternative and Modified LPA within the downtown Vancouver area.

4.2.1 No-Build Alternative Traffic Noise

No-Build Alternative traffic noise levels were predicted for downtown Vancouver area receptors (DT) as shown in Table 4-3. No-Build Alternative traffic noise levels are predicted to approach or exceed the WSDOT traffic noise criteria at the same 37 multi-family residences and trail as under the existing conditions, and at five additional residential units and additional trail use. No-Build Alternative noise levels would range from 51 to 73 dBA L_{eq} with a 1 to 7 dBA increase in noise levels over existing conditions with a 1 to 2 dBA increase over existing conditions at most modeled locations. Increase in noise levels would result from an increase in traffic columns from existing conditions to the year 2045. The highest predicted noise levels under the No-Build Alternative would be 73 dBA L_{eq} at the apartments under construction at 400 Washington Street.

Table 4-3. No-Build Alternative Traffic Noise Levels - Downtown Vancouver, West of I-5

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
DT-001	1	Office	E (71)	68	68	0	0
DT-002	1	Residential	B (66)	**70**	**71**	1	1
DT-003	1	Residential	B (66)	**71**	**72**	1	1
DT-004	1	Residential	B (66)	**70**	**71**	1	1
DT-005	1	Residential	B (66)	**71**	**72**	1	1
DT-006	1	Residential	B (66)	**71**	**71**	0	1
DT-007	1	Residential	B (66)	**72**	**72**	0	1
DT-008	1	Office	E (71)	50	51	1	0
DT-009	1	Residential	B (66)	58	59	1	0
DT-010	1	Residential	B (66)	61	62	1	0
DT-011	1	Residential	B (66)	62	64	2	0
DT-012	1	Residential	B (66)	57	58	1	0
DT-013	1	Residential	B (66)	62	63	1	0
DT-014	1	Residential	B (66)	65	**66**	1	1

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
DT-015	1	Residential	B (66)	**66**	**67**	1	1
DT-016	1	Residential	B (66)	**68**	**69**	1	1
DT-017	1	Restaurant	E (71)	59	60	1	0
DT-018	1	Hotel Pool	C (66)	63	64	1	0
DT-019	1	Office	E (71)	68	69	1	0
DT-020	1	Church	C (66)	58	59	1	0
DT-021	1	Commercial	E (71)	62	63	1	0
DT-022	1	Library	C (66)	59	60	1	0
DT-023	1	Office	E (71)	58	60	2	0
DT-024	0	Undeveloped	G	62	63	1	0
DT-025	1	Restaurant	E (71)	56	57	1	0
DT-026	1	Office	E (71)	64	67	3	0
DT-027	6	Residential	B (66)	**69**	**70**	1	6
DT-028	1	Hotel	E (71)	55	56	1	0
DT-029	1	Commercial	E (71)	64	65	1	0
DT-030	1	Trail	C (66)	58	59	1	0
DT-031	1	Hotel	E (71)	60	61	1	0
DT-032	1	Trail	C (66)	65	**66**	1	1
DT-033	1	Trail	C (66)	**67**	**68**	1	1
DT-033A	6	Residential	B (66)	55	62	7	0
DT-033B	4	Residential	B (66)	56	62	6	0
DT-033C	4	Residential	B (66)	57	62	5	0
DT-034	1	Trail	C (66)	**69**	**70**	1	1
DT-034A	5	Residential	B (66)	56	63	7	0
DT-034B	4	Residential	B (66)	58	63	5	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
DT-034C	4	Residential	B (66)	60	64	4	0
DT-035	1	Trail	C (66)	**70**	**71**	1	1
DT-035A	5	Residential	B (66)	47	48	1	0
DT-035B	4	Residential	B (66)	59	60	1	0
DT-035C	4	Residential	B (66)	61	62	1	0
DT-036	82	Elder Care	B (66) / D (51)	60 / 35	61 / 36	1	0
DT-037	4	Residential	B (66)	56	59	3	0
DT-038	4	Residential	B (66)	60	63	3	0
DT-039	8	Residential	B (66)	62	65	3	0
DT-040	4	Residential	B (66)	63	**66**	3	4
DT-041	4	Residential	B (66)	**71**	**73**	2	4
DT-042	4	Residential	B (66)	**70**	**72**	2	4
DT-043	8	Residential	B (66)	**70**	**72**	2	8
DT-044	4	Residential	B (66)	**69**	**71**	2	4
DT-045	4	Residential	B (66)	63	64	1	0
DT-046	4	Residential	B (66)	63	65	2	0
DT-047	8	Residential	B (66)	64	65	1	0
DT-048	4	Residential	B (66)	64	65	1	0
DT-049	0	Undeveloped	B (66)	56	58	2	0

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences or residential equivalence
c Land use: Residential = single or multi-family; Commercial = commercial/office; Hotel = hotel/motel; Park, Trail
d Traffic noise impacts criteria (WSDOT NAC)
e Existing and Future No-Build modeled noise levels from Traffic Noise Model version 2.5 at or above WSDOT NAC in **bold**
f No-Build Alternative modeled noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds.
g Change in noise, No-Build Alternative minus Existing
h Number of residences, apartment units, or residential equivalence expected to exceed the WSDOT NAC under the No-Build Alternative

dBA = A-weighted decibels; FHWA = Federal Highway Administration; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

4.2.2 Modified LPA Traffic Noise

Traffic noise levels were modeled for the Modified LPA along with a comparison to the existing noise levels and the future No-Build Alternative noise levels. Table 4-4 shows the future Modified LPA traffic noise levels along with the No-Build Alternative traffic noise levels, number of residences or residential equivalents, impact criteria, and expected number of exceedances of the WSDOT NAC with the Modified LPA. A qualitative analysis of the anticipated change in noise levels with the design options is provided below.

Modified LPA traffic noise levels would approach or exceed the WSDOT NAC at the same 37 multi-family residences as existing conditions along with four additional residences, one fewer than as the No-Build Alternative. Traffic noise levels would approach or exceed the NAC at one office and an outdoor use area at the Vancouver Community Library. Noise levels would range from 51 to 74 dBA L_{eq}, with noise levels within 1 dBA of existing conditions at most locations and within a range of -1 to 6 dBA compared to existing noise levels at most locations where the Modified LPA alignment shifts closer to or further from noise receptor locations. At one undeveloped property along Columbia Street (DT-049) noise levels would be 12 dBA higher than existing conditions.

Modified LPA noise levels would be within 3 dBA of No-Build Alternative noise levels at most locations. Where the Modified LPA is closer to or further from noise receptor locations the change in traffic noise levels range from -8 to 8 dBA compared to the No-Build Alternative. The highest noise levels with Modified LPA would be 74 dBA L_{eq} predicted outside a building used as office and commercial space (DT-019) located north of E Evergreen Boulevard. In downtown Vancouver, no substantial increase impacts would result from the Modified LPA. Figure 4-3 and Figure 4-4 show the location of each traffic noise impact under the Modified LPA.

Recreational boat users on the Columbia River in Washington are predicted to experience noise levels ranging from 57 dBA to 65 dBA with the Modified LPA. Future noise levels are estimated based on modeled sites located along the shoreline. Estimated noise levels for recreational boat users on the Columbia River in Washington would change between -1 dBA and 2 dBA compared to existing noise levels due to distance to future bridge alignments and shielding from bridge alignments.

4.2.2.1 Modified LPA Design Options

TWO AUXILIARY LANES IN EACH DIRECTION OF I-5

Highway noise impacts, before and after mitigation, that would result from the Modified LPA with two auxiliary lanes in each direction of I-5 design option would be largely the same as those resulting from the Modified LPA with one auxiliary lane in each direction of I-5 design option. Due to the distance between the nearest noise-sensitive land uses and the additional auxiliary lane, and because no changes in peak hour volumes, posted speed limits, or vehicle mix would occur with the addition of a second auxiliary lane, only slight differences in noise levels (0 to 2 dBA at the closest noise-sensitive uses) are anticipated. These slight differences would occur because a second auxiliary lane would add traffic approximately 16 feet closer to noise-sensitive land uses located east and west of I-5.

SR 14 INTERCHANGE WITHOUT C STREET RAMPS

Traffic noise levels and noise impacts in the downtown Vancouver area that would result from the Modified LPA with SR 14 interchange without C Street ramps design option would be largely the same as those resulting from the Modified LPA with SR 14 interchange with C Street ramps design option. The option without C Street ramps would result in a minor change in traffic noise levels below the common threshold of human hearing (2 to 3 dBA) compared to the option with C Street ramps due to the removal of these roadways and a shift in traffic to other roadways in the area.

I-5 MAINLINE SHIFTED WEST

Traffic noise levels and anticipated noise impacts that would result from the I-5 mainline shifted west design option would be slightly higher in areas located west of I-5 near the southbound I-5 mainline and ramps. In this area, a change in noise levels is expected to be barely perceptibly (2 to 3 dBA) higher than the Modified LPA with the mainline centered due to traffic noise shifting to the west. Shifting the I-5 mainline to the west would result in two building displacements east of C Street between E 7th Street and E 8th Street. One of these buildings houses commercial businesses, including a restaurant (DT-025), a theater, and a salon, and the other is an apartment building (DT-027).

SINGLE-LEVEL FIXED-SPAN CONFIGURATION

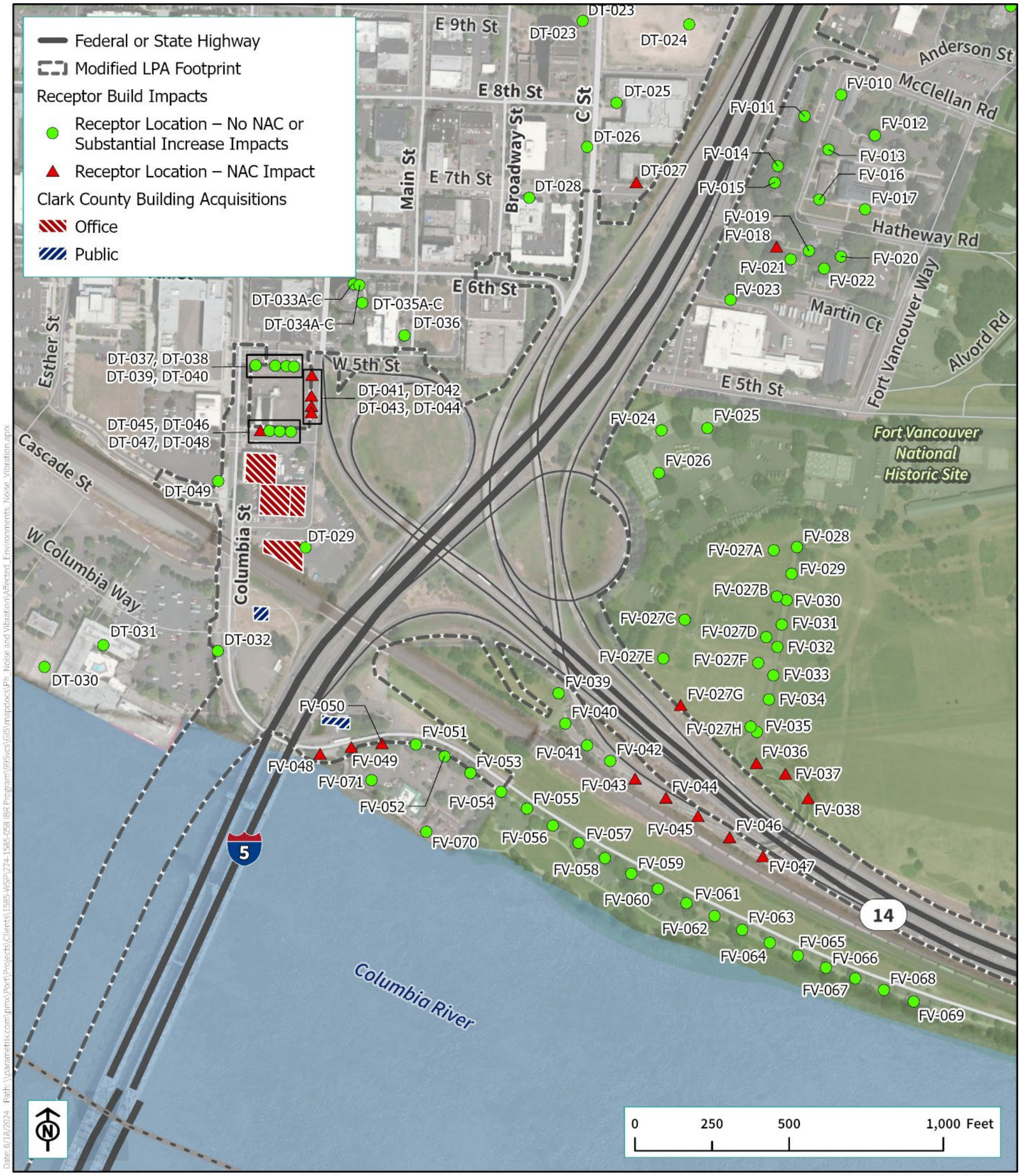
The Modified LPA with single-level fixed-span configuration would result in noise and vibration levels similar to those of the Modified LPA with double-deck fixed-span configuration. The single-level fixed-span configuration would result in a slight increase in highway noise and highway noise impacts east and west of the bridges as compared to the double-deck fixed-span configuration. The single-level fixed-span configuration would also result in additional impacts due to the wider bridge spans (99 feet wider) and lower roadway decks (29 feet lower) than the double-deck fixed-span configuration.

Shared-use path users would experience more exposure to noise from highway vehicles under the Modified LPA single-level configuration than under the Modified LPA double-deck fixed-span configuration to reduced shielding between the shared-use path and highway traffic.

SINGLE-LEVEL MOVABLE-SPAN CONFIGURATION

The Modified LPA with single-level movable-span configuration would result in noise and vibration levels and impacts similar to those of the Modified LPA with single-level fixed-span configuration.

Figure 4-3. Modified LPA (2045) Traffic Noise Impact Locations – Downtown Vancouver and Fort Vancouver (I-5/SR 14 Interchange Area)



Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Figure 4-4. Modified LPA (2045) Traffic Noise Impact Locations – Downtown Vancouver and Fort Vancouver Areas (E 8th Street to E McLoughlin Boulevard)

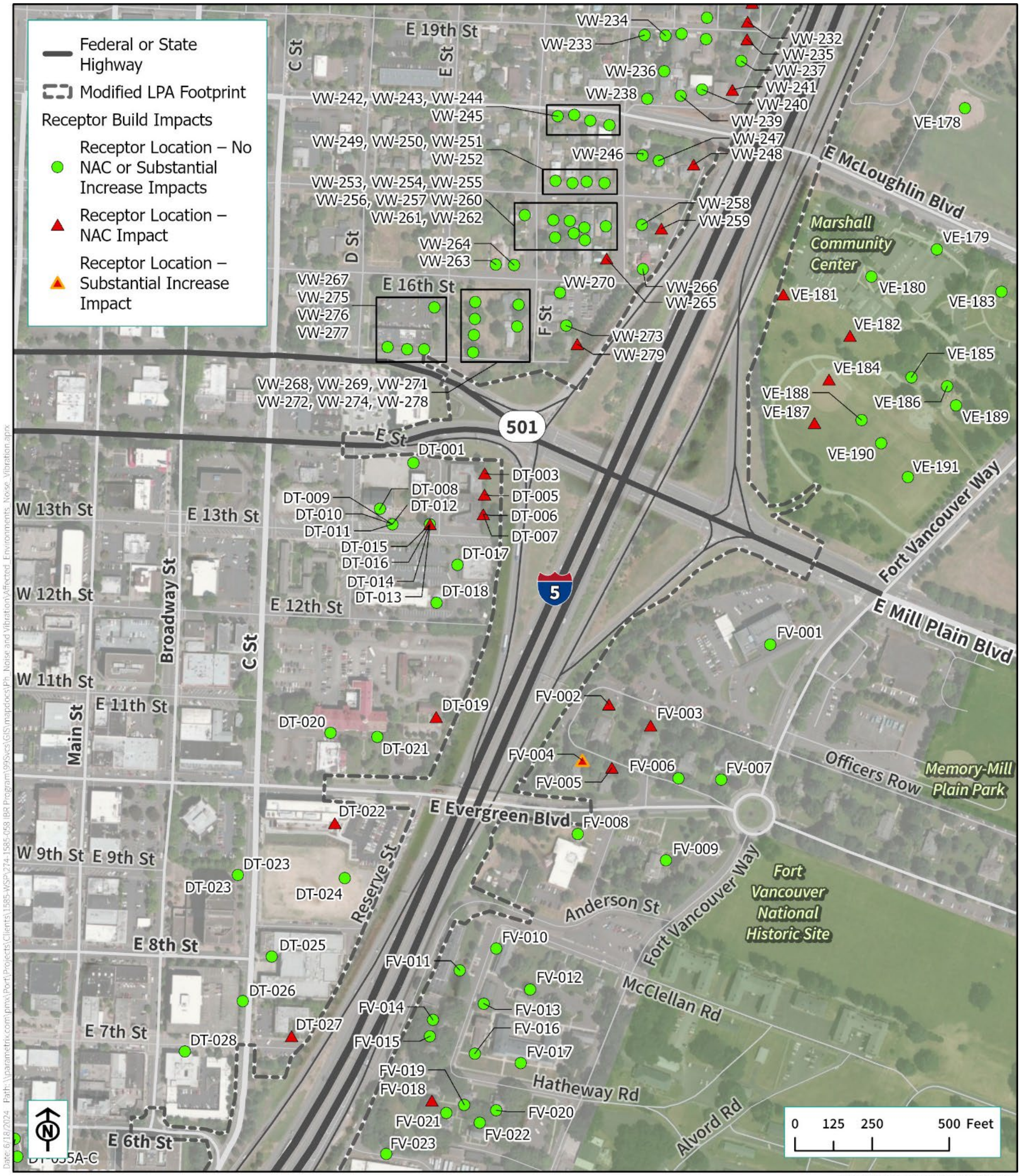


Table 4-4. Modified LPA Traffic Noise Levels - Downtown Vancouver Area

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
DT-001	1	Office	E (71)	68	68	67	-1	0
DT-002	1	Residential	B (66)	**70**	**71**	**69**	-1	1
DT-003	1	Residential	B (66)	**71**	**72**	**70**	-1	1
DT-004	1	Residential	B (66)	**70**	**71**	**68**	-2	1
DT-005	1	Residential	B (66)	**71**	**72**	**70**	-1	1
DT-006	1	Residential	B (66)	**71**	**71**	**69**	-2	1
DT-007	1	Residential	B (66)	**72**	**72**	**71**	-1	1
DT-008	1	Office	E (71)	50	51	52	2	0
DT-009	1	Residential	B (66)	58	59	58	0	0
DT-010	1	Residential	B (66)	61	62	60	-1	0
DT-011	1	Residential	B (66)	62	64	62	0	0
DT-012	1	Residential	B (66)	57	58	56	-1	0
DT-013	1	Residential	B (66)	62	63	62	0	0
DT-014	1	Residential	B (66)	65	**66**	65	0	0
DT-015	1	Residential	B (66)	**66**	**67**	**67**	1	1
DT-016	1	Residential	B (66)	**68**	**69**	**68**	0	1
DT-017	1	Restaurant	E (71)	59	60	61	2	0
DT-018	1	Hotel Pool	C (66)	63	64	65	2	0
DT-019	1	Office	E (71)	68	69	**74**	6	1
DT-020	1	Church	C (66)	58	59	62	4	0
DT-021	1	Commercial	E (71)	62	63	68	6	0
DT-022	1	Library	C (66)	59	60	**67**	8	1
DT-023	1	Office	E (71)	58	60	63	5	0
DT-024	0	Undeveloped	G	62	63	71	9	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
DT-025	1	Restaurant	E (71)	56	57	59	3	0
DT-026	1	Office	E (71)	64	67	64	0	0
DT-027	6	Residential	B (66)	**69**	**70**	71	2	6
DT-028	1	Hotel	E (71)	55	56	62	7	0
DT-029	1	Commercial	E (71)	64	65	64	0	0
DT-030	1	Trail	C (66)	58	59	57	-1	0
DT-031	1	Hotel	E (71)	60	61	58	-2	0
DT-032	1	Trail	C (66)	65	**66**	58	-7	0
DT-033	1	Trail	C (66)	**67**	**68**	ACQ	ACQ	0
DT-033A	6	Residential	B (66)	55	62	61	6	0
DT-033B	4	Residential	B (66)	56	62	61	5	0
DT-033C	4	Residential	B (66)	57	62	61	4	0
DT-034	1	Trail	C (66)	**69**	**70**	ACQ	ACQ	0
DT-034A	5	Residential	B (66)	56	63	60	4	0
DT-034B	4	Residential	B (66)	58	63	62	4	0
DT-034C	4	Residential	B (66)	60	64	63	3	0
DT-035	1	Trail	C (66)	**70**	**71**	ACQ	ACQ	0
DT-035A	5	Residential	B (66)	47	48	52	5	0
DT-035B	4	Residential	B (66)	59	60	62	3	0
DT-035C	4	Residential	B (66)	61	62	64	3	0
DT-036	82	Elder Care	B (66) / D (51)	60 / 35	61 / 36	61 / 36	1	0
DT-037	4	Residential	B (66)	56	59	60	4	0
DT-038	4	Residential	B (66)	60	63	59	-1	0
DT-039	8	Residential	B (66)	62	65	60	-2	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
DT-040	4	Residential	B (66)	63	**66**	62	-1	0
DT-041	4	Residential	B (66)	**71**	**73**	**70**	-1	4
DT-042	4	Residential	B (66)	**70**	**72**	**69**	-1	4
DT-043	8	Residential	B (66)	**70**	**72**	**69**	-1	8
DT-044	4	Residential	B (66)	**69**	**71**	**69**	0	4
DT-045	4	Residential	B (66)	63	64	63	0	0
DT-046	4	Residential	B (66)	63	65	63	0	0
DT-047	8	Residential	B (66)	64	65	65	1	0
DT-048	4	Residential	B (66)	64	65	**66**	2	4
DT-049	0	Undeveloped	B (66)	56	58	68	12	0

Note: Sites DT-024 and DT-025 were removed due to their model locations were found not to include a noise-sensitive land use.
ACQ = Property planned for acquisition under the Modified LPA. Receiver was not present with modeling condition.

a Receptors shown on Figure 3-4 through Figure 3-10

b Number of residences or residential equivalents

c Land use: Hotel = hotel/motel; park = parklands; Comm = commercial and retail; Church

d Traffic noise impact criteria (WSDOT NAC)

e Existing modeled noise levels from Traffic Noise Model version 2.5 using existing 2019 traffic volumes and speeds. WSDOT NAC Exceedances shown in **bold**.

f Future No-Build modeled noise levels from Traffic Noise Model version 2.5 using future 2045 traffic volumes and speeds. WSDOT NAC Exceedances shown in **bold**.

g Future Modified LPA noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds. WSDOT NAC Exceedances shown in **bold**.

h Change in noise levels, Modified LPA compared to Existing

i Number of WSDOT NAC Exceedances under Modified LPA

dBA = A-weighted decibels; FHWA = Federal Highway Administration; LPA = Locally Preferred Alternative; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

4.3 Fort Vancouver Traffic Noise

This section describes the potential noise effects from the No-Build Alternative and Modified LPA within the Fort Vancouver subarea.

4.3.1 No-Build Alternative Traffic Noise

No-Build Alternative traffic noise levels were modeled for Fort Vancouver area receptors (FV), as shown on Table 4-5. Noise levels at Fort Vancouver under the No-Build Alternative are projected to range from 53 to 76 dBA L_{eq}, with the highest levels at unshielded areas along I-5 and SR 14. In general, noise levels are predicted to increase by 1 to 2 dBA over existing conditions throughout the fort due to an increase in traffic volumes. Currently, noise levels approach or exceed the WSDOT NAC at one Fort Vancouver Historic District Village site, one Fort Vancouver Historic District office, the Fort Vancouver Trail, Confluence Land Bridge Trail, and along the Waterfront Renaissance Trail. Under the No-Build Alternative, the same sites would continue to approach or exceed the WSDOT NAC, with three additional trail use locations and the two sites located within the Fort Vancouver Historic Village exceeding the WSDOT NAC.

Table 4-5. No-Build Alternative Traffic Noise Levels - Fort Vancouver

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build [f] (dBA)	Change [g] (dBA)	Exceedances [h]
FV-001	1	Office	E (71)	55	58	3	0
FV-002	1	Historic District/Office	C (66)	65	**66**	1	1
FV-003	1	Historic District/Office	C (66)	63	64	1	0
FV-004	1	Historic District/Office	C (66)	62	63	1	0
FV-005	1	Historic District/Office	C (66)	60	61	1	0
FV-006	1	Historic District/Office	C (66)	56	57	1	0
FV-007	1	Historic District/Office	C (66)	54	55	1	0
FV-008	1	Historic District/Office	C (66)	61	62	1	0
FV-009	1	Historic District/Office	C (66)	54	55	1	0
FV-010	12	Historic District/Residence	C (66)/ B (66)	60	61	1	0
FV-011	0	Historic District/former health care facility	C (66)	57	58	1	0
FV-012	1	Historic District/Office	C (66)	53	54	1	0
FV-013	1	Historic District/Office	C (66)	54	55	1	0
FV-014	2	Historic District/Residence	C (66)/B (66)	61	61	0	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build [f] (dBA)	Change [g] (dBA)	Exceedances [h]
FV-015	2	Historic District/Residence	C (66)/B (66)	61	62	1	0
FV-016	1	Historic District/Office	C (66)	56	57	1	0
FV-017	1	Historic District/Office	C (66)	52	53	1	0
FV-018	2	Historic District/Residence	C (66)/B (66)	61	62	1	0
FV-019	2	Historic District/Residence	C (66)/B (66)	58	59	1	0
FV-020	2	Historic District/Residence	C (66)/B (66)	54	55	1	0
FV-021	2	Historic District/Residence	C (66)/B (66)	59	60	1	0
FV-022	2	Historic District/Residence	C (66)/B (66)	53	54	1	0
FV-023	1	Historic District/Office	C (66)	62	63	1	0
FV-024	1	Historic District/Office	C (66)	55	56	1	0
FV-025	1	Historic District/Office	C (66)	53	54	1	0
FV-026	1	Historic District/Office	C (66)	56	57	1	0
FV-027A	1	Historic District/FV Village	C (66)	55	56	1	0
FV-027B	1	Historic District/FV Village	C (66)	55	56	1	0
FV-027C	1	Historic District/FV Village	C (66)	58	59	1	0
FV-027D	1	Historic District/FV Village	C (66)	57	58	1	0
FV-027E	1	Historic District/FV Village	C (66)	60	61	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build [f] (dBA)	Change [g] (dBA)	Exceedances [h]
FV-027F	1	Historic District/FV Village	C (66)	58	59	1	0
FV-027G	1	Historic District/FV Village	C (66)	65	**66**	1	1
FV-027H	1	Historic District/FV Village	C (66)	63	64	1	0
FV-028	1	Historic District/Trail	C (66)	54	55	1	0
FV-029	1	Historic District/Trail	C (66)	55	56	1	0
FV-030	1	Historic District/Trail	C (66)	55	56	1	0
FV-031	1	Historic District/Trail	C (66)	56	57	1	0
FV-032	1	Historic District/Trail	C (66)	57	58	1	0
FV-033	1	Historic District/Trail	C (66)	59	60	1	0
FV-034	1	Historic District/Trail	C (66)	60	61	1	0
FV-035	1	Historic District/Trail	C (66)	64	65	1	0
FV-036	1	Historic District/Trail	C (66)	**69**	**70**	1	1
FV-037	1	Historic District/Trail	C (66)	**68**	**69**	1	1
FV-038	1	Historic District/Trail	C (66)	**70**	**71**	1	1
FV-039	1	Historic District/Park	C (66)	63	65	2	0
FV-040	1	Historic District/Trail	C (66)	60	61	1	0
FV-041	1	Historic District/Trail	C (66)	59	61	2	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build [f] (dBA)	Change [g] (dBA)	Exceedances [h]
FV-042	1	Historic District/Trail	C (66)	60	62	2	0
FV-043	1	Historic District/Trail	C (66)	65	**66**	1	1
FV-044	1	Historic District/Trail	C (66)	**66**	**67**	1	1
FV-045	1	Historic District/Trail	C (66)	65	**66**	1	1
FV-046	1	Historic District/Trail	C (66)	**66**	**67**	1	1
FV-047	1	Historic District/Trail	C (66)	**75**	**76**	1	1
FV-048	1	Trail	C (66)	**69**	**71**	2	1
FV-049	1	Trail	C (66)	**68**	**69**	1	1
FV-050	1	Trail	C (66)	**66**	**67**	1	1
FV-051	1	Trail	C (66)	64	**66**	2	1
FV-052	1	Trail	C (66)	62	64	2	0
FV-053	1	Trail	C (66)	60	62	2	0
FV-054	1	Trail	C (66)	58	60	2	0
FV-055	1	Historic District/Trail	C (66)	57	59	2	0
FV-056	1	Historic District/Trail	C (66)	57	59	2	0
FV-057	1	Historic District/Trail	C (66)	57	59	2	0
FV-058	1	Historic District/Trail	C (66)	56	59	3	0
FV-059	1	Historic District/Trail	C (66)	56	59	3	0
FV-060	1	Historic District/Park	C (66)	56	58	2	0
FV-061	1	Historic District/Trail	C (66)	56	59	3	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build [f] (dBA)	Change [g] (dBA)	Exceedances [h]
FV-062	1	Historic District/Trail	C (66)	56	59	3	0
FV-063	1	Historic District/Trail	C (66)	56	59	3	0
FV-064	1	Historic District/Trail	C (66)	57	59	2	0
FV-065	1	Historic District/Trail	C (66)	57	59	2	0
FV-066	1	Historic District/Trail	C (66)	57	59	2	0
FV-067	1	Historic District/Trail	C (66)	58	60	2	0
FV-068	1	Historic District/Trail	C (66)	58	60	2	0
FV-069	1	Historic District/Trail	C (66)	59	61	2	0
FV-070	1	Restaurant	E (71)	61	62	1	0
FV-071	0	Undeveloped	G	66	67	1	0

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences or residential equivalence
c Land use: Recreation = athletic field or playfield; Park; Trail, Historic District, Fort Vancouver Village
d Traffic noise impacts criteria (WSDOT NAC)
e Existing and Future No-Build Alternative modeled noise levels from Traffic Noise Model version 2.5 at or above WSDOT NAC in **bold**.
f No-Build Alternative modeled noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds. WSDOT NAC exceedances shown in **bold**.
g Change in noise, No-Build Alternative minus Existing
h Number of residences, apartment units, or residential equivalence expected to exceed WSDOT NAC under the No-Build Alternative

dBA = A-weighted decibels; FHWA = Federal Highway Administration; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

4.3.2 Modified LPA Traffic Noise

Table 4-6 shows the Modified LPA (2045) traffic noise levels, existing and No-Build Alternative traffic noise levels, number of residences or residential equivalents, noise impact criteria, and expected number of WSDOT NAC exceedances under the Modified LPA.

The Modified LPA includes the same WSDOT NAC exceedances as the No-Build Alternative at Fort Vancouver trails, one Fort Vancouver Historic Village site, and one of the four offices. In the VNHR, noise levels would be above the WSDOT NAC at two residences and four total offices, with outdoor noise levels at the VNHR office represented by site FV-004 predicted to experience a substantial increase of 10 dBA over existing conditions. Among all sites in the VNHR, noise levels would range from 54 to 75 dBA Leq, with a decrease of 2 dBA below existing conditions at Old Apple Tree Park and nearby trail and an increase of up to 10 dBA over existing conditions at one Fort Vancouver office, represented by site FV-004. Compared to the No-Build Alternative, traffic noise levels under the Modified LPA are expected to increase throughout much of the Fort Vancouver area by up to 10 dBA at site FV-004 and decrease by as much as 4 dBA at Old Apple Tree Park, represented by site FV-039. Figure 4-3 and Figure 4-4 show the location of each traffic noise impact under the Modified LPA (2045). A qualitative analysis of the anticipated change in noise levels with the design options is provided below.

4.3.2.1 Modified LPA Design Options

TWO AUXILIARY LANES IN EACH DIRECTION OF I-5

Highway noise impacts, before and after mitigation, that would result from the Modified LPA with two auxiliary lanes in each direction of I-5 design option would be largely the same as those resulting from the Modified LPA with one auxiliary lane in each direction of I-5 design option. Due to the distance between the nearest noise-sensitive land uses and the additional auxiliary lane, and because no changes in peak hour volumes, posted speed limits, or vehicle mix would occur with the addition of a second auxiliary lane, only slight differences in noise levels (0 to 2 dBA at the closest noise-sensitive uses) are anticipated. These slight differences would occur because a second auxiliary lane would add traffic approximately 16 feet closer to noise-sensitive land uses located east and west of I-5.

SR 14 INTERCHANGE WITHOUT C STREET RAMPS

Noise levels and anticipated noise impacts within the VNHR that would result from the Modified LPA with SR 14 interchange without C Street ramps design option would largely be the same as those resulting from the option with C Street ramps, except in the area where the option without C Street ramps would shift the westbound SR 14 on-ramp to northbound I-5 further from noise-sensitive use areas. In this area, traffic noise levels resulting from the option without C Street ramps would be slightly below those with C Street ramps due to traffic moving further from noise-sensitive areas in the VNHR. The difference in traffic noise levels between the two options would be barely perceptible (2 to 3 dBA).

I-5 MAINLINE SHIFTED WEST

Traffic noise levels and anticipated noise impacts resulting from the Modified LPA with I-5 mainline shifted west design option would be slightly lower in areas closest to the westward shift of I-5 mainline traffic. Traffic noise levels in this area would be slightly lower (2 to 3 dBA) than under the Modified LPA with I-5 mainline shifted west option due to traffic noise shifting further from Fort Vancouver.

SINGLE-LEVEL FIXED-SPAN CONFIGURATION

The Modified LPA with single-level fixed-span configuration would result in noise and vibration levels similar to those of the Modified LPA with double-deck fixed-span configuration. The single-level fixed-span configuration would result in slightly greater highway noise and highway noise impacts east and west of the bridges than the Modified LPA with double-deck fixed-span configuration. The single-level fixed-span configuration would also result in additional impacts from the wider bridge spans (99 feet wider) and lower roadway decks (29 feet lower) than the double-deck fixed-span configuration.

Shared-use path users would experience more exposure to noise from highway vehicles under the Modified LPA with single-level fixed-span configuration than under the Modified LPA with double-deck fixed-span configuration due to reduced shielding between the shared-use path and highway traffic.

SINGLE-LEVEL MOVABLE-SPAN CONFIGURATION

The Modified LPA with single-level movable-span configuration would result in noise and vibration levels and impacts similar to those of the Modified LPA with single-level fixed-span configuration.

Table 4-6. Modified LPA Traffic Noise Levels – Fort Vancouver

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
FV-001	1	Office	E (71)	55	58	57	2	0
FV-002	1	Historic District/Office	C (66)	65	**66**	**72**	7	1
FV-003	1	Historic District/Office	C (66)	63	64	**66**	3	1
FV-004	1	Historic District/Office	C (66)	62	63	**72**	**10**	1
FV-005	1	Historic District/Office	C (66)	60	61	**66**	6	1
FV-006	1	Historic District/Office	C (66)	56	57	60	4	0
FV-007	1	Historic District/Office	C (66)	54	55	57	3	0
FV-008	1	Historic District/Office	C (66)	61	62	65	4	0
FV-009	1	Historic District/Office	C (66)	54	55	56	2	0
FV-010	12	Historic District/Residence	C (66)/B (66)	60	61	64	4	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
FV-011	0	Historic District/former health care facility	C (66)	57	58	59	2	0
FV-012	1	Historic District/Office	C (66)	53	54	54	1	0
FV-013	1	Historic District/Office	C (66)	54	55	59	5	0
FV-014	2	Historic District/Residence	C (66)/B (66)	61	61	65	4	0
FV-015	2	Historic District/Residence	C (66)/B (66)	61	62	64	3	0
FV-016	1	Historic District/Office	C (66)	56	57	59	3	0
FV-017	1	Historic District/Office	C (66)	52	53	56	4	0
FV-018	2	Historic District/Residence	C (66)/B (66)	61	62	**66**	5	2
FV-019	2	Historic District/Residence	C (66)/B (66)	58	59	62	4	0
FV-020	2	Historic District/Residence	C (66)/B (66)	54	55	59	5	0
FV-021	2	Historic District/Residence	C (66)/B (66)	59	60	63	4	0
FV-022	2	Historic District/Residence	C (66)/B (66)	53	54	57	4	0
FV-023	1	Historic District/Office	C (66)	62	63	64	2	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
FV-024	1	Historic District/Office	C (66)	55	56	56	1	0
FV-025	1	Historic District/Office	C (66)	53	54	57	4	0
FV-026	1	Historic District/Office	C (66)	56	57	57	1	0
FV-027A	1	Historic District/FV Village	C (66)	55	56	58	3	0
FV-027B	1	Historic District/FV Village	C (66)	55	56	59	4	0
FV-027C	1	Historic District/FV Village	C (66)	58	59	62	4	0
FV-027D	1	Historic District/FV Village	C (66)	57	58	60	3	0
FV-027E	1	Historic District/FV Village	C (66)	60	61	65	5	0
FV-027F	1	Historic District/FV Village	C (66)	58	59	61	3	0
FV-027G	1	Historic District/FV Village	C (66)	65	**66**	**71**	6	1
FV-027H	1	Historic District/FV Village	C (66)	63	64	65	2	0
FV-028	1	Historic District/Trail	C (66)	54	55	58	4	0
FV-029	1	Historic District/Trail	C (66)	55	56	59	4	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
FV-030	1	Historic District/Trail	C (66)	55	56	59	4	0
FV-031	1	Historic District/Trail	C (66)	56	57	60	4	0
FV-032	1	Historic District/Trail	C (66)	57	58	60	3	0
FV-033	1	Historic District/Trail	C (66)	59	60	61	2	0
FV-034	1	Historic District/Trail	C (66)	60	61	62	2	0
FV-035	1	Historic District/Trail	C (66)	64	65	65	1	0
FV-036	1	Historic District/Trail	C (66)	**69**	**70**	**71**	2	1
FV-037	1	Historic District/Trail	C (66)	**68**	**69**	**69**	1	1
FV-038	1	Historic District/Trail	C (66)	**70**	**71**	**71**	1	1
FV-039	1	Historic District/Park	C (66)	63	65	61	-2	0
FV-040	1	Historic District/Trail	C (66)	60	61	61	1	0
FV-041	1	Historic District/Trail	C (66)	59	61	63	4	0
FV-042	1	Historic District/Trail	C (66)	60	62	65	5	0
FV-043	1	Historic District/Trail	C (66)	65	**66**	**67**	2	1
FV-044	1	Historic District/Trail	C (66)	**66**	**67**	**70**	4	1
FV-045	1	Historic District/Trail	C (66)	65	**66**	**73**	8	1

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
FV-046	1	Historic District/Trail	C (66)	**66**	**67**	**74**	8	1
FV-047	1	Historic District/Trail	C (66)	**75**	**76**	**75**	0	1
FV-048	1	Trail	C (66)	**69**	**71**	**68**	-1	1
FV-049	1	Trail	C (66)	**68**	**69**	**66**	-2	1
FV-050	1	Trail	C (66)	**66**	**67**	**66**	0	1
FV-051	1	Trail	C (66)	64	65	65	1	0
FV-052	1	Trail	C (66)	62	64	64	2	0
FV-053	1	Trail	C (66)	60	62	63	3	0
FV-054	1	Trail	C (66)	58	60	62	4	0
FV-055	1	Historic District/Trail	C (66)	57	59	62	5	0
FV-056	1	Historic District/Trail	C (66)	57	59	61	4	0
FV-057	1	Historic District/Trail	C (66)	57	59	60	3	0
FV-058	1	Historic District/Trail	C (66)	56	59	60	4	0
FV-059	1	Historic District/Trail	C (66)	56	58	60	4	0
FV-060	1	Historic District/Park	C (66)	56	58	59	3	0
FV-061	1	Historic District/Trail	C (66)	56	58	59	3	0
FV-062	1	Historic District/Trail	C (66)	56	59	59	3	0
FV-063	1	Historic District/Trail	C (66)	56	59	59	3	0
FV-064	1	Historic	C (66)	57	59	59	2	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
		District/Trail						
FV-065	1	Historic District/Trail	C (66)	57	59	59	2	0
FV-066	1	Historic District/Trail	C (66)	57	59	59	2	0
FV-067	1	Historic District/Trail	C (66)	58	60	59	1	0
FV-068	1	Historic District/Trail	C (66)	58	60	59	1	0
FV-069	1	Historic District/Trail	C (66)	59	60	60	1	0
FV-070	1	Restaurant	E (71)	61	62	61	0	0
FV-071	1	Undeveloped	G	66	67	65	-1	0

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences or residential equivalents
c Land use: Park = parklands; Trail, Fort Vancouver Historic District
d Traffic noise impact criteria (WSDOT NAC)
e Existing modeled noise levels from Traffic Noise Model version 2.5 using existing 2019 traffic volumes and speeds. WSDOT NAC exceedances shown in **bold**.
f Future No-Build Alternative modeled noise levels from Traffic Noise Model version 2.5 using future 2045 traffic volumes and speeds. WSDOT NAC exceedances in **bold**.
g Future Modified LPA noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds. WSDOT NAC exceedances in **bold**. Substantial impacts of 10 dBA or more shown in **gray highlights**.
h Change in noise levels, Modified compared to Existing
i Number of exceedances under Modified LPA
dBA = A-weighted decibels; FHWA = Federal Highway Administration; LPA = Locally Preferred Alternative; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

4.4 East of I-5/Mill Plain to North Vancouver Traffic Noise

The section describes the potential noise impacts from the No-Build Alternative and the Modified LPA east of I-5, north of Mill Plain to the northern study area terminus.

4.4.1 No-Build Alternative Traffic Noise

No-Build Alternative traffic noise levels were projected for “VE” designated receptors as shown in Table 4-7. Future No-Build Alternative noise levels at the modeling locations in this subarea ranged from 50 to 74 dBA L_{eq}, an increase of 1 to 3 dBA over existing noise levels. These increases are due to an increase in traffic volumes from existing conditions to the year 2045. Currently, 17 locations approach or exceed the WSDOT NAC. Under the No-Build Alternative, 30 locations approach or exceed the WSDOT NAC. Noise levels do not approach or exceed the WSDOT NAC at the hospital or churches located in this subarea; however, they exceed the criteria at 25 residences, and at athletic fields and other outdoor use locations at Marshall Park.

Table 4-7. No-Build Alternative Traffic Noise Levels East of I-5, North of Mill Plain

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VE-001	1	Residential	B (66)	65	65	0	0
VE-002	1	Residential	B (66)	64	65	1	0
VE-003	1	Residential	B (66)	64	65	1	0
VE-004	1	Residential	B (66)	64	65	1	0
VE-005	6	Residential/ Recreation	B / C (66)	65	**66**	1	6
VE-006	3	Residential	B (66)	64	65	1	0
VE-007	3	Residential	B (66)	64	64	0	0
VE-008	1	Residential	B (66)	64	65	1	0
VE-009	1	Residential	B (66)	64	65	1	0
VE-010	1	Residential	B (66)	64	64	0	0
VE-011	1	Residential	B (66)	63	64	1	0
VE-012	1	Residential	B (66)	64	64	0	0
VE-013	1	Residential	B (66)	64	65	1	0
VE-014	1	Residential	B (66)	64	65	1	0
VE-015	1	Residential	B (66)	63	64	1	0
VE-016	1	Recreation	C (66)	60	60	0	0
VE-017	1	Recreation	C (66)	60	61	1	0
VE-018	1	Recreation	C (66)	60	60	0	0
VE-019	1	Recreation	C (66)	59	59	0	0
VE-020	1	Recreation	C (66)	59	60	1	0
VE-021	1	Recreation	C (66)	58	58	0	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VE-022	1	Recreation	C (66)	59	60	1	0
VE-023	1	Recreation	C (66)	59	59	0	0
VE-024	1	Residential	B (66)	61	62	1	0
VE-025	1	Residential	B (66)	60	61	1	0
VE-026	1	Residential	B (66)	60	61	1	0
VE-027	1	Residential	B (66)	60	61	1	0
VE-028	1	Residential	B (66)	60	61	1	0
VE-029	1	Residential	B (66)	61	61	0	0
VE-030	1	Residential	B (66)	60	61	1	0
VE-031	1	Residential	B (66)	59	59	0	0
VE-032	1	Residential	B (66)	61	62	1	0
VE-033	1	Residential	B (66)	59	60	1	0
VE-034	2	Residential	B (66)	62	63	1	0
VE-035	1	Residential	B (66)	60	61	1	0
VE-036	1	Residential	B (66)	60	61	1	0
VE-037	1	Residential	B (66)	59	59	0	0
VE-038	1	Residential	B (66)	56	57	1	0
VE-039	1	Residential	B (66)	59	60	1	0
VE-040	1	Residential	B (66)	58	59	1	0
VE-041	2	Residential	B (66)	64	65	1	0
VE-042	2	Residential	B (66)	61	62	1	0
VE-043	1	Residential	B (66)	59	60	1	0
VE-044	1	Residential	B (66)	54	55	1	0
VE-045	1	Residential	B (66)	54	55	1	0
VE-046	1	Residential	B (66)	52	53	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VE-047	1	Residential	B (66)	**66**	**67**	1	1
VE-048	2	Residential	B (66)	60	61	1	0
VE-049	2	Residential	B (66)	58	59	1	0
VE-050	1	Residential	B (66)	57	58	1	0
VE-051	2	Residential	B (66)	58	59	1	0
VE-052	1	Residential	B (66)	62	63	1	0
VE-053	2	Residential	B (66)	53	54	1	0
VE-054	1	Residential	B (66)	58	59	1	0
VE-055	1	Residential	B (66)	64	64	0	0
VE-056	1	Residential	B (66)	56	56	0	0
VE-057	1	Residential	B (66)	58	58	0	0
VE-058	1	Residential	B (66)	63	64	1	0
VE-059	1	Residential	B (66)	57	57	0	0
VE-060	1	Residential	B (66)	57	58	1	0
VE-061	1	Residential	B (66)	63	64	1	0
VE-062	1	Residential	B (66)	57	58	1	0
VE-063	1	Residential	B (66)	63	64	1	0
VE-064	2	Residential	B (66)	54	55	1	0
VE-065	1	Residential	B (66)	57	58	1	0
VE-066	1	Residential	B (66)	63	63	0	0
VE-067	1	Residential	B (66)	57	58	1	0
VE-068	2	Residential	B (66)	55	56	1	0
VE-069	1	Residential	B (66)	56	57	1	0
VE-070	2	Residential	B (66)	53	54	1	0
VE-071	2	Residential	B (66)	51	52	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VE-072	1	Residential	B (66)	63	64	1	0
VE-073	1	Residential	B (66)	56	57	1	0
VE-074	1	Residential	B (66)	54	55	1	0
VE-075	1	Residential	B (66)	63	64	1	0
VE-076	1	Residential	B (66)	56	57	1	0
VE-077	1	Residential	B (66)	53	54	1	0
VE-078	1	Residential	B (66)	63	64	1	0
VE-079	1	Residential	B (66)	54	55	1	0
VE-080	1	Residential	B (66)	51	52	1	0
VE-081	1	Residential	B (66)	63	64	1	0
VE-082	1	Residential	B (66)	54	55	1	0
VE-083	1	Residential	B (66)	52	53	1	0
VE-084	1	Residential	B (66)	63	63	0	0
VE-085	1	Residential	B (66)	51	52	1	0
VE-086	2	Residential	B (66)	51	52	1	0
VE-087	1	Residential	B (66)	62	63	1	0
VE-088	1	Residential	B (66)	52	53	1	0
VE-089	1	Residential	B (66)	51	52	1	0
VE-090	1	Residential	B (66)	51	52	1	0
VE-091	1	Church	C (66)	59	60	1	0
VE-092	1	Residential	B (66)	53	54	1	0
VE-093	2	Residential	B (66)	51	52	1	0
VE-094	1	Residential	B (66)	49	50	1	0
VE-095	1	Residential	B (66)	**67**	**68**	1	1
VE-096	1	Residential	B (66)	58	59	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VE-097	1	Residential	B (66)	56	57	1	0
VE-098	1	Residential	B (66)	65	**66**	1	1
VE-099	1	Residential	B (66)	53	54	1	0
VE-100	1	Residential	B (66)	**66**	**67**	1	1
VE-101	1	Residential	B (66)	56	57	1	0
VE-102	1	Residential	B (66)	52	53	1	0
VE-103	1	Residential	B (66)	62	63	1	0
VE-104	2	Residential	B (66)	56	57	1	0
VE-105	1	Residential	B (66)	52	53	1	0
VE-106	1	Residential	B (66)	62	62	0	0
VE-107	2	Residential	B (66)	54	55	1	0
VE-108	1	Residential	B (66)	62	63	1	0
VE-109	2	Residential	B (66)	55	56	1	0
VE-110	1	Residential	B (66)	52	53	1	0
VE-110B	1	Residential	B (66)	53	54	1	0
VE-111	1	Residential	B (66)	**66**	**67**	1	1
VE-112	2	Residential	B (66)	56	57	1	0
VE-113	1	Residential	B (66)	52	53	1	0
VE-114	1	Residential	B (66)	63	64	1	0
VE-115	1	Residential	B (66)	57	58	1	0
VE-116	1	Residential	B (66)	51	52	1	0
VE-117	1	Residential	B (66)	62	62	0	0
VE-118	1	Residential	B (66)	54	55	1	0
VE-119	1	Residential	B (66)	53	54	1	0
VE-120	1	Residential	B (66)	61	62	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VE-121	1	Residential	B (66)	52	53	1	0
VE-122	1	Residential	B (66)	52	53	1	0
VE-123	3	Residential	B (66)	64	65	1	0
VE-124	1	Residential	B (66)	51	52	1	0
VE-125	1	Residential	B (66)	52	53	1	0
VE-126	1	Residential	B (66)	**66**	**67**	1	1
VE-127	1	Residential	B (66)	54	55	1	0
VE-128	1	Residential	B (66)	52	53	1	0
VE-129	1	Residential	B (66)	65	**66**	1	1
VE-130	2	Residential	B (66)	57	58	1	0
VE-131	1	Residential	B (66)	**66**	**66**	0	1
VE-132	1	Residential	B (66)	57	58	1	0
VE-133	2	Residential	B (66)	51	52	1	0
VE-134	1	Residential	B (66)	**67**	**67**	0	1
VE-135	2	Residential	B (66)	56	57	1	0
VE-136	2	Residential	B (66)	51	52	1	0
VE-137	1	Residential	B (66)	**66**	**67**	1	1
VE-138	2	Residential	B (66)	58	59	1	0
VE-139	1	Residential	B (66)	52	53	1	0
VE-140	1	Residential	B (66)	64	65	1	0
VE-141	2	Residential	B (66)	59	60	1	0
VE-142	1	Residential	B (66)	53	54	1	0
VE-143	2	Residential	B (66)	52	53	1	0
VE-144	1	Residential	B (66)	64	64	0	0
VE-145	2	Residential	B (66)	57	58	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VE-146	1	Residential	B (66)	53	53	0	0
VE-147	1	Residential	B (66)	52	53	1	0
VE-148	1	Residential	B (66)	57	58	1	0
VE-149	2	Residential	B (66)	54	55	1	0
VE-150	1	Residential	B (66)	**68**	**68**	0	1
VE-151	1	Recreation	C (66)	57	58	1	0
VE-152	1	Residential	B (66)	53	54	1	0
VE-153	1	Residential	B (66)	**68**	**68**	0	1
VE-154	2	Residential	B (66)	55	56	1	0
VE-155	1	Residential	B (66)	**68**	**68**	0	1
VE-155B	1	Residential	B (66)	**66**	**67**	1	1
VE-156	1	Residential	B (66)	54	55	1	0
VE-157	2	Residential	B (66)	50	51	1	0
VE-158	1	Church	C (66)	57	58	1	0
VE-159	1	Residential	B (66)	55	56	1	0
VE-160	1	Residential	B (66)	53	54	1	0
VE-161	1	Residential	B (66)	**66**	**66**	0	1
VE-162	1	Residential	B (66)	58	59	1	0
VE-163	2	Residential	B (66)	**66**	**67**	1	2
VE-164	1	Residential	B (66)	60	61	1	0
VE-165	1	Residential	B (66)	57	58	1	0
VE-166	1	Residential	B (66)	56	58	2	0
VE-167	1	Residential	B (66)	57	58	1	0
VE-168	1	Residential	B (66)	**73**	**74**	1	1
VE-169	2	Residential	B (66)	63	64	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VE-170	2	Cemetery	C (66)	64	65	1	0
VE-171	2	Cemetery	C (66)	61	62	1	0
VE-172	2	Cemetery	C (66)	56	58	2	0
VE-173	1	Health Care	C (66)	62	64	2	0
VE-174	1	Health Care	C (66)	57	58	1	0
VE-175	2	Recreation	C (66)	61	62	1	0
VE-176	1	Commercial	E (71)	59	59	0	0
VE-177	2	Recreation	C (66)	54	55	1	0
VE-178	2	Recreation	C (66)	61	62	1	0
VE-179	1	Community Center	C (66)	59	60	1	0
VE-180	1	Community Center	C (66)	63	64	1	0
VE-181	1	Recreation	C (66)	**70**	**71**	1	1
VE-182	1	Recreation	C (66)	64	65	1	0
VE-183	2	Community Garden	C (66)	58	59	1	0
VE-184	2	Recreation	C (66)	65	**66**	1	2
VE-185	1	Recreation	C (66)	61	62	1	0
VE-186	1	Recreation	C (66)	59	61	2	0
VE-187	2	Recreation	C (66)	65	**66**	1	2
VE-188	2	Recreation	C (66)	63	64	1	0
VE-189	1	Recreation	C (66)	59	61	2	0
VE-190	2	Recreation	C (66)	62	64	2	0
VE-191	2	Recreation	C (66)	61	63	2	0

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences or residential equivalence

c Land use: Residential = single or multi-family; Commercial = commercial/office; Recreation = athletic field or playfield; Health Care; Community Center; Community Garden
d Traffic noise impacts criteria (WSDOT NAC)
e Existing and Future No-Build Alternative modeled noise levels from Traffic Noise Model version 2.5 at or above WSDOT NAC in **bold**.
f No-Build Alternative modeled noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds. WSDOT NAC exceedances shown in **bold**.
g Change in noise, No-Build Alternative minus Existing
h Number of residences, apartment units, or residential equivalence expected to exceed the WSDOT NAC under the No-Build Alternative

dBA = A-weighted decibels; FHWA = Federal Highway Administration; LPA = Locally Preferred Alternative; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

4.4.2 Modified LPA Traffic Noise

Traffic noise levels were modeled for the Modified LPA. In the Vancouver area, existing noise walls are located along both sides of I-5. This analysis of the Modified LPA evaluates noise levels with the existing noise walls remaining in place, as analyzed for existing conditions and the No-Build Alternative. Table 4-8 shows the future Modified LPA traffic noise levels, along with existing and No-Build Alternative noise levels, number of residences or residential equivalents, impact criteria, and WSDOT NAC exceedances. A qualitative analysis of the anticipated change in noise levels with the design options is provided below.

In this subarea of Vancouver, the Modified LPA would exceed the WSDOT NAC at 26 locations near the future I-5 alignment. The 26 locations include 26 of the 31 WSDOT NAC exceedances predicted under the No-Build Alternative (including 21 of the 25 exceedances at residences and five of the six outdoor use locations at Marshall Park). No substantial increase impacts are predicted.

Noise levels would range from 49 to 73 dBA L_{eq}, and would fall within 1 to 3 dBA of existing conditions at most locations. Compared to existing conditions, noise levels would range from a decrease of 5 dBA below existing conditions to an increase of 3 dBA above existing conditions. Compared to No-Build Alternative, traffic noise levels are expected to be within 1 dBA throughout much of the subarea, with only slight increases of 0 to 2 dBA at most locations. Noise reductions of up to 6 dBA are predicted at outdoor use areas south of the VA Hospital due to the shift in the northbound I-5 off-ramp to Fourth Plain Boulevard. Figure 4-5, Figure 4-6, and Figure 4-7, show the location of each traffic noise impact under the Modified LPA (2045) in north Vancouver east of I-5.

4.4.2.1 Modified LPA Design Options

TWO AUXILIARY LANES IN EACH DIRECTION OF I-5

Highway noise impacts, before and after mitigation, that would result from the Modified LPA with two auxiliary lanes design option in each direction of I-5 would be largely the same as those resulting from the Modified LPA with one auxiliary lane in each direction of I-5 design option. Due to the distance between the nearest noise-sensitive land uses and the additional auxiliary lane, and because no changes in peak hour volumes, posted speed limits, or vehicle mix would occur with the addition of a second auxiliary lane, only slight differences in noise levels (0 to 2 dBA at the closest noise-sensitive uses) are anticipated. These slight differences would occur because the second auxiliary lane would add traffic approximately 16 feet closer to noise-sensitive land uses located east and west of I-5.

SR 14 INTERCHANGE WITHOUT C STREET RAMPS

Noise levels and anticipated noise impacts that would result from the Modified LPA with SR 14 interchange without C Street ramps design option in this subarea would be nearly identical to those of the option with C Street ramps because the improvements from E Mill Plain Boulevard to E McLoughlin Boulevard would only occur near the southernmost noise-sensitive land uses located in this subarea. Under the Modified LPA with SR 14 interchange without C Street ramps design option, the receptors located nearest to I-5 in this area would experience a minor reduction in noise levels as compared to the option with C Street ramps. The change in noise levels would be near the range of human perception, or 2 to 3 dBA.

I-5 MAINLINE SHIFTED WEST

Traffic noise levels and anticipated noise impacts in this subarea resulting from the Modified LPA with I-5 mainline shifted west design option would be nearly identical to those associated with the Modified LPA with I-5 mainline centered design option. With I-5 shifted west, sites located closest to I-5 would experience minor reductions in noise levels compared to the Modified LPA with I-5 mainline centered option due to the shift in mainline traffic further from this area.

Figure 4-5. Modified LPA (2045) Traffic Noise Impact Locations– North Vancouver (E McLoughlin Boulevard to E 30th Street)

Figure 4-6. Modified LPA (2045) Traffic Noise Impact Locations – North Vancouver (E 30th Street to E 39th Street)

Figure 4-7. Modified LPA (2045) Traffic Noise Impact Locations – North Vancouver (E 39th Street to North Study Area Terminus)

Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Table 4-8. Modified LPA (2045) Traffic Noise Levels - Vancouver, East of I-5

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing (dBA) [e]	No-Build Alternative (dBA) [f]	Modified LPA [g] (dBA)	Modified LPA vs. Existing (dBA) [h]	Modified LPA Impacts [i]
VE-001	1	Residential	B (66)	65	65	65	0	0
VE-002	1	Residential	B (66)	64	65	65	1	0
VE-003	1	Residential	B (66)	64	65	65	1	0
VE-004	1	Residential	B (66)	64	65	65	1	0
VE-005	6	Residential/ Recreation	B / C (66)	65	**66**	65	0	0
VE-006	3	Residential	B (66)	64	65	64	0	0
VE-007	3	Residential	B (66)	64	64	64	0	0
VE-008	1	Residential	B (66)	64	65	65	1	0
VE-009	1	Residential	B (66)	64	65	64	0	0
VE-010	1	Residential	B (66)	64	64	64	0	0
VE-011	1	Residential	B (66)	63	64	64	1	0
VE-012	1	Residential	B (66)	64	64	64	0	0
VE-013	1	Residential	B (66)	64	65	65	1	0
VE-014	1	Residential	B (66)	64	65	64	0	0
VE-015	1	Residential	B (66)	63	64	64	1	0
VE-016	1	Recreation	C (66)	60	60	61	1	0
VE-017	1	Recreation	C (66)	60	61	61	1	0
VE-018	1	Recreation	C (66)	60	60	60	0	0
VE-019	1	Recreation	C (66)	59	59	59	0	0
VE-020	1	Recreation	C (66)	59	60	60	1	0
VE-021	1	Recreation	C (66)	58	58	58	0	0
VE-022	1	Recreation	C (66)	59	60	59	0	0
VE-023	1	Recreation	C (66)	59	59	59	0	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing (dBA) [e]	No-Build Alternative (dBA) [f]	Modified LPA [g] (dBA)	Modified LPA vs. Existing (dBA) [h]	Modified LPA Impacts [i]
VE-024	1	Residential	B (66)	61	62	63	2	0
VE-025	1	Residential	B (66)	60	61	61	1	0
VE-026	1	Residential	B (66)	60	61	62	2	0
VE-027	1	Residential	B (66)	60	61	61	1	0
VE-028	1	Residential	B (66)	60	61	61	1	0
VE-029	1	Residential	B (66)	61	61	62	1	0
VE-030	1	Residential	B (66)	60	61	61	1	0
VE-031	1	Residential	B (66)	59	59	60	1	0
VE-032	1	Residential	B (66)	61	62	62	1	0
VE-033	1	Residential	B (66)	59	60	61	2	0
VE-034	2	Residential	B (66)	62	63	64	2	0
VE-035	1	Residential	B (66)	60	61	62	2	0
VE-036	1	Residential	B (66)	60	61	62	2	0
VE-037	1	Residential	B (66)	59	59	60	1	0
VE-038	1	Residential	B (66)	56	57	57	1	0
VE-039	1	Residential	B (66)	59	60	61	2	0
VE-040	1	Residential	B (66)	58	59	60	2	0
VE-041	2	Residential	B (66)	64	65	**66**	2	2
VE-042	2	Residential	B (66)	61	62	63	2	0
VE-043	1	Residential	B (66)	59	60	60	1	0
VE-044	1	Residential	B (66)	54	55	55	1	0
VE-045	1	Residential	B (66)	54	55	55	1	0
VE-046	1	Residential	B (66)	52	53	53	1	0
VE-047	1	Residential	B (66)	**66**	**67**	**67**	1	1

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing (dBA) [e]	No-Build Alternative (dBA) [f]	Modified LPA [g] (dBA)	Modified LPA vs. Existing (dBA) [h]	Modified LPA Impacts [i]
VE-048	2	Residential	B (66)	60	61	61	1	0
VE-049	2	Residential	B (66)	58	59	59	1	0
VE-050	1	Residential	B (66)	57	58	58	1	0
VE-051	2	Residential	B (66)	58	59	60	2	0
VE-052	1	Residential	B (66)	62	63	63	1	0
VE-053	2	Residential	B (66)	53	54	53	0	0
VE-054	1	Residential	B (66)	58	59	59	1	0
VE-055	1	Residential	B (66)	64	64	64	0	0
VE-056	1	Residential	B (66)	56	56	56	0	0
VE-057	1	Residential	B (66)	58	58	59	1	0
VE-058	1	Residential	B (66)	63	64	64	1	0
VE-059	1	Residential	B (66)	57	57	57	0	0
VE-060	1	Residential	B (66)	57	58	58	1	0
VE-061	1	Residential	B (66)	63	64	64	1	0
VE-062	1	Residential	B (66)	57	58	58	1	0
VE-063	1	Residential	B (66)	63	64	64	1	0
VE-064	2	Residential	B (66)	54	55	54	0	0
VE-065	1	Residential	B (66)	57	58	58	1	0
VE-066	1	Residential	B (66)	63	63	63	0	0
VE-067	1	Residential	B (66)	57	58	58	1	0
VE-068	2	Residential	B (66)	55	56	56	1	0
VE-069	1	Residential	B (66)	56	57	56	0	0
VE-070	2	Residential	B (66)	53	54	53	0	0
VE-071	2	Residential	B (66)	51	52	51	0	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing (dBA) [e]	No-Build Alternative (dBA) [f]	Modified LPA [g] (dBA)	Modified LPA vs. Existing (dBA) [h]	Modified LPA Impacts [i]
VE-072	1	Residential	B (66)	63	64	63	0	0
VE-073	1	Residential	B (66)	56	57	56	0	0
VE-074	1	Residential	B (66)	54	55	55	1	0
VE-075	1	Residential	B (66)	63	64	63	0	0
VE-076	1	Residential	B (66)	56	57	56	0	0
VE-077	1	Residential	B (66)	53	54	53	0	0
VE-078	1	Residential	B (66)	63	64	63	0	0
VE-079	1	Residential	B (66)	54	55	55	1	0
VE-080	1	Residential	B (66)	51	52	52	1	0
VE-081	1	Residential	B (66)	63	64	63	0	0
VE-082	1	Residential	B (66)	54	55	54	0	0
VE-083	1	Residential	B (66)	52	53	52	0	0
VE-084	1	Residential	B (66)	63	63	63	0	0
VE-085	1	Residential	B (66)	51	52	52	1	0
VE-086	2	Residential	B (66)	51	52	52	1	0
VE-087	1	Residential	B (66)	62	63	62	0	0
VE-088	1	Residential	B (66)	52	53	52	0	0
VE-089	1	Residential	B (66)	51	52	52	1	0
VE-090	1	Residential	B (66)	51	52	52	1	0
VE-091	1	Church	C (66)	59	60	59	0	0
VE-092	1	Residential	B (66)	53	54	53	0	0
VE-093	2	Residential	B (66)	51	52	52	1	0
VE-094	1	Residential	B (66)	49	50	49	0	0
VE-095	1	Residential	B (66)	**67**	**68**	**68**	1	1

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing (dBA) [e]	No-Build Alternative (dBA) [f]	Modified LPA [g] (dBA)	Modified LPA vs. Existing (dBA) [h]	Modified LPA Impacts [i]
VE-096	1	Residential	B (66)	58	59	58	0	0
VE-097	1	Residential	B (66)	56	57	57	1	0
VE-098	1	Residential	B (66)	65	**66**	**66**	1	1
VE-099	1	Residential	B (66)	53	54	54	1	0
VE-100	1	Residential	B (66)	**66**	**67**	**66**	0	1
VE-101	1	Residential	B (66)	56	57	57	1	0
VE-102	1	Residential	B (66)	52	53	53	1	0
VE-103	1	Residential	B (66)	62	63	62	0	0
VE-104	2	Residential	B (66)	56	57	57	1	0
VE-105	1	Residential	B (66)	52	53	52	0	0
VE-106	1	Residential	B (66)	62	62	62	0	0
VE-107	2	Residential	B (66)	54	55	55	1	0
VE-108	1	Residential	B (66)	62	63	63	1	0
VE-109	2	Residential	B (66)	55	56	56	1	0
VE-110	1	Residential	B (66)	52	53	53	1	0
VE-110B	1	Residential	B (66)	53	54	53	0	0
VE-111	1	Residential	B (66)	**66**	**67**	**67**	1	1
VE-112	2	Residential	B (66)	56	57	57	1	0
VE-113	1	Residential	B (66)	52	53	53	1	0
VE-114	1	Residential	B (66)	63	64	64	1	0
VE-115	1	Residential	B (66)	57	58	57	0	0
VE-116	1	Residential	B (66)	51	52	52	1	0
VE-117	1	Residential	B (66)	62	62	62	0	0
VE-118	1	Residential	B (66)	54	55	55	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing (dBA) [e]	No-Build Alternative (dBA) [f]	Modified LPA [g] (dBA)	Modified LPA vs. Existing (dBA) [h]	Modified LPA Impacts [i]
VE-119	1	Residential	B (66)	53	54	53	0	0
VE-120	1	Residential	B (66)	61	62	62	1	0
VE-121	1	Residential	B (66)	52	53	53	1	0
VE-122	1	Residential	B (66)	52	53	52	0	0
VE-123	3	Residential	B (66)	64	65	65	1	0
VE-124	1	Residential	B (66)	51	52	52	1	0
VE-125	1	Residential	B (66)	52	53	52	0	0
VE-126	1	Residential	B (66)	**66**	**67**	**67**	1	1
VE-127	1	Residential	B (66)	54	55	55	1	0
VE-128	1	Residential	B (66)	52	53	52	0	0
VE-129	1	Residential	B (66)	65	**66**	**66**	1	1
VE-130	2	Residential	B (66)	57	58	58	1	0
VE-131	1	Residential	B (66)	**66**	**66**	**66**	0	1
VE-132	1	Residential	B (66)	57	58	57	0	0
VE-133	2	Residential	B (66)	51	52	52	1	0
VE-134	1	Residential	B (66)	**67**	**67**	**67**	0	1
VE-135	2	Residential	B (66)	56	57	57	1	0
VE-136	2	Residential	B (66)	51	52	52	1	0
VE-137	1	Residential	B (66)	**66**	**67**	**68**	2	1
VE-138	2	Residential	B (66)	58	59	58	0	0
VE-139	1	Residential	B (66)	52	53	53	1	0
VE-140	1	Residential	B (66)	64	65	65	1	0
VE-141	2	Residential	B (66)	59	60	59	0	0
VE-142	1	Residential	B (66)	53	54	54	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing (dBA) [e]	No-Build Alternative (dBA) [f]	Modified LPA [g] (dBA)	Modified LPA vs. Existing (dBA) [h]	Modified LPA Impacts [i]
VE-143	2	Residential	B (66)	52	53	53	1	0
VE-144	1	Residential	B (66)	64	64	64	0	0
VE-145	2	Residential	B (66)	57	58	57	0	0
VE-146	1	Residential	B (66)	53	53	53	0	0
VE-147	1	Residential	B (66)	52	53	53	1	0
VE-148	1	Residential	B (66)	57	58	57	0	0
VE-149	2	Residential	B (66)	54	55	55	1	0
VE-150	1	Residential	B (66)	**68**	**68**	**68**	0	1
VE-151	1	Recreation	C (66)	57	58	57	0	0
VE-152	1	Residential	B (66)	53	54	53	0	0
VE-153	1	Residential	B (66)	**68**	**68**	**68**	0	1
VE-154	2	Residential	B (66)	55	56	56	1	0
VE-155	1	Residential	B (66)	**68**	**68**	**68**	0	1
VE-155B	1	Residential	B (66)	**66**	**67**	**66**	0	1
VE-156	1	Residential	B (66)	54	55	55	1	0
VE-157	2	Residential	B (66)	50	51	51	1	0
VE-158	1	Church	C (66)	57	58	58	1	0
VE-159	1	Residential	B (66)	55	56	56	1	0
VE-160	1	Residential	B (66)	53	54	54	1	0
VE-161	1	Residential	B (66)	**66**	**66**	**66**	0	1
VE-162	1	Residential	B (66)	58	59	59	1	0
VE-163	2	Residential	B (66)	**66**	**67**	**67**	1	2
VE-164	1	Residential	B (66)	60	61	60	0	0
VE-165	1	Residential	B (66)	57	58	58	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing (dBA) [e]	No-Build Alternative (dBA) [f]	Modified LPA [g] (dBA)	Modified LPA vs. Existing (dBA) [h]	Modified LPA Impacts [i]
VE-166	1	Residential	B (66)	56	58	57	1	0
VE-167	1	Residential	B (66)	57	58	58	1	0
VE-168	1	Residential	B (66)	**73**	**74**	**73**	0	1
VE-169	2	Residential	B (66)	63	64	64	1	0
VE-170	2	Cemetery	C (66)	64	**65**	64	1	0
VE-171	2	Cemetery	C (66)	61	62	62	1	0
VE-172	2	Cemetery	C (66)	56	58	59	3	0
VE-173	1	Health Care	C (66)	62	64	64	1	0
VE-174	1	Health Care	C (66)	57	58	54	-3	0
VE-175	2	Recreation	C (66)	61	62	56	-5	0
VE-176	1	Commercial	E (71)	59	59	55	-4	0
VE-177	2	Recreation	C (66)	54	55	52	-2	0
VE-178	2	Recreation	C (66)	61	62	59	-2	0
VE-179	1	Community Center	C (66)	59	60	59	0	0
VE-180	1	Community Center	C (66)	63	64	65	2	0
VE-181	1	Recreation	C (66)	**70**	**71**	**70**	0	1
VE-182	1	Recreation	C (66)	64	65	**66**	2	1
VE-183	2	Community Garden	C (66)	58	59	58	0	0
VE-184	2	Recreation	C (66)	65	**66**	**66**	1	2
VE-185	1	Recreation	C (66)	61	62	62	1	0
VE-186	1	Recreation	C (66)	59	61	61	2	0
VE-187	2	Recreation	C (66)	65	**66**	**66**	1	2
VE-188	2	Recreation	C (66)	63	64	64	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing (dBA) [e]	No-Build Alternative (dBA) [f]	Modified LPA [g] (dBA)	Modified LPA vs. Existing (dBA) [h]	Modified LPA Impacts [i]
VE-189	1	Recreation	C (66)	59	61	60	1	0
VE-190	2	Recreation	C (66)	62	64	63	1	0
VE-191	2	Recreation	C (66)	61	63	62	1	0

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences or residential equivalents
c Land use: Commercial = commercial and retail
d Traffic noise impact criteria (WSDOT NAC)
e Existing modeled noise levels from Traffic Noise Model version 2.5 using existing 2019 traffic volumes and speeds. WSDOT NAC exceedances in **bold**.
f Future No-Build Alternative modeled noise levels from Traffic Noise Model version 2.5 using future 2045 traffic volumes and speeds. WSDOT NAC exceedances in **bold**.
g Future Modified LPA noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds. WSDOT NAC impacts in **bold**.
h Change in noise levels, Modified LPA compared to Existing
i Number of WSDOT NAC exceedances under Modified LPA
dBA = A-weighted decibels; FHWA = Federal Highway Administration; LPA = Locally Preferred Alternative; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

4.5 West of I-5/Mill Plain to North Vancouver Traffic Noise

This section describes the potential noise impacts from the No-Build Alternative and the Modified LPA in this subarea west of I-5 and north of Mill Plain Boulevard to the northern study area terminus.

4.5.1 No-Build Alternative Traffic Noise

No-Build Alternative traffic noise levels were projected for "VW" designated receptors as shown on Table 4-9. Table 4-9 provides the predicted No-Build Alternative noise levels compared to existing noise levels and locations where No-Build Alternative noise levels exceed the WSDOT NAC.

Future No-Build Alternative noise levels at the modeling locations in this subarea north of Mill Plain Boulevard to Discovery Middle school range from 50 to 76 dBA L_{eq}, an increase of 1 to 3 dBA over existing noise levels. These increases are due to an increase in traffic volumes from existing conditions to the year 2045. Under the No-Build Alternative, the number of residences with noise levels that would approach or exceed the WSDOT NAC is predicted to increase to 65 from the current 47 locations. The same locations predicted to reach the WSDOT NAC under existing conditions would also exceed the WSDOT NAC under the No-Build Alternative, along with 18 additional residences and two additional use areas at the Kiggins athletic fields, one outdoor use at Discovery Middle School and two offices.

Table 4-9. No-Build Alternative Traffic Noise Levels - West of I-5, North of Mill Plain

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-001	2	Recreation	C (66)	64	65	1	0
VW-002	2	Recreation	C (66)	**67**	**68**	1	2
VW-003	4	Recreation	C (66)	63	64	1	0
VW-004	1	School	C (66)	**66**	**67**	1	1
VW-005	1	School	C (66)	55	55	0	0
VW-006	1	School	C (66)	58	59	1	0
VW-007	1	Residential	B (66)	58	58	0	0
VW-008	1	Residential	B (66)	59	60	1	0
VW-009	1	Residential	B (66)	61	62	1	0
VW-010	2	Residential	B (66)	**67**	**68**	1	2
VW-011	2	Residential	B (66)	**75**	**76**	1	2
VW-012	4	Residential	B (66)	55	56	1	0
VW-013	3	Residential	B (66)	53	54	1	0
VW-014	4	Residential	B (66)	53	54	1	0
VW-015	2	Residential	B (66)	53	53	0	0
VW-016	1	Residential	B (66)	61	62	1	0
VW-017	2	Residential	B (66)	**71**	**72**	1	2
VW-018	4	Residential	B (66)	54	55	1	0
VW-019	2	Residential	B (66)	50	51	1	0
VW-020	1	Residential	B (66)	62	62	0	0
VW-021	2	Residential	B (66)	58	59	1	0
VW-022	2	Residential	B (66)	61	62	1	0
VW-023	1	Residential	B (66)	65	65	0	0
VW-024	2	Residential	B (66)	56	56	0	0
VW-025	2	Residential	B (66)	58	58	0	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-026	2	Residential	B (66)	62	62	0	0
VW-027	1	Residential	B (66)	**67**	**68**	1	1
VW-028	2	Residential	B (66)	62	63	1	0
VW-029	2	Residential	B (66)	60	60	0	0
VW-029B	1	Residential	B (66)	64	64	0	0
VW-030	2	Residential	B (66)	62	63	1	0
VW-031	1	Residential	B (66)	62	62	0	0
VW-032	2	Residential	B (66)	**66**	**66**	0	2
VW-033	1	Residential	B (66)	64	64	0	0
VW-034	1	Commercial	E (71)	63	63	0	0
VW-035	1	Residential	B (66)	57	57	0	0
VW-036	1	Residential	B (66)	55	56	1	0
VW-037	1	Residential	B (66)	**66**	**66**	0	1
VW-038	1	Residential	B (66)	65	**66**	1	1
VW-039	2	Residential	B (66)	54	54	0	0
VW-040	1	Residential	B (66)	54	55	1	0
VW-041	1	Residential	B (66)	56	57	1	0
VW-042	1	Residential	B (66)	59	59	0	0
VW-043	1	Residential	B (66)	63	63	0	0
VW-044	1	Residential	B (66)	52	53	1	0
VW-045	2	Residential	B (66)	64	64	0	0
VW-046	1	Residential	B (66)	60	61	1	0
VW-047	1	Residential	B (66)	54	54	0	0
VW-048	1	Residential	B (66)	55	56	1	0
VW-049	1	Residential	B (66)	53	54	1	0
VW-050	1	Residential	B (66)	57	58	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-051	1	Residential	B (66)	61	61	0	0
VW-052	2	Residential	B (66)	57	58	1	0
VW-053	1	Residential	B (66)	65	**66**	1	1
VW-054	1	Residential	B (66)	53	54	1	0
VW-055	1	Residential	B (66)	57	58	1	0
VW-056	1	Residential	B (66)	63	64	1	0
VW-057	1	Residential	B (66)	53	54	1	0
VW-058	1	Residential	B (66)	57	58	1	0
VW-059	1	Residential	B (66)	63	64	1	0
VW-060	1	Residential	B (66)	54	55	1	0
VW-061	1	Residential	B (66)	57	58	1	0
VW-062	1	Residential	B (66)	64	65	1	0
VW-063	1	Residential	B (66)	54	54	0	0
VW-064	1	Residential	B (66)	57	58	1	0
VW-065	1	Residential	B (66)	62	63	1	0
VW-066	1	Residential	B (66)	54	55	1	0
VW-067	1	Residential	B (66)	55	55	0	0
VW-068	1	Residential	B (66)	61	62	1	0
VW-069	1	Residential	B (66)	52	53	1	0
VW-070	1	Residential	B (66)	53	54	1	0
VW-071	1	Residential	B (66)	59	59	0	0
VW-072	1	Residential	B (66)	53	54	1	0
VW-073	1	Residential	B (66)	53	54	1	0
VW-074	1	Residential	B (66)	55	55	0	0
VW-075	1	Residential	B (66)	57	58	1	0
]VW-076	1	Residential	B (66)	61	61	0	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-077	1	Residential	B (66)	63	63	0	0
VW-078	1	Residential	B (66)	54	55	1	0
VW-079	1	Residential	B (66)	57	58	1	0
VW-079B	2	Residential	B (66)	56	57	1	0
VW-080	1	Residential	B (66)	63	64	1	0
VW-081	1	Residential	B (66)	53	54	1	0
VW-082	1	Residential	B (66)	63	64	1	0
VW-083	1	Residential	B (66)	53	54	1	0
VW-084	2	Residential	B (66)	62	63	1	0
VW-085	1	Residential	B (66)	54	55	1	0
VW-086	1	Residential	B (66)	55	56	1	0
VW-087	1	Residential	B (66)	56	57	1	0
VW-088	1	Residential	B (66)	61	62	1	0
VW-089	1	Residential	B (66)	54	55	1	0
VW-090	1	Residential	B (66)	55	56	1	0
VW-091	1	Residential	B (66)	51	52	1	0
VW-092	1	Residential	B (66)	54	55	1	0
VW-093	1	Residential	B (66)	54	55	1	0
VW-094	1	Residential	B (66)	61	62	1	0
VW-095	1	Residential	B (66)	52	53	1	0
VW-096	1	Residential	B (66)	54	55	1	0
VW-097	1	Residential	B (66)	56	57	1	0
VW-098	1	Residential	B (66)	60	61	1	0
VW-099	1	Residential	B (66)	53	54	1	0
VW-100	1	Residential	B (66)	54	55	1	0
VW-101	1	Residential	B (66)	53	54	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-102	1	Residential	B (66)	56	57	1	0
VW-103	1	Residential	B (66)	**67**	**68**	1	1
VW-104	1	Residential	B (66)	52	53	1	0
VW-105	1	Residential	B (66)	53	54	1	0
VW-106	1	Residential	B (66)	53	54	1	0
VW-107	1	Residential	B (66)	63	64	1	0
VW-108	1	Residential	B (66)	52	53	1	0
VW-109	1	Residential	B (66)	54	55	1	0
VW-110	1	Residential	B (66)	55	55	0	0
VW-111	2	Residential	B (66)	59	60	1	0
VW-112	1	Residential	B (66)	53	54	1	0
VW-113	1	Residential	B (66)	53	54	1	0
VW-114	1	Residential	B (66)	56	57	1	0
VW-115	1	Residential	B (66)	52	53	1	0
VW-116	1	Residential	B (66)	56	57	1	0
VW-117	1	Residential	B (66)	58	58	0	0
VW-118	1	Residential	B (66)	65	**66**	1	1
VW-119	1	Residential	B (66)	51	52	1	0
VW-120	1	Residential	B (66)	53	54	1	0
VW-121	1	Residential	B (66)	54	55	1	0
VW-122	1	Residential	B (66)	57	58	1	0
VW-123	1	Residential	B (66)	60	61	1	0
VW-124	1	Residential	B (66)	63	64	1	0
VW-125	1	Residential	B (66)	57	58	1	0
VW-126	1	Residential	B (66)	55	56	1	0
VW-127	1	Residential	B (66)	56	57	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-128	1	Residential	B (66)	51	52	1	0
VW-128B	1	Residential	B (66)	51	52	1	0
VW-129	1	Residential	B (66)	52	53	1	0
VW-130	1	Residential	B (66)	54	55	1	0
VW-131	1	Residential	B (66)	64	65	1	0
VW-132	1	Residential	B (66)	61	62	1	0
VW-133	1	Residential	B (66)	53	53	0	0
VW-134	1	Residential	B (66)	53	54	1	0
VW-135	1	Residential	B (66)	56	57	1	0
VW-136	1	Residential	B (66)	52	53	1	0
VW-137	1	Residential	B (66)	51	52	1	0
VW-138	1	Residential	B (66)	**67**	**68**	1	1
VW-138B	1	Residential	B (66)	62	62	0	0
VW-139	2	Residential	B (66)	52	53	1	0
VW-140	1	Residential	B (66)	56	57	1	0
VW-141	1	Residential	B (66)	61	62	1	0
VW-142	1	Residential	B (66)	65	**66**	1	1
VW-143	1	Church	C (66)	52	53	1	0
VW-144	1	Residential	B (66)	59	60	1	0
VW-145	1	Residential	B (66)	52	53	1	0
VW-146	1	Residential	B (66)	53	53	0	0
VW-147	2	Residential	B (66)	59	59	0	0
VW-148	5	Residential	B (66)	52	52	0	0
VW-149	1	Residential	B (66)	53	54	1	0
VW-150	1	Residential	B (66)	53	54	1	0
VW-151	1	Residential	B (66)	59	60	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-152	1	Residential	B (66)	**66**	**67**	1	1
VW-153	1	Residential	B (66)	62	63	1	0
VW-154	1	Residential	B (66)	52	53	1	0
VW-155	1	Residential	B (66)	56	57	1	0
VW-156	1	Residential	B (66)	64	65	1	0
VW-157	1	Residential	B (66)	52	53	1	0
VW-158	1	Residential	B (66)	57	57	0	0
VW-159	1	Residential	B (66)	64	65	1	0
VW-160	1	Residential	B (66)	52	54	1	0
VW-161	1	Residential	B (66)	57	58	1	0
VW-162	2	Residential	B (66)	63	64	1	0
VW-163	1	Residential	B (66)	54	55	1	0
VW-164	1	Residential	B (66)	59	60	1	0
VW-165	1	Residential	B (66)	51	51	0	0
VW-166	1	Residential	B (66)	58	60	2	0
VW-167	1	Residential	B (66)	54	56	2	0
VW-168	1	Residential	B (66)	55	56	1	0
VW-169	1	Residential	B (66)	60	62	2	0
VW-170	1	Residential	B (66)	60	61	1	0
VW-171	1	Residential	B (66)	62	63	1	0
VW-172	1	Residential	B (66)	**66**	**67**	1	1
VW-173	1	Residential	B (66)	64	65	1	0
VW-174	1	Residential	B (66)	**67**	**68**	1	1
VW-175	2	Residential	B (66)	64	65	1	0
VW-176	1	Residential	B (66)	63	64	1	0
VW-177	1	Residential	B (66)	**71**	**73**	2	1

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-178	3	Residence/ Recreation	B (66)	55	57	2	0
VW-179	1	Residential	B (66)	60	62	2	0
VW-180	1	Residential	B (66)	60	61	1	0
VW-181	1	Commercial	E (71)	57	58	1	0
VW-182	2	Residential	B (66)	57	58	1	0
VW-183	1	Residential	B (66)	**68**	**69**	1	1
VW-184	1	Residential	B (66)	56	57	1	0
VW-185	1	Residential	B (66)	58	59	1	0
VW-186	1	Residential	B (66)	**68**	**68**	0	1
VW-187	1	Residential	B (66)	**66**	**67**	1	1
VW-188	1	Residential	B (66)	55	56	1	0
VW-189	1	Residential	B (66)	56	57	1	0
VW-190	1	Residential	B (66)	**66**	**67**	1	1
VW-191	1	Residential	B (66)	56	57	1	0
VW-192	1	Residential	B (66)	65	**66**	1	1
VW-193	1	Residential	B (66)	55	56	1	0
VW-194	3	Residential	B (66)	56	56	0	0
VW-195	1	Residential	B (66)	64	65	1	0
VW-196	1	Office	E (71)	55	56	1	0
VW-197	2	Residential	B (66)	53	54	1	0
VW-198	3	Residential	B (66)	56	57	1	0
VW-199	1	Residential	B (66)	58	59	1	0
VW-200	1	Residential	B (66)	59	60	1	0
VW-201	1	Residential	B (66)	62	63	1	0
VW-202	1	Residential	B (66)	**68**	**69**	1	1

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-203	4	Residential	B (66)	58	59	1	0
VW-204	2	Residential	B (66)	57	58	1	0
VW-205	1	Residential	B (66)	56	57	1	0
VW-206	2	Residential	B (66)	57	58	1	0
VW-207	1	Residential	B (66)	57	58	1	0
VW-208	1	Residential	B (66)	58	59	1	0
VW-209	1	Residential	B (66)	64	64	0	0
VW-210	1	Residential	B (66)	58	58	0	0
VW-211	2	Residential	B (66)	59	60	1	0
VW-212	1	Residential	B (66)	57	58	1	0
VW-213	1	Residential	B (66)	59	59	0	0
VW-214	1	Residential	B (66)	**71**	**71**	0	1
VW-215	1	Residential	B (66)	57	58	1	0
VW-216	1	Residential	B (66)	60	60	0	0
VW-217	1	Residential	B (66)	**72**	**73**	1	1
VW-218	1	Residential	B (66)	57	58	1	0
VW-219	1	Residential	B (66)	61	62	1	0
VW-220	1	Residential	B (66)	**72**	**73**	1	1
VW-221	1	Residential	B (66)	59	60	1	0
VW-222	1	Residential	B (66)	58	59	1	0
VW-223	1	Residential	B (66)	62	63	1	0
VW-224	1	Residential	B (66)	**73**	**74**	1	1
VW-225	1	Residential	B (66)	59	60	1	0
VW-226	1	Residential	B (66)	**73**	**74**	1	1
VW-227	1	Residential	B (66)	60	61	1	0
VW-228	1	Residential	B (66)	**68**	**69**	1	1

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-229	1	Residential	B (66)	**73**	**74**	1	1
VW-230	1	Residential	B (66)	**69**	**70**	1	1
VW-231	1	Residential	B (66)	62	63	1	0
VW-232	1	Residential	B (66)	**69**	**70**	1	1
VW-233	1	Residential	B (66)	55	56	1	0
VW-234	1	Residential	B (66)	57	58	1	0
VW-235	1	Residential	B (66)	**70**	**71**	1	1
VW-236	1	Residential	B (66)	59	59	0	0
VW-237	1	Residential	B (66)	58	59	1	0
VW-238	1	Residential	B (66)	62	64	2	0
VW-239	1	Residential	B (66)	65	**66**	1	1
VW-240	6	Residential	B (66)	65	**66**	1	6
VW-241	6	Residential	B (66)	**71**	**72**	1	6
VW-242	1	Residential	B (66)	58	61	3	0
VW-243	1	Office	E (71)	59	62	3	0
VW-244	1	Residential	B (66)	59	61	2	0
VW-245	1	Office	E (71)	60	62	2	0
VW-246	1	Residential	B (66)	61	62	1	0
VW-247	2	Residential	B (66)	60	61	1	0
VW-248	1	Residential	B (66)	**70**	**72**	2	1
VW-249	1	Residential	B (66)	58	59	1	0
VW-250	1	Residential	B (66)	58	59	1	0
VW-251	1	Residential	B (66)	59	60	1	0
VW-252	1	Residential	B (66)	62	63	1	0
VW-253	1	Residential	B (66)	58	59	1	0
VW-254	1	Residential	B (66)	55	56	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-255	1	Residential	B (66)	57	58	1	0
VW-256	1	Residential	B (66)	60	61	1	0
VW-257	1	Residential	B (66)	63	64	1	0
VW-258	1	Residential	B (66)	64	65	1	0
VW-259	1	Residential	B (66)	**72**	**73**	1	1
VW-260	1	Residential	E (71)	53	54	1	0
VW-261	1	Residential	B (66)	58	59	1	0
VW-262	3	Residential	B (66)	59	60	1	0
VW-263	1	Residential	B (66)	58	59	1	0
VW-264	1	Residential	B (66)	59	60	1	0
VW-265	1	Residential	B (66)	**68**	**69**	1	1
VW-266	1	Office	E (71)	**72**	**73**	1	1
VW-267	1	Office	E (71)	57	58	1	0
VW-268	6	Residential	B (66)	49	50	1	0
VW-269	5	Residential	B (66)	62	63	1	0
VW-270	1	Office	E (71)	62	63	1	0
VW-271	6	Residential	B (66)	52	53	1	0
VW-272	1	Residential	B (66)	64	65	1	0
VW-273	1	Residential	B (66)	**66**	**67**	1	1
VW-274	6	Residential	B (66)	51	52	1	0
VW-275	1	Office	E (71)	**71**	**73**	2	1
VW-276	1	Office	E (71)	68	70	2	0
VW-277	1	Office	E (71)	66	68	2	0
VW-278	6	Residential	B (66)	65	**66**	1	6
VW-279	1	Residential	B (66)	**69**	**70**	1	1
VW-280	4	Residential	B (66)	59	59	0	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria (dBA) [d]	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Change [g] (dBA)	Exceedances [h]
VW-281	4	Residential	B (66)	62	62	0	0
VW-282	1	Recreation	C (66)	59	60	1	0
VW-283	1	Recreation	C (66)	62	63	1	0
VW-284	1	Recreation	C (66)	61	63	2	0

a Receptors shown on Figure 3-4 through Figure 3-10
b Number of residences or residential equivalence
c Land use: Residential = single or multi-family; Commercial = commercial/office; Recreation = athletic field or playfield.
d Traffic noise impacts criteria (WSDOT NAC)
e Existing and Future No-Build Alternative modeled noise levels from Traffic Noise Model version 2.5, at or above WSDOT NAC in **bold**.
f No-Build Alternative modeled noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds. WSDOT NAC exceedances in **bold.**
g Change in noise, No-Build Alternative minus Existing
h Number of residences, apartment units, or residential equivalence expected to exceed the WSDOT NAC under the No-Build Alternative

dBA = A-weighted decibels; FHWA = Federal Highway Administration; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

4.5.2 Modified LPA Traffic Noise

Traffic noise levels were modeled for the Modified LPA. In this area, existing noise walls are located along both sides of I-5. This analysis of the Modified LPA evaluates noise levels with the existing noise walls remaining in place, as analyzed for existing conditions and the No-Build Alternative. Table 4-10 shows the future (2045) Modified LPA and the design option traffic noise levels, along with existing and No-Build Alternative noise levels, number of residences or residential equivalents, impact criteria, and impacts under the Modified LPA. A qualitative analysis of the anticipated change in noise levels with the design options is provided below

The Modified LPA would exceed the WSDOT NAC at 54 locations near the future I-5 alignment. Which is seven more NAC impacts than existing conditions and 12 fewer NAC impacts than the No-Build Alternative. The 54 exceedance locations s with the modified LPA include the sites with an exceedance under existing conditions and the No-Build Alternative, which include residences, Kiggins Bowl, and one outdoor location at Discovery Middle School; however, no NAC impacts are predicted with the Modified LPA at the two offices with NAC impacts under existing conditions or under the No-Build Alternative.

Modified LPA noise levels at this locations would range from 49 to 76 dBA L_{eq}. Increases in noise levels over existing conditions would range from 2 to 12 dBA at residences between E 33rd Street and E 39th Street, where the Modified LPA would shift I-5 southbound on-ramps west, closer to residences. In this area, the Modified LPA would displace seven single-family homes between E 35th Street and E 37th

Street. Displaced residences are represented by modeled sites VW-056, VW-059, VW-062, VW-065, VW-068, VW-071, and VW-077.

A 2 to 4 dBA increase in noise levels over existing conditions is predicted at most locations in this area. Compared to the No-Build Alternative, noise levels under the Modified LPA would be within 1 dBA of No-Build Alternative noise levels at most locations with similar increases of up to 10 dBA over No-Build Alternative noise levels at residences near the ramp improvements between E 33rd Street and E 39th Street. Six residences located between E 33rd Street and E 35th Street are predicted to experience substantial noise impacts with the Modified LPA. The six residences are represented by five modeled sites—VW-080, VW-082, VW-084, VW-094, and VW-098—and Figure 4-7 shows the location of each traffic noise impact under the Modified LPA (2045) in north Vancouver west of I-5.

4.5.2.1 Modified LPA Design Options

TWO AUXILIARY LANES IN EACH DIRECTION OF I-5

Highway noise impacts, before and after mitigation, that would result from the Modified LPA with two auxiliary lanes in each direction of I-5 design option would be largely the same as those resulting from the Modified LPA with one auxiliary lane in each direction of I-5 design option. Due to the distance between the nearest noise-sensitive land uses and the additional auxiliary lane, and because no changes in peak hour volumes, posted speed limits, or vehicle mix would occur with the addition of a second auxiliary lane, only slight differences in noise levels (0 to 2 dBA at the closest noise-sensitive uses) are anticipated. The slight differences would occur because a second auxiliary lane would add traffic approximately 16 feet closer to noise-sensitive land uses located east and west of I-5.

SR 14 INTERCHANGE WITHOUT C STREET RAMPS

Noise levels and anticipated noise impacts in this subarea that would result from the Modified LPA with SR 14 interchange without C Street ramps design option would be nearly identical to those resulting from the option with C Street ramps because the improvements from E Mill Plain Boulevard to E McLoughlin Boulevard would only occur near the southernmost noise-sensitive land uses located in this subarea.

I-5 MAINLINE SHIFTED WEST

Traffic noise levels and anticipated noise impacts in this subarea resulting from the Modified LPA I-5 mainline shifted west design option would be nearly identical to the Modified LPA with I-5 mainline centered design option. Sites located closest to I-5 would experience minor increases in noise levels compared to the Modified LPA with I-5 mainline centered due to the shift in mainline traffic closer to this area.

Table 4-10. Modified LPA (2045) Traffic Noise Levels - Vancouver Area, West of I-5

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-001	2	Recreation	C (66)	64	65	65	1	0
VW-002	2	Recreation	C (66)	**67**	**68**	**68**	1	2
VW-003	4	Recreation	C (66)	63	64	65	2	0
VW-004	1	School	C (66)	**66**	**67**	**67**	1	1
VW-005	1	School	C (66)	55	55	55	0	0
VW-006	1	School	C (66)	58	59	59	1	0
VW-007	1	Residential	B (66)	58	58	58	0	0
VW-008	1	Residential	B (66)	59	60	59	0	0
VW-009	1	Residential	B (66)	61	62	62	1	0
VW-010	2	Residential	B (66)	**67**	**68**	**68**	1	2
VW-011	2	Residential	B (66)	**75**	**76**	**76**	1	2
VW-012	4	Residential	B (66)	55	56	56	1	0
VW-013	3	Residential	B (66)	53	54	54	1	0
VW-014	4	Residential	B (66)	53	54	54	1	0
VW-015	2	Residential	B (66)	53	53	53	0	0
VW-016	1	Residential	B (66)	61	62	61	0	0
VW-017	2	Residential	B (66)	**71**	**72**	**71**	0	2
VW-018	4	Residential	B (66)	54	55	55	1	0
VW-019	2	Residential	B (66)	50	51	51	1	0
VW-020	1	Residential	B (66)	62	62	62	0	0
VW-021	2	Residential	B (66)	58	59	58	0	0
VW-022	2	Residential	B (66)	61	62	62	1	0
VW-023	1	Residential	B (66)	65	65	65	0	0
VW-024	2	Residential	B (66)	56	56	56	0	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-025	2	Residential	B (66)	58	58	58	0	0
VW-026	2	Residential	B (66)	62	62	62	0	0
VW-027	1	Residential	B (66)	**67**	**68**	**67**	0	1
VW-028	2	Residential	B (66)	62	63	62	0	0
VW-029	2	Residential	B (66)	60	60	60	0	0
VW-029B	1	Residential	B (66)	64	64	64	0	0
VW-030	2	Residential	B (66)	62	63	63	1	0
VW-031	1	Residential	B (66)	62	62	62	0	0
VW-032	2	Residential	B (66)	**66**	**66**	**66**	0	2
VW-033	1	Residential	B (66)	64	64	64	0	0
VW-034	1	Commercial	E (71)	63	63	63	0	0
VW-035	1	Residential	B (66)	57	57	57	0	0
VW-036	1	Residential	B (66)	55	56	55	0	0
VW-037	1	Residential	B (66)	**66**	**66**	**66**	0	1
VW-038	1	Residential	B (66)	65	**66**	65	0	0
VW-039	2	Residential	B (66)	54	54	54	0	0
VW-040	1	Residential	B (66)	54	55	55	1	0
VW-041	1	Residential	B (66)	56	57	57	1	0
VW-042	1	Residential	B (66)	59	59	59	0	0
VW-043	1	Residential	B (66)	63	63	63	0	0
VW-044	1	Residential	B (66)	52	53	52	0	0
VW-045	2	Residential	B (66)	64	64	64	0	0
VW-046	1	Residential	B (66)	60	61	61	1	0
VW-047	1	Residential	B (66)	54	54	54	0	0
VW-048	1	Residential	B (66)	55	56	56	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-049	1	Residential	B (66)	53	54	54	1	0
VW-050	1	Residential	B (66)	57	58	58	1	0
VW-051	1	Residential	B (66)	61	61	65	4	0
VW-052	2	Residential	B (66)	57	58	59	2	0
VW-053	1	Residential	B (66)	65	**66**	**70**	5	1
VW-054	1	Residential	B (66)	53	54	55	2	0
VW-055	1	Residential	B (66)	57	58	60	3	0
VW-056	1	Residential	B (66)	63	64	ACQ	ACQ	0
VW-057	1	Residential	B (66)	53	54	55	2	0
VW-058	1	Residential	B (66)	57	58	60	3	0
VW-059	1	Residential	B (66)	63	64	ACQ	ACQ	0
VW-060	1	Residential	B (66)	54	55	56	2	0
VW-061	1	Residential	B (66)	57	58	59	2	0
VW-062	1	Residential	B (66)	64	65	ACQ	ACQ	0
VW-063	1	Residential	B (66)	54	54	56	2	0
VW-064	1	Residential	B (66)	57	58	61	4	0
VW-065	1	Residential	B (66)	62	63	ACQ	ACQ	0
VW-066	1	Residential	B (66)	54	55	55	1	0
VW-067	1	Residential	B (66)	55	55	57	2	0
VW-068	1	Residential	B (66)	61	62	ACQ	ACQ	0
VW-069	1	Residential	B (66)	52	53	53	1	0
VW-070	1	Residential	B (66)	53	54	55	2	0
VW-071	1	Residential	B (66)	59	59	ACQ	ACQ	0
VW-072	1	Residential	B (66)	53	54	57	4	0
VW-073	1	Residential	B (66)	53	54	54	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-074	1	Residential	B (66)	55	55	59	4	0
VW-075	1	Residential	B (66)	57	58	61	4	0
VW-076	1	Residential	B (66)	61	61	**69**	8	1
VW-077	1	Residential	B (66)	63	63	ACQ	ACQ	0
VW-078	1	Residential	B (66)	54	55	58	4	0
VW-079	1	Residential	B (66)	57	58	62	5	0
VW-079B	2	Residential	B (66)	56	57	61	5	0
VW-080	1	Residential	B (66)	63	64	**74**	**11**	1
VW-081	1	Residential	B (66)	53	54	57	4	0
VW-082	1	Residential	B (66)	63	64	**74**	**11**	1
VW-083	1	Residential	B (66)	53	54	57	4	0
VW-084	2	Residential	B (66)	62	63	**72**	**10**	2
VW-085	1	Residential	B (66)	54	55	56	2	0
VW-086	1	Residential	B (66)	55	56	58	3	0
VW-087	1	Residential	B (66)	56	57	60	4	0
VW-088	1	Residential	B (66)	61	62	**70**	9	1
VW-089	1	Residential	B (66)	54	55	56	2	0
VW-090	1	Residential	B (66)	55	56	59	4	0
VW-091	1	Residential	B (66)	51	52	52	1	0
VW-092	1	Residential	B (66)	54	55	55	1	0
VW-093	1	Residential	B (66)	54	55	58	4	0
VW-094	1	Residential	B (66)	61	62	**73**	**12**	1
VW-095	1	Residential	B (66)	52	53	54	2	0
VW-096	1	Residential	B (66)	54	55	57	3	0
VW-097	1	Residential	B (66)	56	57	59	3	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-098	1	Residential	B (66)	60	61	**70**	**10**	1
VW-099	1	Residential	B (66)	53	54	54	1	0
VW-100	1	Residential	B (66)	54	55	56	2	0
VW-101	1	Residential	B (66)	53	54	54	1	0
VW-102	1	Residential	B (66)	56	57	57	1	0
VW-103	1	Residential	B (66)	**67**	**68**	**69**	2	1
VW-104	1	Residential	B (66)	52	53	53	1	0
VW-105	1	Residential	B (66)	53	54	54	1	0
VW-106	1	Residential	B (66)	53	54	54	1	0
VW-107	1	Residential	B (66)	63	64	65	2	0
VW-108	1	Residential	B (66)	52	53	53	1	0
VW-109	1	Residential	B (66)	54	55	54	0	0
VW-110	1	Residential	B (66)	55	55	55	0	0
VW-111	2	Residential	B (66)	59	60	60	1	0
VW-112	1	Residential	B (66)	53	54	54	1	0
VW-113	1	Residential	B (66)	53	54	54	1	0
VW-114	1	Residential	B (66)	56	57	57	1	0
VW-115	1	Residential	B (66)	52	53	53	1	0
VW-116	1	Residential	B (66)	56	57	57	1	0
VW-117	1	Residential	B (66)	58	58	59	1	0
VW-118	1	Residential	B (66)	65	66	65	0	0
VW-119	1	Residential	B (66)	51	52	52	1	0
VW-120	1	Residential	B (66)	53	54	54	1	0
VW-121	1	Residential	B (66)	54	55	55	1	0
VW-122	1	Residential	B (66)	57	58	58	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-123	1	Residential	B (66)	60	61	61	1	0
VW-124	1	Residential	B (66)	63	64	64	1	0
VW-125	1	Residential	B (66)	57	58	58	1	0
VW-126	1	Residential	B (66)	55	56	56	1	0
VW-127	1	Residential	B (66)	56	57	57	1	0
VW-128	1	Residential	B (66)	51	52	52	1	0
VW-128B	1	Residential	B (66)	51	52	52	1	0
VW-129	1	Residential	B (66)	52	53	53	1	0
VW-130	1	Residential	B (66)	54	55	54	0	0
VW-131	1	Residential	B (66)	64	65	65	1	0
VW-132	1	Residential	B (66)	61	62	61	0	0
VW-133	1	Residential	B (66)	53	53	53	0	0
VW-134	1	Residential	B (66)	53	54	53	0	0
VW-135	1	Residential	B (66)	56	57	57	1	0
VW-136	1	Residential	B (66)	52	53	52	0	0
VW-137	1	Residential	B (66)	51	52	52	1	0
VW-138	1	Residential	B (66)	**67**	**68**	**67**	0	1
VW-138B	1	Residential	B (66)	62	62	62	0	0
VW-139	2	Residential	B (66)	52	53	53	1	0
VW-140	1	Residential	B (66)	56	57	56	0	0
VW-141	1	Residential	B (66)	61	62	61	0	0
VW-142	1	Residential	B (66)	65	66	65	0	0
VW-143	1	Church	C (66)	52	53	53	1	0
VW-144	1	Residential	B (66)	59	60	59	0	0
VW-145	1	Residential	B (66)	52	53	53	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-146	1	Residential	B (66)	53	53	53	0	0
VW-147	2	Residential	B (66)	59	59	59	0	0
VW-148	5	Residential	B (66)	52	52	52	0	0
VW-149	1	Residential	B (66)	53	54	54	1	0
VW-150	1	Residential	B (66)	53	54	53	0	0
VW-151	1	Residential	B (66)	59	60	59	0	0
VW-152	1	Residential	B (66)	**66**	**67**	**66**	0	1
VW-153	1	Residential	B (66)	62	63	63	1	0
VW-154	1	Residential	B (66)	52	53	53	0	0
VW-155	1	Residential	B (66)	56	57	58	2	0
VW-156	1	Residential	B (66)	64	65	65	1	0
VW-157	1	Residential	B (66)	52	53	53	1	0
VW-158	1	Residential	B (66)	57	57	58	1	0
VW-159	1	Residential	B (66)	64	65	64	0	0
VW-160	1	Residential	B (66)	52	54	53	0	0
VW-161	1	Residential	B (66)	57	58	59	2	0
VW-162	2	Residential	B (66)	63	64	63	0	0
VW-163	1	Residential	B (66)	54	55	55	1	0
VW-164	1	Residential	B (66)	59	60	60	1	0
VW-165	1	Residential	B (66)	51	51	51	0	0
VW-166	1	Residential	B (66)	58	60	60	1	0
VW-167	1	Residential	B (66)	54	56	56	2	0
VW-168	1	Residential	B (66)	55	56	58	3	0
VW-169	1	Residential	B (66)	60	62	62	2	0
VW-170	1	Residential	B (66)	60	61	60	0	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-171	1	Residential	B (66)	62	63	65	3	0
VW-172	1	Residential	B (66)	**66**	**67**	**66**	0	1
VW-173	1	Residential	B (66)	64	65	**66**	2	1
VW-174	1	Residential	B (66)	**67**	**68**	**67**	0	1
VW-175	2	Residential	B (66)	64	65	64	0	0
VW-176	1	Residential	B (66)	63	64	64	1	0
VW-177	1	Residential	B (66)	**71**	**73**	**72**	1	1
VW-178	3	Residence/ Recreation	B (66)	55	57	56	1	0
VW-179	1	Residential	B (66)	60	62	60	0	0
VW-180	1	Residential	B (66)	60	61	60	0	0
VW-181	1	Commercial	E (71)	57	58	58	1	0
VW-182	2	Residential	B (66)	57	58	58	1	0
VW-183	1	Residential	B (66)	**68**	**69**	**68**	0	1
VW-184	1	Residential	B (66)	56	57	56	0	0
VW-185	1	Residential	B (66)	58	59	59	1	0
VW-186	1	Residential	B (66)	**68**	**68**	**68**	0	1
VW-187	1	Residential	B (66)	**66**	**67**	**66**	0	1
VW-188	1	Residential	B (66)	55	56	55	0	0
VW-189	1	Residential	B (66)	56	57	57	1	0
VW-190	1	Residential	B (66)	**66**	**67**	**66**	0	1
VW-191	1	Residential	B (66)	56	57	57	1	0
VW-192	1	Residential	B (66)	65	**66**	65	0	0
VW-193	1	Residential	B (66)	55	56	56	1	0
VW-194	3	Residential	B (66)	56	56	56	0	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-195	1	Residential	B (66)	64	65	64	0	0
VW-196	1	Office	E (71)	55	56	56	1	0
VW-197	2	Residential	B (66)	53	54	53	0	0
VW-198	3	Residential	B (66)	56	57	56	0	0
VW-199	1	Residential	B (66)	58	59	58	0	0
VW-200	1	Residential	B (66)	59	60	59	0	0
VW-201	1	Residential	B (66)	62	63	62	0	0
VW-202	1	Residential	B (66)	**68**	**69**	**68**	0	1
VW-203	4	Residential	B (66)	58	59	59	1	0
VW-204	2	Residential	B (66)	57	58	58	1	0
VW-205	1	Residential	B (66)	56	57	57	1	0
VW-206	2	Residential	B (66)	57	58	58	1	0
VW-207	1	Residential	B (66)	57	58	57	0	0
VW-208	1	Residential	B (66)	58	59	58	0	0
VW-209	1	Residential	B (66)	64	64	64	0	0
VW-210	1	Residential	B (66)	58	58	58	0	0
VW-211	2	Residential	B (66)	59	60	59	0	0
VW-212	1	Residential	B (66)	57	58	58	1	0
VW-213	1	Residential	B (66)	59	59	59	0	0
VW-214	1	Residential	B (66)	**71**	**71**	**70**	-1	1
VW-215	1	Residential	B (66)	57	58	58	1	0
VW-216	1	Residential	B (66)	60	60	60	0	0
VW-217	1	Residential	B (66)	**72**	**73**	**72**	0	1
VW-218	1	Residential	B (66)	57	58	58	1	0
VW-219	1	Residential	B (66)	61	62	61	0	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-220	1	Residential	B (66)	**72**	**73**	**71**	-1	1
VW-221	1	Residential	B (66)	59	60	59	0	0
VW-222	1	Residential	B (66)	58	59	59	1	0
VW-223	1	Residential	B (66)	62	63	60	-2	0
VW-224	1	Residential	B (66)	**73**	**74**	**72**	-1	1
VW-225	1	Residential	B (66)	59	60	60	1	0
VW-226	1	Residential	B (66)	**73**	**74**	**72**	-1	1
VW-227	1	Residential	B (66)	60	61	61	1	0
VW-228	1	Residential	B (66)	**68**	**69**	**68**	0	1
VW-229	1	Residential	B (66)	**73**	**74**	**72**	-1	1
VW-230	1	Residential	B (66)	**69**	**70**	**69**	0	1
VW-231	1	Residential	B (66)	62	63	63	1	0
VW-232	1	Residential	B (66)	**69**	**70**	**70**	1	1
VW-233	1	Residential	B (66)	55	56	55	0	0
VW-234	1	Residential	B (66)	57	58	56	-1	0
VW-235	1	Residential	B (66)	**70**	**71**	**71**	1	1
VW-236	1	Residential	B (66)	59	59	59	0	0
VW-237	1	Residential	B (66)	58	59	58	0	0
VW-238	1	Residential	B (66)	62	64	63	1	0
VW-239	1	Residential	B (66)	65	**66**	65	0	0
VW-240	6	Residential	B (66)	65	**66**	64	-1	0
VW-241	6	Residential	B (66)	**71**	**72**	**72**	1	6
VW-242	1	Residential	B (66)	58	61	60	2	0
VW-243	1	Office	E (71)	59	62	62	3	0
VW-244	1	Residential	B (66)	59	61	60	1	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-245	1	Office	E (71)	60	62	62	2	0
VW-246	1	Residential	B (66)	61	62	61	0	0
VW-247	2	Residential	B (66)	60	61	60	0	0
VW-248	1	Residential	B (66)	**70**	**72**	**68**	-2	1
VW-249	1	Residential	B (66)	58	59	58	0	0
VW-250	1	Residential	B (66)	58	59	58	0	0
VW-251	1	Residential	B (66)	59	60	59	0	0
VW-252	1	Residential	B (66)	62	63	62	0	0
VW-253	1	Residential	B (66)	58	59	57	-1	0
VW-254	1	Residential	B (66)	55	56	55	0	0
VW-255	1	Residential	B (66)	57	58	58	1	0
VW-256	1	Residential	B (66)	60	61	60	0	0
VW-257	1	Residential	B (66)	63	64	63	0	0
VW-258	1	Residential	B (66)	64	65	64	0	0
VW-259	1	Residential	B (66)	**72**	**73**	**70**	-2	1
VW-260	1	Residential	E (71)	53	54	53	0	0
VW-261	1	Residential	B (66)	58	59	58	0	0
VW-262	3	Residential	B (66)	59	60	60	1	0
VW-263	1	Residential	B (66)	58	59	57	-1	0
VW-264	1	Residential	B (66)	59	60	58	-1	0
VW-265	1	Residential	B (66)	**68**	**69**	**66**	-2	1
VW-266	1	Office	E (71)	**72**	**73**	70	-2	0
VW-267	1	Office	E (71)	57	58	57	0	0
VW-268	6	Residential	B (66)	49	50	49	0	0
VW-269	5	Residential	B (66)	62	63	60	-2	0

Receptor [a]	Residents [b]	Land Use [c]	Criteria [d] (dBA)	Existing [e] (dBA)	No-Build Alternative [f] (dBA)	Modified LPA [g] (dBA)	Modified LPA vs. Existing [h] (dBA)	Modified LPA Impacts [i]
VW-270	1	Office	E (71)	62	63	61	-1	0
VW-271	6	Residential	B (66)	52	53	51	-1	0
VW-272	1	Residential	B (66)	64	65	62	-2	0
VW-273	1	Residential	B (66)	**66**	**67**	64	-2	0
VW-274	6	Residential	B (66)	51	52	50	-1	0
VW-275	1	Office	E (71)	**71**	73	66	-5	0
VW-276	1	Office	E (71)	68	70	65	-3	0
VW-277	1	Office	E (71)	66	68	64	-2	0
VW-278	6	Residential	B (66)	65	66	64	-1	0
VW-279	1	Residential	B (66)	**69**	**70**	**67**	-2	1
VW-280	4	Residential	B (66)	59	59	58	-1	0
VW-281	4	Residential	B (66)	62	62	62	0	0
VW-282	1	Recreation	C (66)	59	60	59	0	0
VW-283	1	Recreation	C (66)	62	63	63	1	0
VW-284	1	Recreation	C (66)	61	63	64	2	0

Notes: ACQ = Property planned for acquisition under the Modified LPA. Receiver was not present with modeling condition.

a Receptors shown on Figure 3-4 through Figure 3-10

b Number of residences or residential equivalents

c Land use: Residential = single or multi-family; Office; Commercial; Church; Recreation; School

d Traffic noise impact criteria (WSDOT NAC)

e Existing modeled noise levels from Traffic Noise Model version 2.5 using existing 2019 traffic volumes and speeds. WSDOT NAC exceedances in **bold**.

f Future No-Build Alternative modeled noise levels from Traffic Noise Model version 2.5 using future 2045 traffic volumes and speeds. WSDOT NAC exceedances in **bold**.

g Future Modified LPA noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds. WSDOT NAC exceedances in **bold**. Substantial impacts of 10 dBA or more shown in **gray highlights**.

h Change in noise levels, Modified LPA compared to Existing

i Number of impacts under Modified LPA

dBA = A-weighted decibels; FHWA = Federal Highway Administration; LPA = Locally Preferred Alternative; WSDOT NAC = Washington State Department of Transportation Noise Abatement Criteria

4.6 Light-Rail Noise and Vibration Effects

The noise and vibration analysis results for the light-rail extension that is part of the Modified LPA is provided in the following sections. First, the potential noise levels that would occur under the No-Build Alternative are explained, followed by the effects with the proposed light-rail extension in Portland and downtown Vancouver. Finally, a light-rail vibration impacts analysis is provided. To simplify the tables, a set of aerial photos with the analysis locations for noise and vibration, along with identification of all noise and vibration impacts, are provided at the end of this section.

4.6.1 No-Build Alternative Noise and Vibration Levels along the Light-Rail Corridor

With the No-Build Alternative there would be no extension of the existing light-rail line that currently ends at the Expo Center; therefore, there would be no vibration impacts from light-rail operations. Noise levels along the existing light-rail line would continue to increase as traffic noise, and traffic volumes increase.

4.6.2 Modified LPA Noise and Vibration Levels along the Light-Rail Corridor

4.6.2.1 Portland Light-Rail Noise

The only noise-sensitive land use between the existing light-rail alignment at the Expo Center and the Portland and Oregon boundary is several rows of floating homes in the North Portland Harbor. The Modified LPA would require the relocation of the first row of homes and one home on the second dock; therefore, those homes were not analyzed for noise impacts. Light-rail noise resulting from light-rail trains operating between the Expo Center Station and Hayden Island Station was analyzed at the nearest remaining homes based on the distance between the proposed tracks and the homes. In all, 36 homes on the west side of the proposed North Portland Harbor and Columbia River bridges were evaluated for light-rail noise. The existing L_{dn} for the homes was extrapolated from measured data and on-site inspections.

The analysis predicted noise levels below the FTA Noise Impact Criteria under the Modified LPA, including at the nearest remaining floating homes in North Portland Harbor. At all other noise-sensitive properties in the Portland portion of the project area, noise from light-rail operations would be well below the traffic noise levels, including the manufactured home residential area along the Columbia River. The cumulative effects at receptor LRT-3 would be less than 1 dB because the train noise would be more than 10 dB lower than the existing ambient levels. Results at the floating homes in North Portland Harbor are shown in Table 4-11 under site LRT-3.

4.6.2.2 Portland Transit Station Noise

The analysis reviewed the noise-sensitive receptors located nearest to the station improvements under the Modified LPA, following the FTA's guidance for noise-screening distances. These included the Hayden Island Station, Expo Center Station, and Expo Center Overnight Station. The nearest noise-sensitive receptors were located beyond the FTA noise screening distance at each of the Portland Transit Stations; therefore, no noise impacts are predicted at these locations.

4.6.2.3 Ruby Junction Maintenance Facility, Gresham

The planned storage yard at the Ruby Junction Maintenance Facility Expansion is 350 feet from the nearest homes on SE 202nd Avenue, which is located within the FTA noise screening distance. Modeled noise levels at the nearest home that would result from overall maintenance yard improvements are predicted to be below the FTA moderate and severe impact criteria. Results are shown in Table 4-11 under Site OMF-1.

The other noise-sensitive land uses located closest to improvements at Ruby Junction Maintenance Facility are single-family residences at SE 196th Avenue and residences at the Mobile Park Plaza located at 19776 SE Stark Street. Both noise-sensitive use areas were reviewed with the FTA noise screening distances and are located beyond the screening distance from the planned improvements. Therefore, no noise impacts are predicted at either location

4.6.2.4 Downtown Vancouver Light-Rail Noise

The Modified LPA would have moderate noise impacts at one location between the southern Columbia River bridge landings and W 6th Street - modeled site LRT-1 (the Normandy Apartments located at 316 E 7th Street). These impacts would result from special track work (i.e. turnouts, crossovers, switches). Noise levels with light-rail operations at this site are predicted at 67 dBA L_{dn}. Because these receptors are well over 100 feet from the Waterfront and Evergreen Stations, the predicted noise levels do not include the noise contribution from the train clappers or the ancillary equipment at the station such as public address systems. The criterion for moderate impacts at site LRT-1 is 66 dBA L_{dn}; therefore, moderate noise impacts are predicted at this location.

4.6.2.5 Downtown Vancouver Transit Station Noise

The FTA noise screening distances were used to review the nearest noise-sensitive receptors to station improvements included in the Modified LPA, Evergreen Station, and Waterfront Station. These receptors were located beyond the FTA noise screening distance at each of the Portland Transit Stations; therefore, no noise impacts are predicted.

4.6.2.6 Downtown Vancouver Park and Ride Noise

Two planned park-and-ride facilities with multiple options in downtown Vancouver were reviewed against the FTA noise screening distances. Park and Ride lots 1a and 1c located near the planned Waterfront Station, and Park and Ride lot 2a located near the planned Evergreen Station were located beyond FTA noise screening distances; therefore, no noise impacts are predicted.

Downtown Vancouver Park and Ride lot 1b, at W 4th Street and Columbia Street is located within the FTA noise screening distance from the new apartments under construction at 400 Washington Street (shown as PNR-1 on Table 4-11). Modeled noise levels that would result from Park and Ride lot 1b are predicted to be below the FTA moderate and severe impact criteria; therefore, no noise impacts are predicted at 400 Washington Street. The Park and Ride lot 2b at C Street and E 7th Street is located within the FTA noise screening distance from the Normandy Apartments located at 316 E 7th Street and the Econo Lodge located at 601 Broadway Street. Modeled noise levels that would result from Park and Ride lot 2a are predicted to be below the FTA moderate and severe impact criteria; therefore, no noise impacts are predicted at either location. Results are shown in Table 4-11.

4.6.2.7 Single-Level Fixed and Movable-Span Configurations

The Modified LPA single-level fixed-span and single-level movable-span configurations would result in transit-related noise and vibration levels and impacts similar to those of the Modified LPA with a double-deck fixed-span configuration. Noise and vibration levels and impacts would be similar for these design options due to the similar distance between the LRT alignment and the nearest receptors and no change in LRT operations.

Table 4-11. Modified LPA L_{eq} and L_{dn} for the Light-Rail Transit Operations

Receptor [a]	Area Description [b]	Land Use [c]	Number of Units [d]	Existing Noise [e] (dBA)	Modified LPA Noise Source	Modified LPA Noise Contribution [f] (dBA)	FTA Criteria [g]		Impact [h]	
							Moderate (dBA)	Severe (dBA)	Moderate	Severe
LRT-1	E 7th St./E C St.	SF	12	83	Light-rail	67	66	76	12	–
LRT-2	E 6th St/ E C St.	Hotel	0	80	Light-rail	65	66	76	–	–
LRT-3	Jantzen Beach Houseboats	SF	5	77	Light-rail	65	66	76	–	–
OMF-1	SE 202nd Ave. (Gresham)	SF	3	61	Ruby Junction Maintenance Facility	56	59	64	–	–
PNR-1[i]	400 Washington St.	MF	200	68	Park and Ride Lot 1b	61	63	73	–	–

a Receptors shown on Figure 4-1 and Figure 4-2
b General description of the area of analysis
c Land Use: SF = single-family; Hotel = hotel/motel
d Number of individual apartments or homes affected
e Existing noise levels in L_{dn} for category 2 land use, or L_{eq} for category 1 or 3 land uses
f Noise from operation of the Modified LPA transit source only. This is the noise level used to determine impacts with the FTA criteria. Levels in **bold** exceed FTA criteria.
g FTA impact criteria.
h Number of units analyzed for transit operations noise with the Modified LPA
i Site PNR-1 used to assess contribution of Park and Ride noise at sites at other nearby sites located similar distance to planned Park and Ride lots 1c and 2b. Park and Rides were evaluated using FTA methods. Noise-sensitive land uses were also included in the Traffic Noise Modeling analysis.

Ave. = Avenue; dBA = A-weighted decibels; FTA = Federal Transit Administration; L_{dn} = day-night equivalent sound level; L_{eq} = equivalent sound level; LPA = Locally Preferred Alternative; St. = Street

4.6.2.8 Portland Light-Rail Vibration

Sites sensitive to vibration were reviewed, along with the location of transit improvements, to identify potential vibration impacts. In this area, the proposed extension of light-rail is on a structure in most areas and is not near vibration-sensitive buildings. The one area that includes sites sensitive to vibration near transit improvements is the area of floating homes located near the proposed light-rail bridge from the Portland mainland to Hayden Island. Because these homes are located on water, minimal transmission of vibration is expected, and no impacts are predicted. The other transit facilities included in the Modified LPA located in and around Portland are Hayden Island Station, Expo Center Station, Expo Center Overnight Station, and the Ruby Junction Maintenance Facility, located in Gresham. As no vibration-sensitive sites are located in close proximity to these sites, no impacts are predicted. Therefore, no transit-related vibration impacts are predicted in the Portland area.

4.6.2.9 Downtown Vancouver Light-Rail Vibration

Vibration levels at the Normandy Apartments located at 316 E 7th Street (LRV-1) and the mixed-use building at 801 C Street that includes the Regal City Center Cinema (LRV-2) are predicted to exceed the FTA vibration criteria due to the close proximity of special trackwork to each building. Maximum vibration levels at these sites could reach 77 to 81 VdB as shown in Table 4-12. The ground-borne vibration levels are due to the special trackwork near the receptors and not the vibration generated by the train passbys. Vibration levels at the Econo Lodge hotel at 601 Broadway (LRV-4) are predicted below the FTA vibration impact criteria. Figure 4-8, at the end of this section, provides an aerial view of this area and identifies the grouping of the homes and location of the proposed light-rail alignment. The Modified LPA with I-5 mainline shifted west design option would result in higher vibration levels in downtown Vancouver due to the westward shift of the light-rail alignment; however, no additional vibration impacts are anticipated due to the distance to sensitive receptors.

No transit-related vibration impacts are predicted in the Portland area. In Vancouver, vibration impacts would affect 12 multifamily residences at the Normandy Apartments at 316 E 7th Street (LRV-1) and a multi-use building at 801 C Street that includes a cinema and commercial businesses (LRV-2) shown in Figure 4-8.

Table 4-12. Projected Vibration Levels at Receptors in Vancouver

Receptor [a]	Area Description [b]	Land Use [c]	FTA Vibration Criteria [d] (VdB)	Vibration Level [e] (VdB)	Meets Criteria [f]	Number of Impacts [g]
LRV-1	E 7th St./E C St.	MF	72	77	Y	12
LRV-2	E 8th St./E C St.	Movie Theater	75	81	Y	Movie Theater
LRV-3	Hayden Island Houseboats	SF	72	Because these single-family residences are on water, minimal transmission of ground vibration occurs.		

Receptor [a]	Area Description [b]	Land Use [c]	FTA Vibration Criteria [d] (VdB)	Vibration Level [e] (VdB)	Meets Criteria [f]	Number of Impacts [g]
LRV-4	Econo Lodge, 601 Broadway	Hotel	72	70	N	Hotel

a Receptors shown on Figure 4-1 and Figure 4-2
b General description of the area of analysis
c Land Use: SF = single-family; MF = multi-family
d FTA vibration impact criteria
e Predicted vibration level
f Amount the predicted level exceeds the criteria
g Number of individual structures affected
FTA = Federal Transit Administration; St. = Street; VdB = vibration decibels

Figure 4-8. Light-Rail Noise and Vibration Impacts in Vancouver

5. TEMPORARY EFFECTS

This chapter assesses temporary noise and vibration effects from construction of the Modified LPA, effects would end upon completion of construction.

5.1 Construction Activities

Table 5-1 lists the typical equipment used for many roadway and structural activities and that would be required to construct the Modified LPA, including removal of the existing Interstate Bridge. Table 5-1 lists the activities it would be used for and the corresponding maximum noise level, measured at 50 feet, under normal use.

Table 5-1. Construction Equipment, Use, and Reference Maximum Noise Level

Equipment	Typical Expected Project Use	L_{max}	Source
Air Compressors	Used for pneumatic tools and general maintenance - all phases	70–76	a, b, c
Backhoe	General construction and yard work	78–82	b, c
Backhoe	General construction and yard work	78–82	b, c
Concrete Pump	Pumping concrete	78–82	b, c
Concrete Saws	Concrete removal, utilities access	75–80	b, c
Crane	Materials handling, removal, and replacement	78–84	b, c
Excavator	General construction and materials handling	82–88	b, c
Forklifts	Staging area work and hauling materials	72	a, b, c
Haul Trucks	Materials handling, general hauling	86	b, c
Jackhammers	Pavement removal	74–82	b, c
Loader	General construction and materials handling	86	b, c
Pavers	Roadway paving	88	b
Pile Drivers	Support for structure and hillside	99–105	b, c
Power Plants	General construction use, nighttime work	72	b, c
Pumps	General construction use, water removal	62	b, c
Pneumatic Tools	Miscellaneous construction work	78–86	c

Equipment	Typical Expected Project Use	L_{max}	Source
Service Trucks	Repair and maintenance of equipment	72	b, c
Tractor Trailers	Material removal and delivery	86	c
Utility Trucks	General project work	72	b
Vibratory equipment	Shore up hillside to prevent slides and soil compacting	82–88	b, c
Welders	General project work	76	b, c

a Typical maximum noise level under normal operation as measured at 50 feet from the noise source.
b Maximum noise level as measured at a distance of 50 feet under normal operation.
c Sources of noise levels compiled during the development of the Columbia River Crossing Noise and Vibration Technical Report:
Portland, Oregon Area Projects: Light-rail, I-5 Preservation and Hawthorne Bridge construction projects and other measured data.
U.S. Department of Transportation construction noise documentation and other construction noise sources.
L_{max} = maximum sound level

5.1.1 Construction Noise

Four typical construction phases would be required to complete the Modified LPA as follows:

- Demolishing existing building and bridge structures.
- Preparing for construction of new structures.
- Constructing new structures and paving roadways.
- Conducting miscellaneous activities, including striping, lighting, and erecting signs.

5.1.1.1 Demolition

Demolition of existing structures would require heavy equipment such as concrete saws, cranes, excavators, hoe-rams, haul trucks, jackhammers, loaders, and tractor trailers. Maximum noise levels during this phase could reach 82 to 94 dBA at the nearest residences.

5.1.1.2 Preparation

Major noise-producing equipment used during the preparation stage could include concrete pumps, cranes, excavators, haul trucks, loaders, tractor trailers, and vibratory equipment. Other less notable noise-producing equipment expected during this phase includes backhoe, air compressors, forklifts, pumps, power plants, service trucks, and utility trucks. Maximum noise levels during this phase could reach 82 to 93 dBA at the nearest residences (50 to 100 feet).

Other major noise sources that may be required during this phase would include the use of vibratory and impact equipment, such as pile driving and vibratory sheet installations. The purpose of these activities would be to supply support for the new structure and to shore up hillsides to stop slides before retaining walls are installed. Pile-driving noise levels are discussed in Section 5.1.2.

5.1.1.3 Construction

Construction impacts would persist at the project site, and temporary noise impacts would occur at various times throughout construction and demolition over an approximately 9-year construction period. The loudest noise sources in use during construction of the Modified LPA would be cement mixers, concrete pumps, pavers, haul trucks, and tractor trailers. The cement mixers and concrete pumps would be required for construction of the superstructure. The pavers and haul trucks would be used to provide the final surface on the roadway and to construct the transitions from the at-grade roadway to the new structures. Maximum noise levels would range from 82 to 94 dBA at the closest receiver locations.

It is estimated that approximately 3,311 temporary piles would be installed and removed during the multi-year construction of the Columbia River and North Portland Harbor bridges. These piles would be staged throughout the in-water construction and demolition periods, and it is assumed that between 100 and 400 temporary piles may be in the water at any given time.

An average of six temporary, load-bearing piles could be installed per day using one or two impact drivers. It is estimated that some amount of impact pile driving in the Columbia River or North Portland Harbor would occur on approximately 735 days spread over the estimated six in-water work windows that would be required for construction of the replacement bridges.

It is estimated that up to 300 impact strikes may be required to finish driving and/or proofing a given pile. This number of strikes would require a maximum of approximately 30 to 45 minutes of impact hammer activity. It is further estimated that two to three piles per day may be installed and/or proofed with an impact hammer, with an estimated total maximum number of 900 impact strikes per day if a single impact pile driver is in operation, or up to 1,800 impact strikes per day if two pile-driving rigs are operated concurrently. It is important to note that actual pile production rates would vary, and a typical day would likely have fewer strikes.

A bubble curtain or similarly effective noise attenuation device would be implemented during all impact pile driving, and a hydroacoustic monitoring plan would be implemented during impact pile driving to confirm the level of attenuation provided. This monitoring program would require unattenuated pile strikes in order to confirm the amount of attenuation provided by the system. It is estimated that up to 75 unattenuated strikes may be required, approximately one day per week, to accomplish this testing. Testing would occur on up to approximately 40 days total over the course of construction, and on each day of testing, unattenuated pile strikes would occur over a period of less than 10 minutes.

During construction, up to two impact pile drivers may operate simultaneously near one another. In addition, the contractor may elect to have both a vibratory and an impact pile-driving rig in operation simultaneously. Operation of two pile-driving rigs simultaneously is not expected to produce greater decibel levels. Pile strikes from both drivers would need to be synchronous (within 0.0 and approximately 0.1 seconds apart) in order to produce higher noise levels than a single pile driver operating alone. Because this level of synchronicity is highly unlikely, the analysis in this document assumes that pile drivers would not generate noise levels greater than that of a single pile driver. Refer to the Ecosystems Technical Report for additional information regarding construction noise impacts to underwater species.

The Program would result in temporary impacts to noise levels associated with construction of the replacement bridges and associated roadway and interchange improvements and removal of the existing Interstate Bridge. The extent and nature of these impacts have been minimized and avoided to the extent possible through the implementation of best management practices described in Chapter 7.

5.1.1.4 Miscellaneous Activities

General construction such as installation of bridge railing, signage, roadway striping, and other general activities would occur after completion of heavy construction and would include installation of bridge railings, signage, lighting, roadway striping, and other components. These less intensive activities are not expected to produce noise levels above 80 dBA at 50 feet for extended periods of time.

Table 5-2 shows the typical maximum noise levels for each of the four typical construction phases as measured at 50 feet from the construction activity. The noise levels would occur periodically during construction of the Modified LPA. Actual hourly noise levels could be substantially lower, depending on the level of activity and the distance from the work site to the noise-sensitive properties.

Table 5-2. Noise Levels for Typical Construction Phases at 50 Feet from Work Site

Scenario	Equipment	L_{max} [c] (dBA)	L_{eq} [d] (dBA)
Preparing for construction of new structures	Air compressor, backhoe, concrete pump, crane, excavator, forklift, haul truck, loader, water pump, power plant, service truck, tractor trailer, utility truck, and vibratory equipment.	94	87
Constructing new structures and paving roadways	Air compressor, backhoe, cement mixer, concrete pump, crane, forklift, haul truck, loader, paver, pump, power plant, service truck, tractor trailer, utility truck, vibratory equipment, and welder.	94	88
Conducting miscellaneous activities, including striping, lighting, and providing signs	Air compressor, backhoe, crane, forklift, haul truck, loader, pump, service truck, tractor trailer, utility truck, and welder.	91	83
Demolishing existing structures	Air compressor, backhoe, concrete saw, crane, excavator, forklift, haul truck, jackhammer, loader, power plant, pneumatic tools, water pump, service truck, and utility truck.	93	88

Source: Columbia River Crossing Project Noise and Vibration Technical Report

Note: Combined worst-case noise levels for all equipment at a distance of 50 feet from work site.

a Operational conditions under which the noise levels are projected.

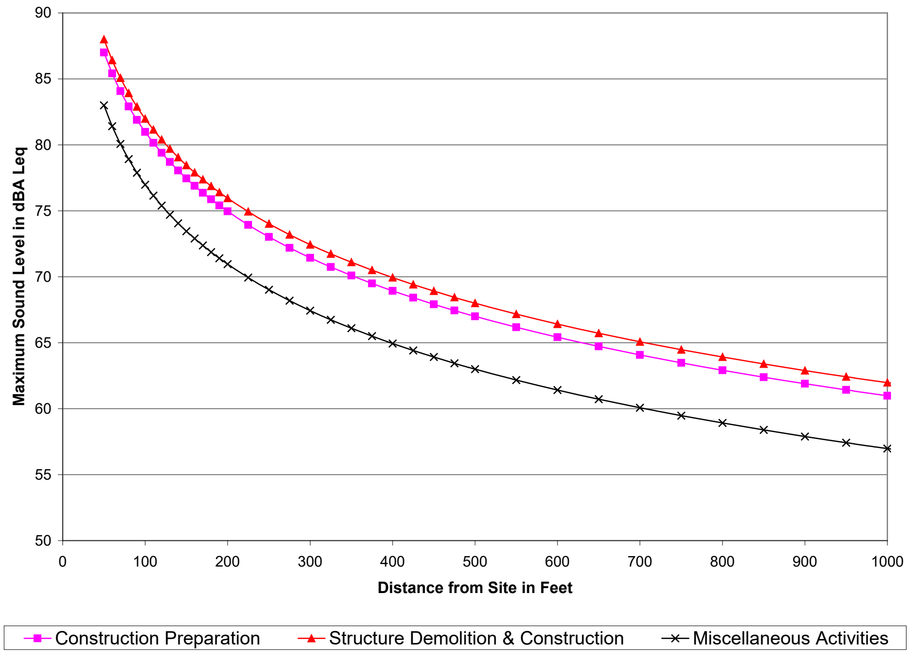
b Normal equipment in operation under the given scenario.

c L_{max} (dBA) is an average maximum noise emission for the construction equipment under the given scenario.

d L_{eq} (dBA) is an energy average noise emission level for construction equipment operating under the given scenario. For this type of equipment, the L_{eq} is approximately equal to the L_{50} (that is, noise levels that are exceeded 50% of the time).

To provide the public with a general understanding of how loud construction might be, this assessment assumed worst-case (maximum) noise levels of the four construction phases to predict construction noise levels for several distances from the project work area. Noise levels presented in Table 5-2 were developed using a mix of measurement and modeling data to provide average conservative estimates for construction noise levels for the four construction scenarios and equipment listed. The actual noise levels experienced during construction would generally be expected to be lower than those described. Figure 5-1 is a graph of construction noise level versus distance for the construction phases listed in Table 5-2.

Figure 5-1. Noise Level versus Distance for Typical Construction Phases



5.1.2 Construction Vibration

Vibration associated with general construction can result in vibration effects on surrounding receivers. Major vibration-producing activities would occur primarily during demolition and preparation of the Columbia River bridges. Activities that have the potential to produce a high level of vibration include pile driving, vibratory shoring, soil compacting, and some hauling and demolition activities. Vibration effects from pile driving or vibratory sheet installations could occur within 50 to 100 feet of sensitive receivers. It is unlikely that vibration levels would exceed 0.5 inch per second (in/sec) at distances greater than 100 feet from the construction sites. The mitigation measures intended to protect marine life from pile-driving hydroacoustic impacts, as described in the Ecosystems Technical Report, would also reduce the potential for noise and vibration impacts to nearby noise-sensitive land uses.

5.1.2.1 Fragile Buildings and Structures

During demolition and construction, there is the potential for vibration damage to fragile buildings and structures at levels less than 0.5 in/sec PPV. The damage from vibrations is usually architectural and not structural. Where these fragile buildings and structures are usually located within 100 feet of construction activities, the contractor would conduct vibration monitoring to ensure that the vibration levels do not exceed 0.12 in/sec PPV. In some cases, where very fragile historic buildings may be exposed to construction vibration photograph survey of the exterior and interior of the buildings would be conducted. Figure 5-2 through Figure 5-8 are the locations of the surveyed historic resources within the project limits both in Oregon and Washington that could be fragile buildings affected by construction vibration.

Figure 5-2. Historic Resources in Oregon

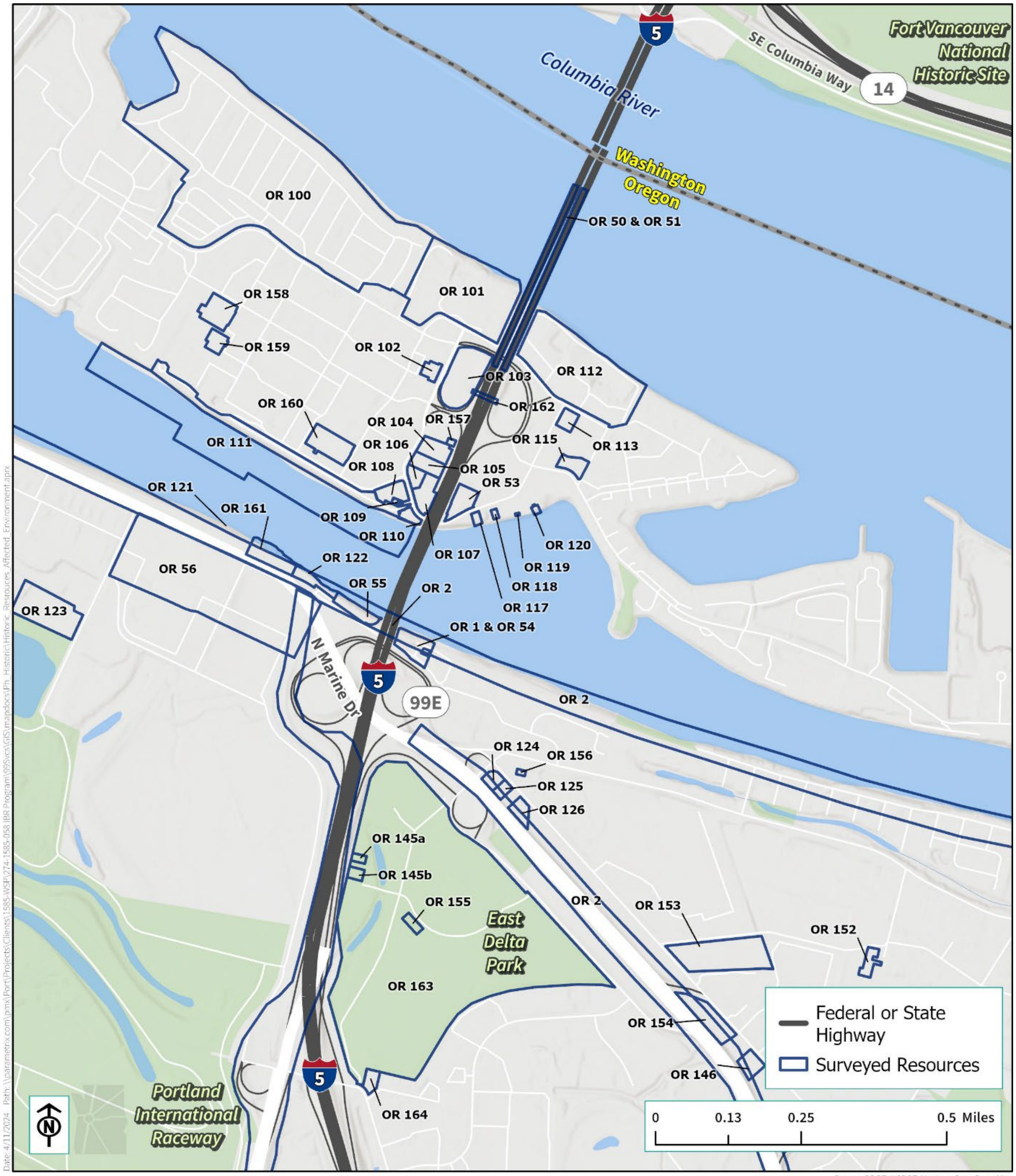


Figure 5-3. Historic Resources in Washington

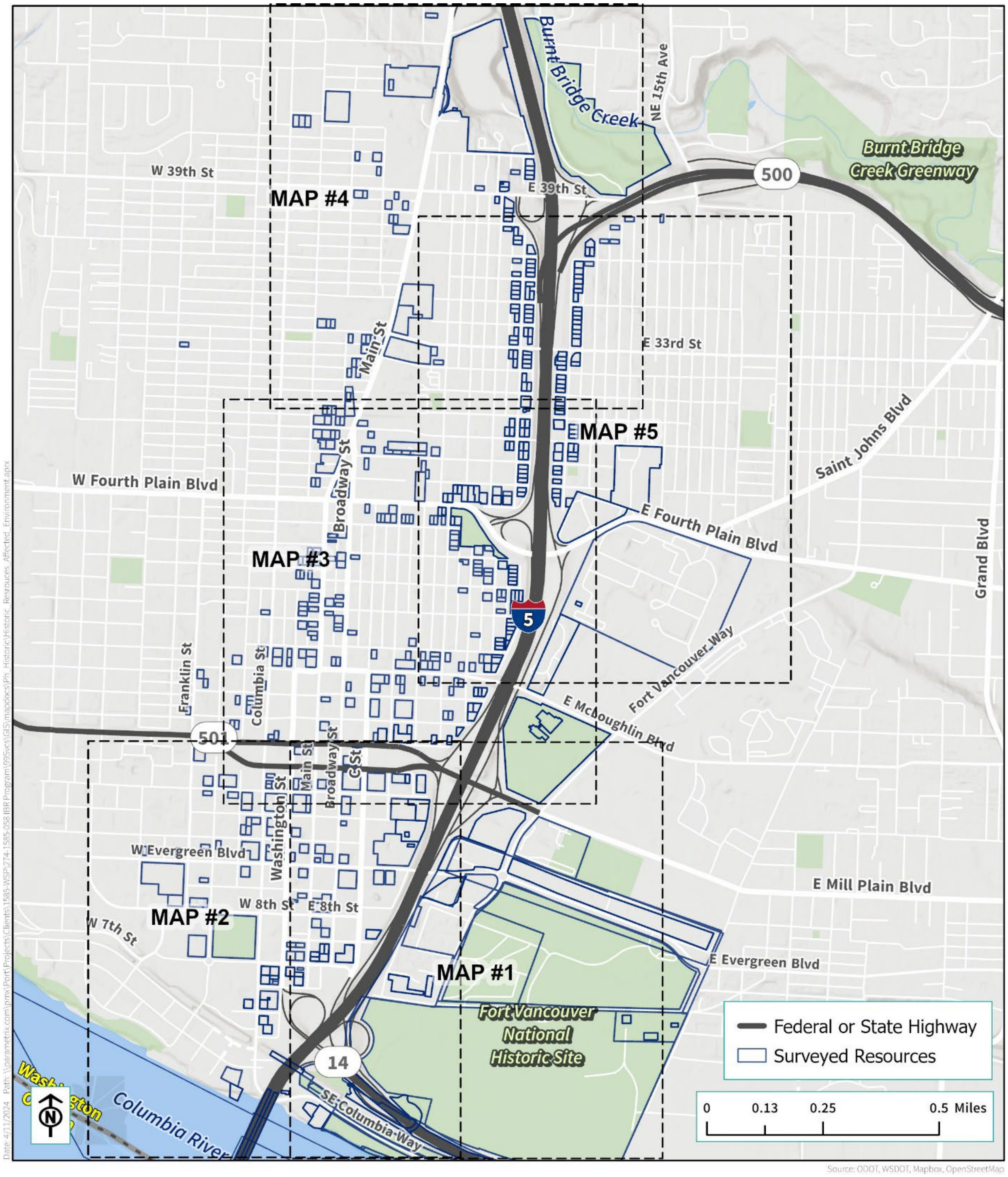


Figure 5-4. Surveyed Historic Resources in Washington – Map 1

Figure 5-5. Surveyed Historic Resources in Washington – Map 2

Figure 5-6. Surveyed Historic Resources in Washington – Map 3

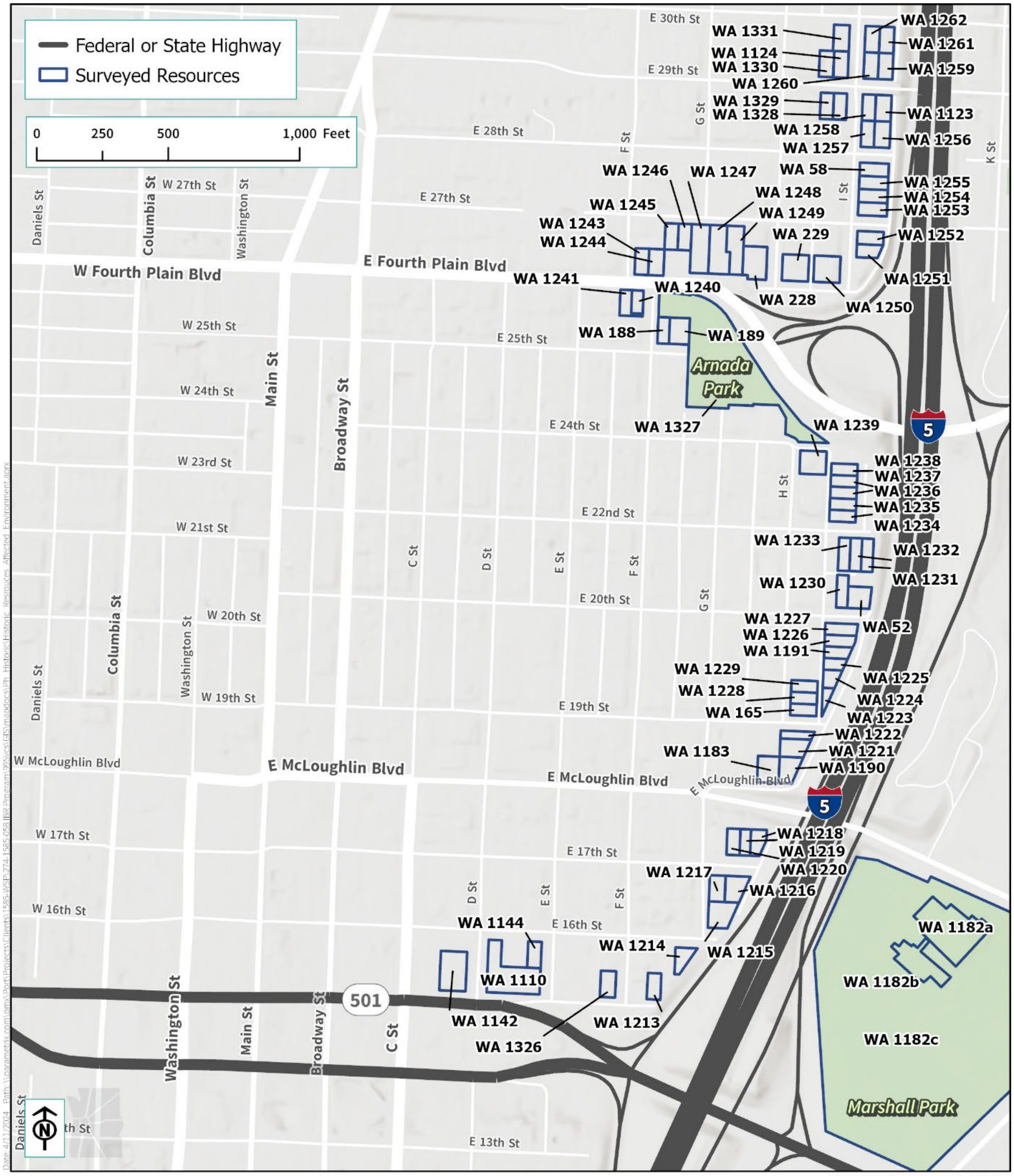
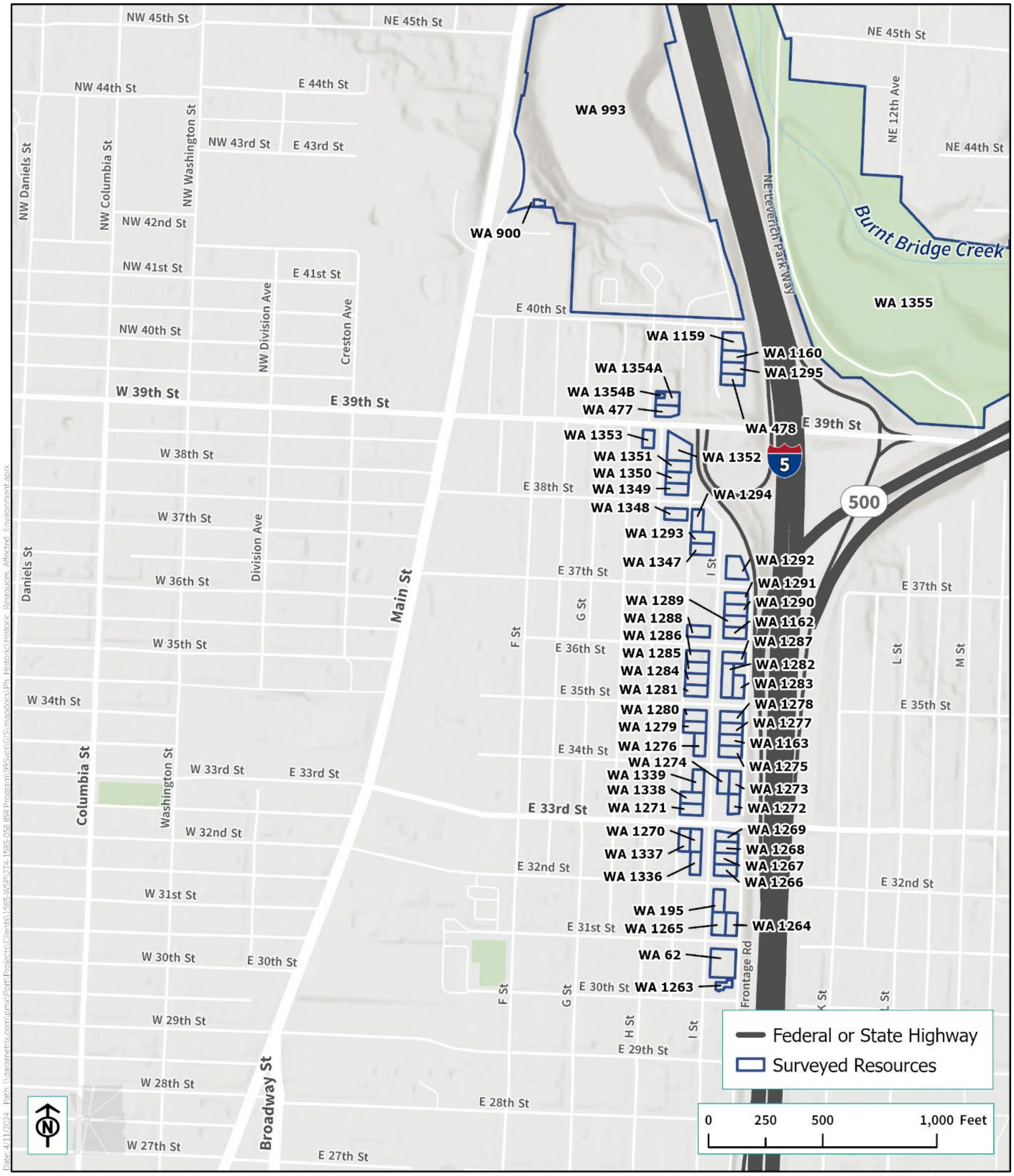
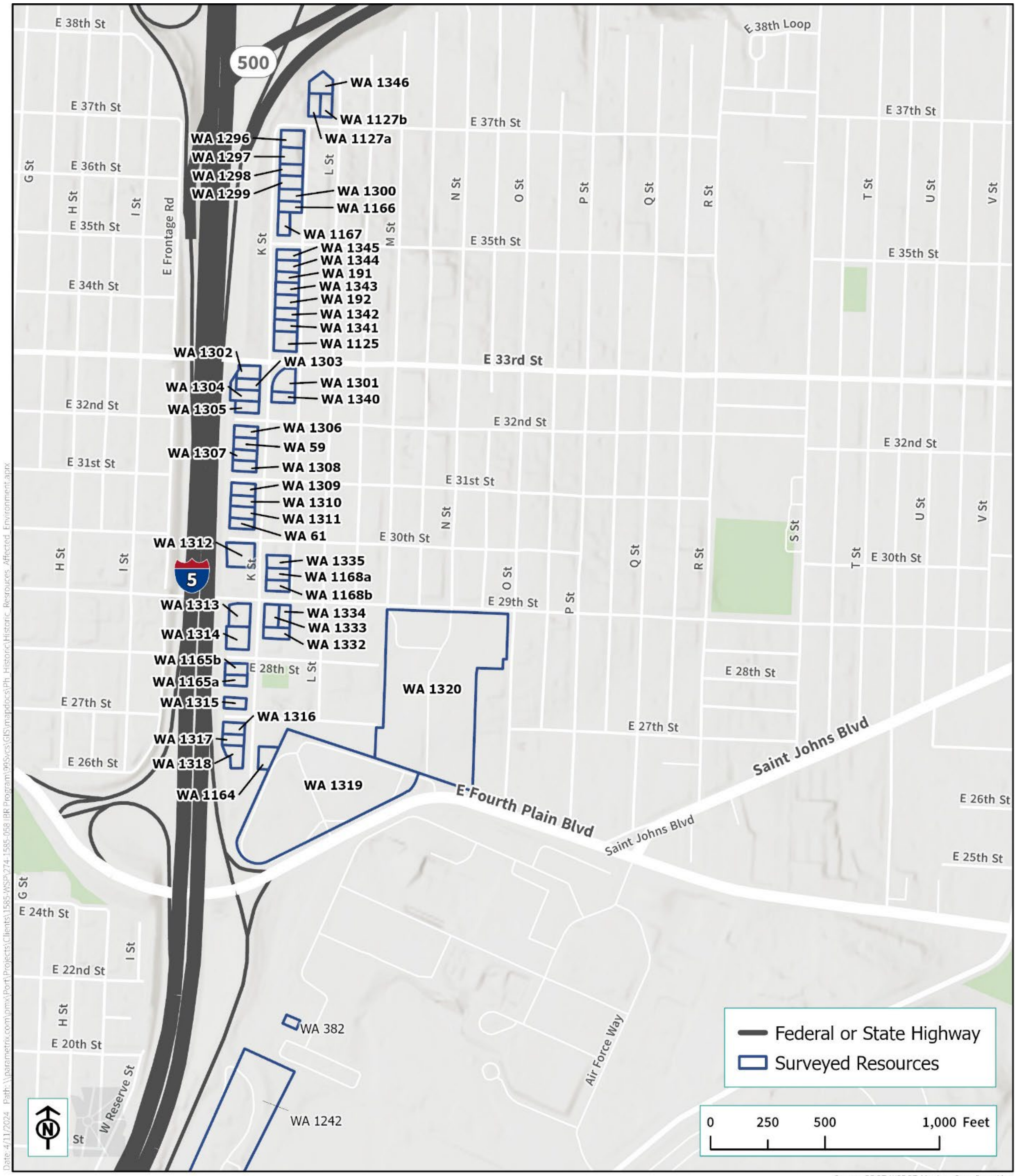


Figure 5-7. Surveyed Historic Resources in Washington – Map 4



Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Figure 5-8. Surveyed Historic Resources in Washington – Map 5



6. INDIRECT EFFECTS

An indirect effect of the Modified LPA on population and employment distribution and land use patterns is the promotion of more transit-oriented development around the new transit stations and support minor redistribution in future population and employment growth from outlying areas to the I-5 corridor, consistent with local land use plans. This increase in density and activity would likely result in further minor increases in ambient noise in the study area, and additional residents, including sensitive receptors, would be exposed to the urban noise levels in the study area. Because this new residential and commercial development is expected to occur in highly urbanized areas that already experience a fairly high level of background noise, and because new residents moving into that sound environment would do so by choice, indirect noise effects are anticipated to be minor.

7. POTENTIAL MITIGATION FOR ADVERSE EFFECTS

Since noise effects from the Modified LPA are identified, traffic noise mitigation measures must be considered.

Mitigation related to highway traffic noise, including mitigation (abatement) measures that meet ODOT's and WSDOT's feasibility and reasonableness criteria, may be recommended for inclusion in the Modified LPA. Feasibility primarily deals with engineering considerations such as, for example, whether substantial noise level reductions can be achieved or whether placement of noise walls would have a negative effect on property access. Reasonableness comprises three factors: (1) if abatement is cost-effective; (2) if abatement can achieve the design goal; (3) and if the abatement is desired by benefiting receptors (WSDOT 2020).

Several different traffic noise abatement measures are evaluated whenever noise effects are expected. Under ODOT and WSDOT policies, the following abatement measures must be considered (discussed in Section 7.1 through Section 7.6):

- Traffic management measures (for example, traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive land designations).
- Highway design measures (for example, alteration of horizontal/vertical alignments).
- Acquisition of property rights (either in fee or lesser interest) for construction of noise barriers.
- Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development that would be adversely impacted by traffic noise. This measure may be included in Type I projects only.
- Sound insulation of all Activity Category D land uses, including public use or nonprofit institutional structures.
- Construction of sound barriers (including landscaping for aesthetic purposes), whether within or outside the highway right of way. Interstate construction funds may not participate in landscaping. The use of landscaping for noise abatement requires a minimum of 65 feet of densely planted, mature vegetation to provide a noticeable noise abatement up to 6 dB (NCHRP 2021).

7.1 Traffic Management Measures

Traffic management measures include modifying speed limits, restricting or prohibiting truck traffic, or closing roadways or access ramps during times when noise could have an adverse effect.

Speed reduction can reduce noise levels from vehicles. However, this method is not seen as a potential mitigation for the Modified LPA as it would interfere with IBR Program objectives. Furthermore, the noise reduction that would be achieved would not significantly reduce noise levels or noise effects.

Restricting truck use or closing access ramps on the new Columbia River bridges would reduce noise levels at nearby receivers since trucks are louder than cars. However, the I-5 corridor is an important national, regional, and local truck route. Further, restricting truck traffic on I-5 or its access ramps would displace trucks onto local side streets, causing noise levels to increase in areas that currently have lower truck traffic volumes (for example, residential side streets). Therefore, this mitigation method is not considered feasible or reasonable for the Modified LPA.

7.2 Highway Design Measures

Highway design measures include altering the roadway alignment and depressing roadway cut sections. Altering the roadway alignment could decrease noise levels by moving the noise source farther from the affected receptors. The Modified LPA involves reconstructing on- and off-ramps to already established highways, which does not allow for substantial shifts in the ramp alignments or elevations.

Another noise mitigation measure often discussed is the use of plants for sound reduction. While dense foliage can slightly reduce noise levels, the amount of land required to create an effective sound barrier is substantial and is not available within the study area. National Cooperative Highway Research Program (NCHRP) Report 984 (2022) found that 65 feet of vegetation can provide 3 to 9 dBA measured noise reduction.

7.3 Acquisition of Property Rights for Construction of Noise Barriers

Once the need for noise barriers is evaluated and found warranted by meeting ODOT's or WSDOT's feasibility and reasonableness criteria, every effort is made to construct those noise barriers within existing ODOT or WSDOT right of way. Depending on the final placement of recommended noise barrier mitigation (berms or walls), additional property rights may be needed for the construction of the noise barriers. Under ODOT and WSDOT policies, noise barriers are normally evaluated and constructed within the state's rights of way. There may be cases in which ODOT and WSDOT right of way is not the most prudent location for abatement, but abatement may be reasonable if constructed on adjacent property. In these cases WSDOT notes:

- The department's mitigation cost reasonableness allowance is limited to normal cost for abatement on department right of way;
- The adjacent property owners allow access and easements as necessary to construct and maintain the abatement; and
- Any additional cost to acquire access, acquire property, provide alternative access, or provide additional infrastructure to accommodate access must be added to the barrier cost calculation and compared to the normal reasonableness cost allowance of the abatement to determine whether the proposed abatement is reasonable.

During final design, noise abatement recommendations may change due to design changes and actual right-of-way acquisitions.

7.4 Acquisition of Real Property to Serve as a Buffer Zone

In some instances, real property can be acquired to serve as a buffer zone to preempt development that would be adversely affected by traffic noise. The FHWA limits this noise abatement measure to Type I projects such as the Modified LPA. Buffer zones are undeveloped, open spaces that border a highway. Buffer zones are created when a highway agency purchases land or development rights, in addition to the normal right of way, so that future dwellings cannot be constructed close to the highway. This prevents the possibility of constructing dwellings that would otherwise experience an excessive noise level from nearby highway traffic.

An additional benefit of buffer zones is improvement of the roadside appearance. However, because of the tremendous amount of land that must be purchased and because in many cases dwellings already border existing roads, creating buffer zones is often not possible. While federal-aid highway funds may be used on a highway project to create buffer zones, this measure has not been used very often. As with acquisition of real property for noise barrier construction, additional cost to acquire access, acquire property, provide alternative access, or provide additional infrastructure to accommodate access must be added to the cost calculation and compared to the normal reasonableness cost allowance of the abatement to determine whether the proposed abatement is reasonable.

Within the study area, the majority of the undeveloped, open spaces that border the proposed alignment have been designated park lands and are contained within the Leverich Park and Delta Park boundaries. These park lands have been identified as a noise-sensitive land use and are restricted from residential development. No other open spaces within the study area that could be construed as possible buffers zones exist at this time.

7.5 Noise Insulation (Public Use or Nonprofit Institutional Structures)

Architectural treatment for noise mitigation may be used for NAC Activity Category D land uses such as schools, churches, or libraries. Building retrofits are considered on a case-by-case basis and determined during the final design stage. Some possible mitigation measures to reduce interior noise levels to less than the NAC are described below.

7.5.1 Ventilation Systems

Noise effects may occur in public buildings where windows are used for ventilation. Closing the windows is often sufficient to reduce interior noise levels to less than the NAC. To re-establish the ventilation provided by the windows, ventilation systems are needed. A forced air ventilation system can re-establish proper air circulation while providing effective noise mitigation. The air intakes should be on the north side of the building or in the same area as the windows. Air intakes on the roof or on the south side of the building may take in abnormally hot air and should be avoided.

7.5.2 Storm Windows

The installation of storm windows is often coupled with a ventilation system to provide increased noise reduction. Storm windows also reduce winter heat losses. The money saved in heating should offset operation or maintenance costs associated with the ventilation system.

7.5.3 Air Conditioning

Air conditioning systems may be used in place of ventilation systems when they can be installed at the same or lower cost. Some air conditioners, however, generate their own noise and may negate the traffic noise reductions. Ventilation systems can also be designed so the building owner can add air conditioning at a later date.

7.6 Noise Barriers

Noise barriers may be constructed between roadways and the affected receivers to reduce noise levels by physically blocking the transmission of traffic-generated noise. Barriers can be constructed as walls or earthen berms. Earthen berms require more right of way than walls and are usually constructed with a 3-to-1 slope. Earthen berms would not be a feasible form of noise abatement for the Modified LPA due to the limited amount of right of way available for their construction.

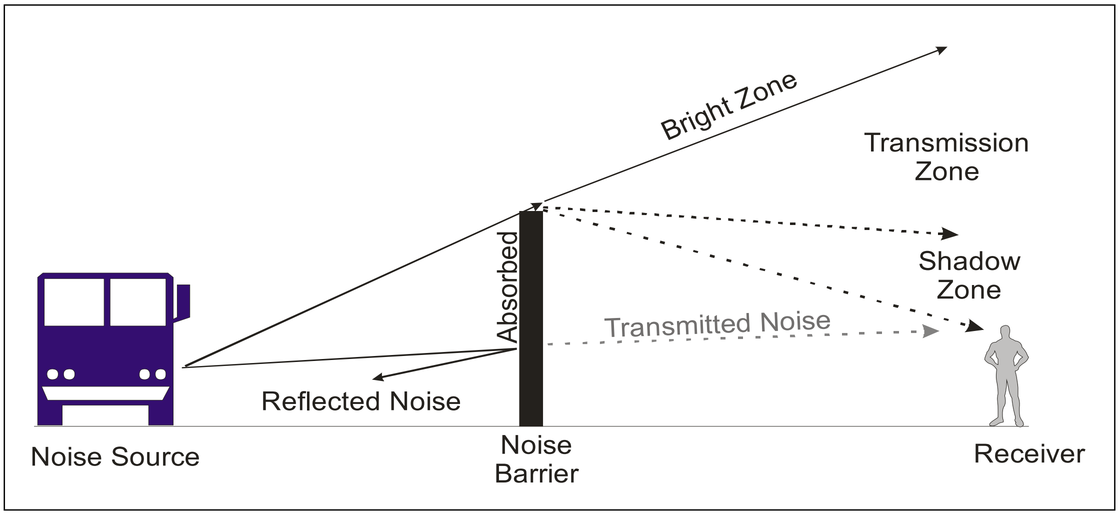
Noise barriers should be high enough to break the line of sight between the highway and the receptor. They must also be long enough to prevent significant flanking of noise around the ends of the walls. Openings in noise walls (for example, at driveways, bridges, and side streets) allow noise to pass through the openings, usually limiting the achievable noise-level reduction to less than 3 dBA for receivers near the openings.

Other design considerations that can affect the overall effectiveness of noise walls include horizontal placement, the general topography between the receptors and the roadway, and the elevation relationship (for example, relative height differences) between the receptor, noise wall, and roadway. In general, noise walls are most effective if they are placed as close as possible to either the noise source or the receptor locations. In addition, if sensitive receptors are located above the roadway grade, the overall effectiveness of the noise wall can be considerably reduced unless it is placed at the same elevation as the receptor. Noise walls have the greatest noise-reducing effect for receptors located close to the roadway.

As shown in Figure 7-1, noise walls reduce traffic noise by directly absorbing it, reflecting it back across the highway, or dispersing or diffracting it upward. Reflected noise is the noise that moves back toward the traffic after hitting the noise wall. Some noise would be diffracted over the wall, while a small amount would be either transmitted through or absorbed by the wall.

There are three zones that can reduce the effectiveness of a noise wall. The “bright zone” is the area above the wall with a direct line of sight to the noise source. The bright zone contains noise directly transmitted from the noise source. The other two zones are the “transmission zone” and the “shadow zone." The transmission zone contains some noise that is directly transmitted by the noise source, along with some noise that is diffracted over the wall. The shadow zone is primarily diffracted noise.

Figure 7-1. Noise Wall Absorption, Transmission, Reflection, and Diffraction



Source: Adapted from Noise Barrier Design Handbook (FHWA 2017).

Two factors to consider when determining the height of a noise wall are design feasibility and construction costs. There is a point of diminishing returns, where the additional height of a noise wall is prohibitively more expensive to construct while providing very little additional noise reduction. Other factors, such as construction considerations, safety, and potential noise wall reflections, are also considered when determining if a noise wall is feasible. If a noise wall is safe, feasible, and meets the WSDOT or ODOT cost-effectiveness criteria (explained below), it is typically recommended for inclusion in a project.

7.6.1 WSDOT Noise Wall Feasibility and Reasonableness Criteria

WSDOT requires that every reasonable effort be made to attain a 10-dBA (or greater) noise reduction at the first row of receivers (for example, front-line receivers). For a noise wall to be considered a feasible form of mitigation by WSDOT, the following feasibility criteria must be met:

1. The proposed mitigation must be physically constructible;
2. A minimum of three first-row impacted receivers must obtain a minimum of 5 dBA noise reduction as a result of mitigation, ensuring that every reasonable effort would be made to assess ground-floor exterior use areas as appropriate; and
3. At least one receiver must achieve the design goal of a 7-dBA noise reduction.

For most projects, noise wall construction is considered feasible if a 7-dBA noise reduction can be achieved for ground-floor residences. Mitigation from noise walls is considered for upper floors, such as second floors of single-family residences when outdoor use areas have higher noise levels than the ground floor or when apartment units have private aboveground outdoor use areas such as patios.

WSDOT has established cost-effectiveness criteria to ensure that if a noise wall is recommended, its cost is consistent with the level of reduction and is not excessive. When a noise wall has been determined feasible, WSDOT then determines whether its construction is reasonable by thoroughly considering the following factors:

1. The noise mitigation cost per residence (or residential equivalent) does not exceed the amounts indicated in Table 7-1. This amount is determined by counting all residences (including owner occupied, rental units, mobile homes, and residential equivalents as defined by WSDOT) that receive at least a 5-dBA noise reduction from the noise wall, and then dividing that number into the total cost of the noise abatement measure. Each benefited unit in a multi-family building is counted as a separate residence. In addition, areas such as parks and schools are counted based on the WSDOT residential equivalent calculations. The criteria used for the residential equivalency for this analysis were determined using the method provided by WSDOT. See Appendix D for calculations on residential equivalents. Table 7-1 shows that as the predicted future noise level increases, it is considered reasonable to implement more costly measures, as necessary, to mitigate traffic noise.
2. Consideration of aesthetic barrier treatments, artwork, re-vegetation, and any increased cost of alternative barrier construction materials with transmission losses lower than 20 dB per frequency range shall not be included in the noise mitigation reasonableness cost calculations for long-term noise mitigation. Decisions on aesthetic treatments, re-vegetation, and barrier material choice is based on applicable department practices and funding availability.

Noise walls would be constructed only if WSDOT determines that they are feasible and reasonable. This decision is normally the responsibility of WSDOT and FHWA, with concurrence from the roadway design personnel. WSDOT policy also provides for local jurisdiction and community input to the process of assessing mitigation measures.

Table 7-1. Cost Allowance for Effects Caused by Total Traffic Noise Levels

Column A	Column B	Column C	Column D
Design Year Traffic Noise Level	Noise Level Increase as a Result of the Project [a]	Allowed Cost per Qualified Residence or Residential Equivalent [a]	Allowed Wall Surface Area per Qualified Residence or Residential Equivalent [b]
66 dBA		$36,127	700 ft^2 (65.0 m^2)
67 dBA		$39,636	770 ft^2 (71.5 m^2)
68 dBA		$43,146	836 ft^2 (77.7 m^2)
69 dBA		$46,655	904 ft^2 (84.0 m^2)
70 dBA		$50,165	972 ft^2 (90.3 m^2)
71 dBA	10 (substantial, tier 1) [c]	$53,674	1,040 ft^2 (96.6 m^2)

Column A	Column B	Column C	Column D
Design Year Traffic Noise Level	Noise Level Increase as a Result of the Project [a]	Allowed Cost per Qualified Residence or Residential Equivalent [a]	Allowed Wall Surface Area per Qualified Residence or Residential Equivalent [b]
72 dBA	11 (substantial, tier 1)	$57,184	1,108 ft^2 (103.0 m^2)
73 dBA	12 (substantial, tier 1)	$60,693	1,176 ft^2 (109.2 m^2)
74 dBA	13 (substantial, tier 1)	$64,203	1,244 ft^2 (115.6 m^2)
75 dBA	14 (substantial, tier 1)	$67,712	1,312 ft^2 (121.9 m^2)
76 dBA [d]	15 (substantial, tier 2) [e]	$71,222	1,380 ft^2 (128.2 m^2)

a If noise level increases 10 dBA or more as a result of the project (Column B), follow the allowed wall surface area and cost for the level of increase in Column C lieu of the total design year sound decibel level in Column A. For total highway-related noise levels at 76 or more dBA or project results in an increase of 15 or more decibels, continue increasing the allowance at the rate provided in the table unless circumstances determined on a case-by-case basis require an alternative methodology for determining allowance.

b Current costs based on $51.61 per square foot constructed cost developed in 2020.

c Step 1 is when the noise levels are 10 to 14 dBA over Existing condition traffic noise as a result of the transportation project.

d Step 2 is when the noise levels are 15 or more dBA over Existing condition traffic noise as a result of the transportation project (or total highway-related noise levels are between 76 and 79 dB). Additional consideration for abatement may be considered under these circumstances.

dBA = A-weighted decibels; ft^2 = square feet; m^2 = square meters

7.6.2 ODOT Noise Mitigation Reasonability and Feasibility Criteria

In accordance with the ODOT Noise Manual, when traffic noise impacts are identified, noise abatement measures must be considered for undeveloped lands with building permits by the date of public knowledge of the project. This includes identifying noise abatement measures that are reasonable, feasible, and likely to be incorporated into the project. In addition, the noise analysis must also identify noise impacts for which no apparent solution is available and include an explanation of why noise abatement was not recommended.

In evaluating whether a particular noise abatement measure is feasible, ODOT requires the noise abatement measures to obtain noise reduction of at least 5 dBA. In addition, for abatement to be feasible, ODOT requires that a simple majority of impacted receptors achieve at least a 5-dBA reduction in noise levels. ODOT also considers engineering factors such as barrier height, safety, topography, drainage, utilities, and access issues when determining feasibility. For abatement to be reasonable, ODOT must consider the viewpoints of the residents and property owners who would benefit from the proposed abatement; the cost-effectiveness of the abatement measure; and the ODOT noise-reduction design goal of the abatement measure, providing at least a 7-dBA noise reduction at one benefited property.

To determine cost-effectiveness for residential areas, all benefited residences must be considered in calculating a noise wall's cost per residence. A benefited residence is any residence, whether it would be the location of an impact or not, that receives a noise reduction of 5 dBA or more. Consistent with ODOT's 2021 Noise Manual Interim Update, the reasonable cost for each of the noise walls included in this analysis was considered to be a maximum of $37,500 per benefited residence (ODOT 2021). This cost is based on $30 per square foot for a post and panel wall up to 16 feet tall. For wall heights greater than 16 feet up to 25 feet, the unit cost increases to $37.50 per square foot to account for additional structural considerations.

7.6.3 Determining Noise Wall Locations and Heights

The height and location of the noise walls were determined by modeling them at various locations and heights. The following section provides the details on the proposed noise walls, including graphic illustrations of typical situations for receivers located at grade, below grade, and above grade, and how the noise walls' overall noise-reduction characteristics are affected by area topography.

7.6.3.1 Noise Walls with At-Grade Receivers

Noise walls could be a very effective mitigation method for receivers located at a similar grade to I-5 or SR 500. Noise wall heights for locations such as these are generally 10 to 14 feet high. Noise walls of this height are normal for major highways with light to moderate levels of heavy truck traffic (such as SR 500) where receivers are at approximately the same grade as the roadway.

Figure 7-2 shows a typical schematic of noise wall placement and relative effectiveness for receivers located at grade for different distances from the project roadway. The data shown in Figure 7-2, Figure 7-3, and Figure 7-4 are for a typical neighborhood where the front-line receivers are 40 to 60 feet from the highway, second-line receivers are approximately 100 feet from the highway, and third-line receivers are over 150 feet from the highway. The noise-level projections are for 5 feet above the ground in typical outdoor uses at the residence.

7.6.3.2 Noise Walls with Below-Grade Receivers

The overall effectiveness of a noise wall is normally higher at locations where receivers are located below the highway elevation. In that case, less noise diffracted over the top of the noise wall reaches the receivers. In most cases, the noise wall height could be lower and still provide the same level of noise reduction, as shown for receivers located at the same level as the roadway. Typical noise wall heights for below-grade receivers are 2 to 4 feet less than for at-grade receivers. The actual height of the noise wall would again depend on wall placement, distance to the receiver, and vehicle mix. Figure 7-3 provides a typical schematic of noise wall heights and relative effectiveness for receivers located below the road grade.

Figure 7-2. Typical Noise Wall Effectiveness with At-Grade Receiver

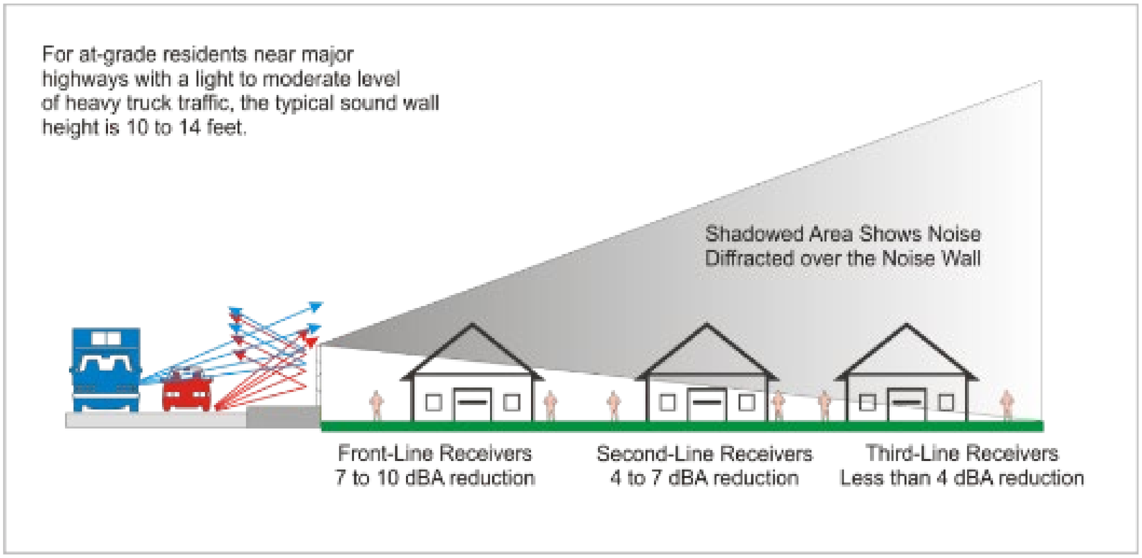
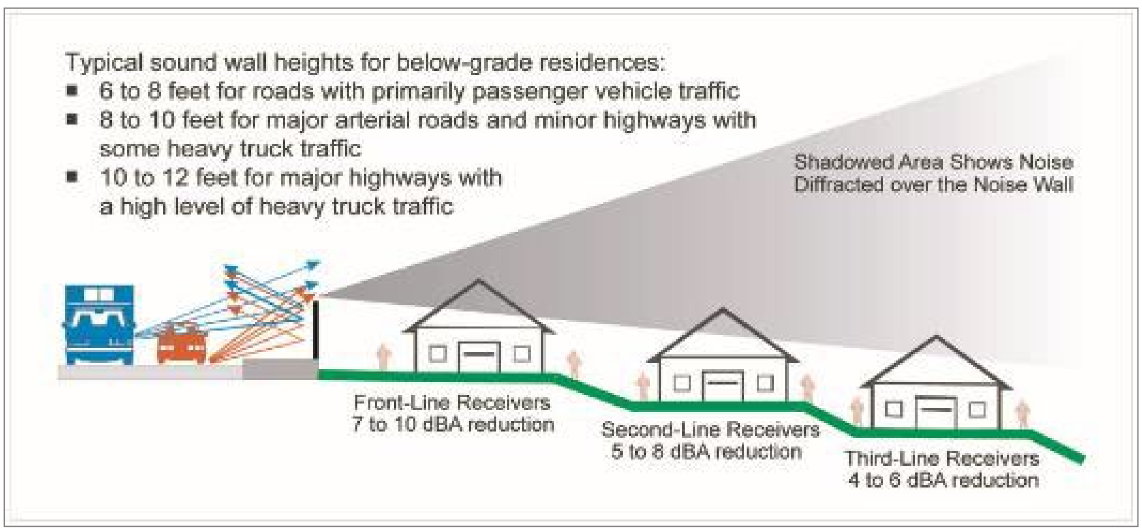


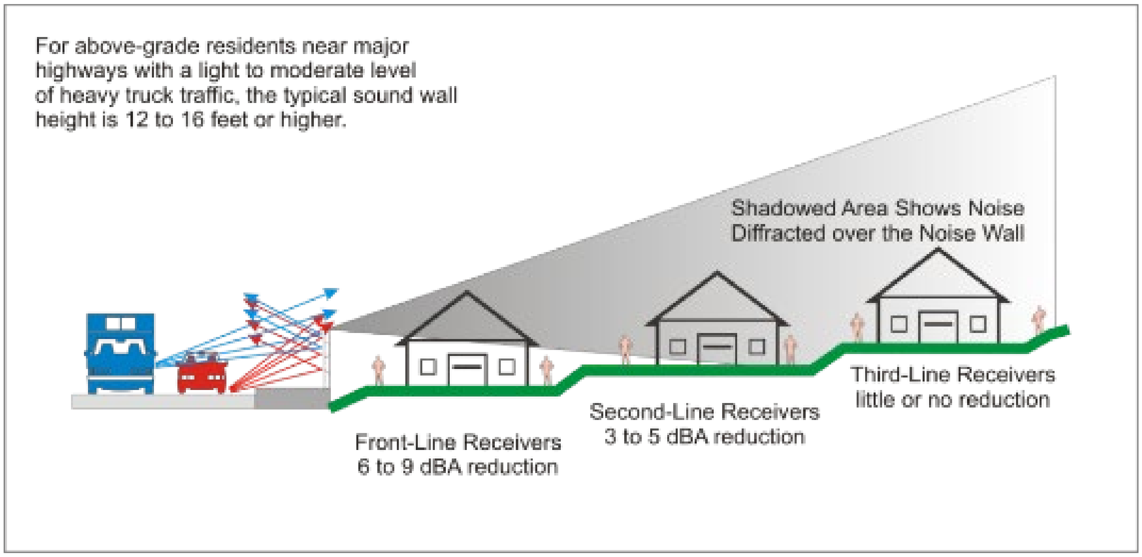
Figure 7-3. Typical Noise Wall Effectiveness with Below-Grade Receiver



7.6.3.3 Noise Walls with Above-Grade Receivers

Noise walls are normally less effective at reducing transportation noise at locations where receivers are elevated above the roadway because the receivers are closer to noise that is diffracted over the top of the noise wall. Increasing the height of a noise wall can, in some circumstances, result in noise reductions of the same magnitude that would be achieved for at-grade receivers. The overall effectiveness would depend on the level of elevation over the roadway, vehicle mixture, noise wall placement, and other geometric considerations. Figure 7-4 shows a typical schematic of noise wall heights and relative effectiveness for receivers located above the road grade.

Figure 7-4. Typical Noise Wall Effectiveness with Above-Grade Receiver



7.6.4 Individual Affected Receptors

Receptors that are isolated from other noise-sensitive land uses throughout the study area would experience impacts from the Modified LPA. These receptors were considered for noise abatement, but abatement was deemed unreasonable because of their proximity to I-5 and the lack of other nearby noise-sensitive land uses. Generally, noise walls cannot be constructed cost-effectively when there is not sufficient receptor density to justify the costs of constructing the noise wall. The FHWA has found that for a noise wall to feasibly reduce noise levels, the noise wall must block the line of sight from the receptor to the roadway noise source. To block the line of sight, the length of the noise wall would need to be roughly equivalent to four times the perpendicular distance from the noise wall to the receptor at each end of the noise wall.

7.6.4.1 Noise Receptor DT-022

Noise receptor DT-022 represents an outdoor use area at Vancouver Community Library. As shown in Appendix G of this report, residential equivalent use at the site was calculated as one residence. Since this is the only noise-sensitive land use in the area and WSDOT feasibility requires a minimum of three first row impacted receivers to benefit from a noise wall; therefore noise mitigation at this site is not feasible.

7.6.4.2 Noise Receptor FV-018

Noise receptor FV-018 represents outdoor use areas outside a residential duplex located at 400 and 402 Barnes Street located in the VNHR. Similar to site DT-022, and sites FV-002 and FV-004, site FV-018 is not located near other locations that would approach or exceed the NAC. WSDOT's feasibility requirement cannot be met in this area; therefore, noise mitigation at either of the sites is not feasible.

7.6.4.3 Noise Receptor PD-178

Noise receptor PD-178 represents an outdoor use area at Delta Park Soccer Field #4 located at the southwestern end of Delta Park, near I-5 at N Victory Boulevard. Appendix G of this report includes an equivalent residential receptor calculation of 2 for this Soccer Field which is consistent with many of the other athletic fields at Delta Park. Considering the usage at this site, the sites' location nearly 500 feet from I-5, the primary noise source in the area, and all other modeled sites in the area are below ODOT NAAC, noise mitigation is not feasible.

7.7 Proposed Mitigation for Long-Term Adverse Effects

After reviewing the locations of the predicted noise impacts, it was determined that noise walls were the only feasible form of noise mitigation. This discussion of noise wall mitigation is organized by evaluating the two primary requirements established by ODOT and WSDOT that must be met before a noise wall can be recommended. Whether each evaluated noise wall meets the feasibility requirement is discussed followed by a detailed analysis of whether the wall meets the cost-effective requirement.

Nineteen potential noise walls were evaluated for the Modified LPA within the study area where traffic noise levels are expected to approach or exceed the FHWA NAC or reach the 10 dBA threshold for substantial increase impacts in both Oregon and Washington. Figure 7-5 through Figure 7-11 show the noise walls that meet the feasibility and reasonableness requirements. The noise walls are given designated numbers (for example, Noise Wall 1), which are used to identify the walls for the remainder of this discussion. Noise Walls 1 through 15 and 11A are located in the Vancouver area. Noise Walls 16 through 18 are located in Oregon. Noise wall evaluations results are provided in Appendix K.

In the Vancouver area, some neighborhoods that were evaluated for noise wall mitigation currently have noise walls; however, noise impacts are still expected due to the ineffectiveness of the existing wall designs to maintain future predicted noise levels to below the NAC. The project would require the removal of all existing noise walls and would construct new noise walls of appropriate height. While the existing noise walls were included in the Traffic Noise Model when determining future noise levels and project impacts, new walls and replacement walls were evaluated without existing walls in the noise model. Using this approach ensures that proposed noise wall heights are appropriately established by "crediting" the new walls with the total amount of noise reduction each wall would ultimately provide. Otherwise, if the baseline future Modified LPA noise levels included the effect of existing noise walls, higher noise wall heights than necessary could be erroneously proposed in an effort to achieve the minimum noise level reductions required by WSDOT's feasibility criteria.

The final decision and recommendation to include noise wall mitigation would be made during final design. As design advances, factors that affect the feasibility and cost-effectiveness of noise walls can change. In addition, should the noise-impacted residents be in opposition to the recommended noise mitigation, the recommended abatement for that particular area would not meet reasonableness and may not be incorporated into the Program.

7.7.1 Analysis of Evaluated Noise Walls

7.7.1.1 Vancouver Noise Walls, North of Mill Plain Boulevard

NOISE WALL 1

Noise Wall 1 was evaluated to mitigate traffic noise impacts at the Kiggins athletic fields, one outdoor use location at Discovery Middle School, and seven residences located at I Street and E 40th Street where noise levels are predicted to approach or exceed the WSDOT NAC. To mitigate traffic noise impacts in this area, Noise Wall 1 was evaluated to begin along the I-5 southbound edge of pavement, just south of the southbound on-ramp from Main Street and extend along the edge of pavement until following the right of way line at E 40th Street until ending just north of E 39th Street for a total length of 2,396 feet. At a wall height of 12 feet, this initial wall length would meet WSDOT criteria for feasibility by reducing traffic noise levels by at least 5 dBA at more than three first-row sites with noise impacts. Since this wall satisfies WSDOT feasibility, this configuration of Noise Wall 1 was evaluated for reasonableness. The 2,396-foot length for Noise Wall 1 would benefit 14 receiver locations, which represent 24 residential equivalent units, resulting in a reasonable wall allowance of $1,007,426. At a height of 12 feet, the planning-level cost of Noise Wall 1 would be approximately $1,483,891, based on wall surface area. Because the construction cost of Noise Wall 1 would be more than the allowable cost of the wall, Noise Wall 1 at 1,396 feet long does not meet the WSDOT reasonableness criteria and is not recommended. The location of Noise Wall 1 is shown on Figure 7-5.

A shorter length noise wall was evaluated to reduce noise levels at the seven residences at I Street and E 40th Street where noise impacts are predicted to approach or exceed the WSDOT NAC. At this location, Noise Wall 1 was evaluated at heights up to 14 feet at a length of 898 feet. A minimum feasible wall height of 10 feet and length of 898 feet would reduce traffic noise levels by at least 5 dBA at more than three first-row sites with noise impacts.

A minimum reasonable height of 12 feet and length of 898 feet for Noise Wall 1 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at eight sites. At a height of 12 feet, the planning-level cost of Noise Wall 1 would be approximately $555,530, based on wall surface area. Noise Wall 1 would benefit 10 receiver locations, which represent 15 residences, resulting in a reasonable wall allowance of $664,736.

This wall would provide noise level reductions of 9 to 10 dBA for the residences located behind Noise Wall 1 predicted to have future noise levels that approach or exceed the NAC. Noise Wall 1 would reduce the number of NAC impacts in the area from 10 to 3. Because the construction cost of Noise Wall 1 would be less than the allowable cost of the wall, Noise Wall 1 meets WSDOT reasonableness criteria and is recommended for further consideration in final design of the Modified LPA.

NOISE WALL 2

Noise Wall 2 was evaluated in the area west of I-5 between E 39th Street and E 33rd Street to mitigate WSDOT NAC impacts at 10 residences in the area. Six of the 10 residences with NAC impacts are predicted to also have substantial increase impacts (sites VW-080, VW-082, two residences represented by VW-084, VW-094, and VW-098). Noise Wall 2 would replace the existing noise wall planned for removal by the project in this area that runs along the southbound on-ramp to I-5 from E 39th Street, shown on Figure 7-6. Receiver impacts and benefits to impacted receivers are the result of the Modified LPA model with the existing wall in place. The total number of benefits result from noise reduction provided by the replacement noise wall compared to no noise wall as described in Section 7.7. Ramp improvements would displace seven residences, represented by sites VW-056, VW-059, VW-062, VW-065, VW-068, VW-071, and VW-077.

Noise Wall 2 was evaluated at heights up to 16 feet and lengths 1,727 feet in this location. At a height of 8 feet, this wall would provide noise level reductions in the range of 5 to 10 dBA for the all 10 residences that would have future noise levels that approach or exceed the NAC and are predicted to experience substantial increase impacts. A minimum feasible wall height of 8 feet and length of 1,727 feet would reduce traffic noise levels by at least 5 dBA at more than three first-row sites with noise impacts. Since this wall satisfies WSDOT feasibility, Noise Wall 2 was evaluated for reasonableness.

A minimum reasonable height of 8 feet and length of 1,727 feet for Noise Wall 2 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at 12 sites. At a height of 8 feet, the planning-level cost of Noise Wall 2 would be approximately $712,631, based on wall surface area. Noise Wall 2 would benefit 13 receiver locations, which represent 15 residential equivalent units, resulting in a reasonable wall allowance of $717,379. Noise Wall 2 would reduce the number of receptors that would experience noise levels that approach or exceed the NAC from 10 to 0, and reduce the number of substantial increase impacts from six to 0. Noise reductions of 9 to 10 dBA at predicted at the six sites predicted for substantial increase impacts. Because the construction cost of Noise Wall 2 would be less than the allowable cost of the wall, Noise Wall 2 meets WSDOT reasonableness criteria and is recommended for further consideration in final design of the Modified LPA.

NOISE WALL 3

Noise Wall 3 was evaluated in the area east of I-5 between E 33rd Street and SR 500 to mitigate WSDOT NAC exceedances at two sites representing three residences in the area. Noise Wall 3 would replace a 4- to 8-foot-tall existing wall planned for removal by the project that is approximately 200 feet in length located just north of the 33rd Street overcrossing. Noise Wall 3 would continue along the top of elevation with WSDOT right of way until reaching the bridge over E 39th Street shown Figure 7-6. Receiver impacts and benefits to impacted receivers are the result of the Modified LPA model with the existing wall in place. The total number of benefits result from noise reduction provided by the replacement noise wall compared to no noise wall as described in Section 7.7. Noise Wall 3 was evaluated at heights up to 16 feet and a length of 1,848 feet in this location. A minimum feasible wall height of 12 feet and length of 1,848 feet would reduce traffic noise levels by at least 5 dBA at more than the three first-row sites with noise impacts. Since this wall satisfies WSDOT feasibility, Noise Wall 3 was evaluated for reasonableness.

At a height of 14 feet and length of 1,848 feet for Noise Wall 3 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at 10 sites. At a height of 14 feet, the planning-level cost of Noise Wall 3 would be approximately $1,333,086, based on wall surface area. Noise Wall 3 would benefit 35 receiver locations, which represent 40 residential equivalent units, resulting in a reasonable wall allowance of $1,455,607. Noise Wall 3 would reduce the number of NAC impacts in the area from 3 to 0. Because the construction cost of Noise Wall 3 would be less than the allowable cost of the wall, Noise Wall 3 meets WSDOT reasonableness criteria and is recommended for further consideration in final design of the Modified LPA.

NOISE WALL 4

Noise Wall 4 was evaluated in the area west of I-5 between E 33rd Street and E 29th Street to mitigate WSDOT NAC impacts at two residences in the area and replace the existing 8- to 9-foot-tall existing noise planned for removal by the project. Noise Wall 4 was evaluated at the same location as the existing wall located at the right of way line along southbound to I-5 from E 33rd Street to E 29th Street shown on Figure 7-6. Receiver impacts and benefits to impacted receivers are the result of the Modified LPA model with the existing wall in place. The total number of benefits result from noise reduction provided by the replacement noise wall compared to no noise wall as described in Section 7.7. Because the required minimum two impacted sites are not located in the wall evaluation area the evaluation of Noise Wall 4 focused on replacing the existing noise wall. To ensure the existing wall was replaced with at least an equivalent noise wall, Noise Wall 4 was evaluated at 10 to 16 feet tall. At a height of 10 feet, this wall would provide noise level reductions in the range of 4 to 9 dBA for the two residences that would have future noise levels that approach or exceed the NAC with the existing noise wall in place. At a wall height of 10 feet up to a height of 16 feet and length of 970 feet, Noise Wall 4 would not meet feasibility by providing a minimum of 5 dBA benefit to at least three first-row sites with impacts; however, at 10 feet this wall would 5 to 11 dBA reduction at 17 sites that represent 18 residences. Noise Wall 4 would not include any additional benefits at wall heights up to 16 feet.

A minimum reasonable height of 10 feet and length of 970 feet for Noise Wall 4 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at eight sites. At a height of 10 feet, the planning-level cost of Noise Wall 5 would be approximately $500,617, based on wall surface area. Noise Wall 5 would benefit 17 receiver locations, which represent 18 residences, resulting in a reasonable wall allowance of $794,174. Noise Wall 5 would reduce the number of receptors that would experience noise levels that approach or exceed the NAC without a noise wall from 11 to 1 and reduce the number of NAC impacts predicted under the Modified LPA behind this wall to 1. Because the construction cost of Noise Wall 5 would be less than the allowable cost of the wall, Noise Wall 5 meets WSDOT reasonableness criteria and is recommended for further consideration in final design of the Modified LPA.

NOISE WALL 5

Noise Wall 5 was evaluated in the area east of I-5 between E 33rd Street and E 29th Street to mitigate WSDOT NAC impacts at nine receiver sites representing nine residences in the area. Noise Wall 5 would replace the existing noise wall planned for removal by the project in this area located at the right of way line along northbound I-5, shown on Figure 7-6. Receiver impacts and benefits to impacted receivers are the result of the Modified LPA model with the existing wall in place. The total number of benefits result from noise reduction provided by the replacement noise wall compared to no noise wall as described in Section 7.7. Noise Wall 5 was evaluated at heights up to 16 feet and a length of 986 feet in this location. At a height of 8 feet, this wall would provide noise level reductions in the range of 8 to 14 dBA for all nine residences that would have future noise levels that approach or exceed the NAC. A minimum feasible wall height of 8 feet and length of 986 feet would reduce traffic noise levels by at least 5 dBA at more than three first-row sites with noise impacts. Since this wall satisfies WSDOT feasibility, Noise Wall 5 was evaluated for reasonableness.

At a height of 10 feet and length of 986 feet for Noise Wall 5 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at 15 sites, which represent 17 residences. At a height of 10 feet, the planning-level cost of Noise Wall 5 would be approximately $509,391, based on wall surface area. Noise Wall 5 would benefit 16 receiver locations, which represent 18 residences, resulting in a reasonable wall allowance of $1,053,875. Noise Wall 5 would reduce the number of receptors that would experience noise levels that approach or exceed the NAC without a noise wall from 17 to 1 and reduce the number of NAC impacts predicted under the Modified LPA behind this wall by 17. Because the construction cost of Noise Wall 5 would be less than the allowable cost of the wall, Noise Wall 5meets WSDOT reasonableness criteria and is recommended for further consideration in final design of the Modified LPA.

NOISE WALL 6

Noise Wall 6 was evaluated in the area west of I-5 between E 29th Street and E 26th Street/E Fourth Plain Boulevard to mitigate WSDOT NAC impacts at four receiver sites representing four residences in the area. Noise Wall 6 would replace the existing noise wall planned for removal by the project in this area located at the right-of-way line along southbound I-5 and the southbound I-5 off-ramp to E Fourth Plain Boulevard, shown on Figure 7-7. Receiver impacts are the result of the Modified LPA model with the existing wall in place. The total number of benefits result from noise reduction provided by the replacement noise wall compared to no noise wall as described in Section 7.7. Noise Wall 7 was evaluated at heights up to 16 feet and a length of 986 feet in this location. At a height of 8 feet, this wall would provide noise level reductions in the range of 1 to 9 dBA for three of the four residences that would have future noise levels that approach or exceed the NAC. A minimum feasible wall height of 8 feet and length of 986 feet would reduce traffic noise levels by at least 5 dBA at more than three first-row sites with noise impacts. Since this wall satisfies WSDOT feasibility, Noise Wall 6 was evaluated for reasonableness.

At a reasonable height of 10 feet and length of 986 feet for Noise Wall 6 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at three sites. At a height of 10 feet, the planning-level cost of Noise Wall 6 would be approximately $508,875, based on wall surface area. Noise Wall 6 would benefit nine receiver locations, which represent 11 residences, resulting in a reasonable wall allowance of $579,889. Noise Wall 6 would reduce the number of receptors that would experience noise levels that approach or exceed the NAC without a noise wall from 4 to 1 and reduce the number of receptors that would experience noise levels that approach or exceed the NAC without a noise wall from 9 to 1. Because the construction cost of Noise Wall 6 would be less than the allowable cost of the wall, Noise Wall 6 meets WSDOT reasonableness criteria and is recommended for further consideration in final design of the Modified LPA.

NOISE WALL 7

Noise Wall 7 was evaluated in the area east of I-5 between E 29th Street and E Fourth Plain Boulevard to mitigate WSDOT NAC impacts at seven receiver sites representing eight residences in the area. Noise Wall 7 would replace the existing noise wall planned for removal by the project in this area located at the right-of-way line along northbound I-5 and the northbound I-5 on-ramp from E Fourth Plain Boulevard, shown on Figure 7-7. Receiver impacts and benefits to impacted receivers are the result of the Modified LPA model with the existing wall in place. The total number of benefits result from noise reduction provided by the replacement noise wall compared to no noise wall as described in Section 7.7. Noise Wall 7 was evaluated at heights up to 16 feet and a length of 1,104 feet in this location. At a height of 8 feet, this wall would provide noise level reductions in the range of 9 to 12 dBA for all eight residences that would have future noise levels that approach or exceed the NAC. A minimum feasible wall height of 8 feet and length of 1,104 feet would reduce traffic noise levels by at least 5 dBA at more than three first-row sites with noise impacts. Since this wall satisfies WSDOT feasibility, Noise Wall 7 was evaluated for reasonableness.

A minimum reasonable height of 10 feet and length of 1,104 feet for Noise Wall 7 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at nine sites. At a height of 10 feet, the planning-level cost of Noise Wall 7 would be approximately $570,291, based on wall surface area. Noise Wall 7 would benefit nine receiver locations, which represent 10 residences, resulting in a reasonable wall allowance of $708,706. Noise Wall 7 would reduce the number of receptors that would experience noise levels that approach or exceed the NAC predicted under the Modified LPA behind this wall from 8 to 0 and reduce the number of receptors that would experience noise levels that approach or exceed the NAC without a noise wall from 10 to 0. Because the construction cost of Noise Wall 7 would be less than the allowable cost of the wall, Noise Wall 7 meets WSDOT reasonableness criteria and is recommended for further consideration in final design of the Modified LPA.

NOISE WALL 8

Noise Wall 8 was evaluated to mitigate traffic noise impacts at 21 residences located west of I-5 between E Fourth Plain Boulevard and E Mill Plain Boulevard where noise levels are predicted to approach or exceed the WSDOT NAC. To mitigate traffic noise impacts in this area, Noise Wall 8 was evaluated to replace an existing wall that runs along the I-5 southbound right of way from the northern end of I Street, south of E Fourth Plain Boulevard to south of E 20th Street. Noise Wall 8 would continue south along the WSDOT right of way until terminating just north of E McLoughlin Boulevard. The location of Noise Wall 8 is shown on Figure 7-7. Receiver impacts and benefits to impacted receivers are the result of the Modified LPA model with the existing wall in place. The total number of benefits result from noise reduction provided by the replacement noise wall compared to no noise wall as described in Section 7.7. Noise Wall 8 was evaluated at heights up to 16 feet and a length of 1,496 feet in this location. A minimum feasible wall height of 8 feet and length of 1,496 feet would reduce traffic noise levels by at least 5 dBA at more than three first-row sites with noise impacts. Since this wall satisfies WSDOT feasibility, this configuration of Noise Wall 8 was evaluated for reasonableness.

At a reasonable height of 16 tall and length of 1,496 feet Noise Wall 8 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at 20 sites. At a height of 16 feet, the planning-level cost of Noise Wall 8 would be approximately $1,235,337 based on wall surface area. Noise Wall 8 would benefit 28 receiver locations, which represent 38 residences, resulting in a reasonable wall allowance of $1,723,771. Noise Wall 8 would reduce the number of receptors that would experience noise levels that approach or exceed the NAC predicted under the Modified LPA behind this wall from 21 to 6 and reduce the number of receptors that would experience noise levels that approach or exceed the NAC without a noise wall from 25 to 6. Because the construction cost of Noise Wall 8 would be less than the allowable cost of the wall, Noise Wall 8 meets WSDOT reasonableness criteria and is recommended for further consideration in final design of the Modified LPA.

NOISE WALL 9

Noise Wall 9 was evaluated to mitigate traffic noise impacts at four residences located west of I-5 between E McLoughlin Boulevard and E Mill Plain Boulevard where noise levels are predicted to approach or exceed the WSDOT NAC. To mitigate traffic noise impacts in this area, Noise Wall 9 was evaluated at the edge of pavement along the I-5 southbound off-ramp to E Mill Plain Boulevard, terminating just north of E 15th Street. The location of Noise Wall 9 is shown on Figure 7-8. Noise Wall 9 was evaluated at heights up to 24 feet at a length of 898 feet in this location. Shorter wall lengths were considered but would not meet feasibility requirements. A minimum feasible wall height of 18 feet and length of 898 feet would reduce traffic noise levels by at least 5 dBA at the three first-row sites with noise impacts. Since this wall satisfies WSDOT feasibility, this configuration of Noise Wall 9 was evaluated for reasonableness.

At a height of 18 feet and length of 898 feet, Noise Wall 9 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at three sites. At a height of 18 feet, the planning-level cost of Noise Wall 9 would be approximately $834,224, based on wall surface area. Noise Wall 9 would benefit 8 receiver locations, which represent 7 residences and one office, resulting in a reasonable wall allowance of $327,620. Additional wall heights were evaluated in an attempt to gain the necessary wall allowance for the cost of the wall. At a maximum wall height of 24 feet and length of 898 feet, Noise Wall 9 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at six sites. At a height of 24 feet, the planning-level cost of Noise Wall 9 would be approximately $1,112,299, based on wall surface area. Noise Wall 9 would benefit 18 receiver locations, resulting in a reasonable wall allowance of $388,890. Because the construction cost of Noise Wall 9 would be more than the allowable cost of the wall, Noise Wall 9 does not meet the WSDOT reasonableness criteria and is not recommended.

NOISE WALL 10

Noise Wall 10 was evaluated to mitigate traffic noise impacts at six residential equivalents that represent outdoor use areas at Marshall Park, located between E McLoughlin Boulevard and E Mill Plain Boulevard, where noise levels are predicted to approach or exceed the WSDOT NAC. To mitigate traffic noise impacts in this area, Noise Wall 10 was evaluated along the I-5 northbound mainline between E Mill Plain Boulevard and E McLoughlin Boulevard. Noise wall placement was considered along the northbound I-5 on-ramp from E Mill Plain Boulevard and along the I-5 northbound off-ramp to E Fourth Plain Boulevard, however, the I-5 mainline location was deemed preferrable due to high traffic volumes and line of sight to the impacted receptors at outdoor use areas at Marshall Park. The location of Noise Wall 10 is shown on Figure 7-8. Noise Wall 10 was evaluated at heights up to 16 feet and a length of 1,089 feet in this location; however, the wall would not achieve a 5-dBA reduction at any sites located behind the wall. Additional wall alignment were evaluated along the I-5 northbound ramps in this area and would also not achieve the minimum reduction requirements. As a result, Noise Wall 10 is not recommended because it would not be feasible to benefit a majority of the first-row receiver sites with noise impacts in the area.

7.7.1.2 Vancouver Noise Walls, South of Mill Plain Boulevard

NOISE WALL 11

Noise Wall 11 was evaluated to mitigate traffic noise impacts at nine residential equivalents that represent patios at six apartment units at the Hudson Apartment Complex, two outdoor use areas at Our Heroes Place mixed-used building, and an outdoor use area outside the separate commercial office building located on the east side of the Academy Chapel complex just north of E Evergreen Boulevard. All nine impact locations in this area are predicted to approach or exceed the WSDOT NAC. To mitigate traffic noise impacts in this area, Noise Wall 11 was evaluated along the I-5 southbound right of way from E Mill Plain Boulevard to E Evergreen Boulevard. The location of Noise Wall 11 is shown on Figure 7-8. Noise Wall 11 was evaluated at heights up to 24 feet and a length of 1,172 feet in this location. A minimum feasible wall height of 18 feet and length of 1,172 feet would reduce traffic noise levels by at least 5 dBA at three first-row sites with noise impacts. Since this wall satisfies WSDOT feasibility, this configuration of Noise Wall 11 was evaluated for reasonableness.

At a height of 18 feet and length of 1,172 feet, Noise Wall 11 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at 1 site. At a height of 18 feet, the planning-level cost of Noise Wall 11 would be approximately $1,088,765, based on wall surface area. Noise Wall 11 would benefit six receiver locations, which represent three residences, one outdoor commercial use area, a hotel pool, and one office, resulting in a reasonable wall allowance of $269,404. Additional wall heights were evaluated in an attempt to gain the necessary wall allowance for the cost of the wall. At a maximum wall height of 24 feet and length of 1,172 feet, Noise Wall 11 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at five sites. At a height of 24 feet, the planning-level cost of Noise Wall 11 would be approximately $1,451,686, based on wall surface area. Noise Wall 11 would benefit 12 receiver locations, resulting in a reasonable wall allowance of $496,694. Because the construction cost of Noise Wall 11 would be more than the allowable cost of the wall, Noise Wall 11 does not meet the WSDOT reasonableness criteria and is not recommended.

The northern portion of Noise Wall 11 was also re-evaluated separately. A shorter length wall 565ft required 22 feet in height to meet WSDOT feasibility. The 22 foot tall wall would not meet WSDOT reasonableness as the planning-level cost of $641,512 is greater than the wall allowance $135,456. A shorter wall was not evaluated along the southern portion of the NW11 because the area could not meet WSDOT feasibility which requires benefits at a minimum of three impacted receptors.

NOISE WALL 11A

Noise Wall 11A was evaluated to mitigate traffic noise impacts at outdoor use area at four offices within Fort Vancouver, located east of I-5 and north of E Evergreen Boulevard, where noise levels are predicted to approach or exceed the WSDOT NAC. To mitigate traffic noise impacts in this area, Noise Wall 11A was evaluated to replace an existing wall that runs along the I-5 northbound right of way from E Evergreen Boulevard to the west end of Officers Row. Noise Wall 11A would follow a similar alignment as the existing wall; however, the new location would be adjusted eastward to align with the program limits. The location of Noise Wall 12 is shown on Figure 7-9. Noise Wall 11A was evaluated at heights up to 12 feet and a length of 464 feet in this location. A minimum feasible wall height of 6 feet and length of 464 feet would reduce traffic noise levels by at least 5 dBA at the outdoor use areas at three historic offices with noise impacts. Since this wall satisfies WSDOT feasibility, this configuration of Noise Wall 11A was evaluated for reasonableness.

A minimum reasonable height of 6 feet and length of 464 feet for Noise Wall 11A would achieve WSDOT's design goal of at least a 7-dBA noise reduction at the two impacted outdoor use areas that represents two historic office locations. At a height of 6 feet, the planning-level cost of Noise Wall 11A would be approximately $143,682, based on wall surface area. Noise Wall 11A would benefit three receiver locations, which represent three historic offices, resulting in a reasonable wall allowance of $150,495. This wall would provide noise level reductions of 7 dBA for the offices located behind Noise Wall 11A predicted to have future noise levels that approach or exceed the NAC. Noise Wall 11A would reduce the number of receptors that would experience noise levels above the NAC without a noise wall from four to zero. Because the construction cost of Noise Wall 11A would be less than the allowable cost of the wall, Noise Wall 11A meets WSDOT reasonableness criteria and is recommended for further consideration in final design of the Modified LPA.

NOISE WALL 12

Noise Wall 12 was evaluated to mitigate traffic noise impacts at a common outdoor use area at the Normandy Apartments located at 316 E 7th Street where noise levels are predicted to approach or exceed the WSDOT NAC. To mitigate traffic noise impacts in this area, Noise Wall 12 was evaluated along the I-5 southbound right of way for 540 feet between the apartment building and the southbound I-5 off-ramp to SR 14. The location of Noise Wall 12 is shown on Figure 7-9. Noise Wall 12 was evaluated at heights up to 12 feet and a length of 540 feet in this location. A minimum feasible wall height of 10 to 12 feet and length of 540 long would reduce traffic noise levels by at least 5 dBA at the common outdoor use area at the apartments which represents six first-row residences with noise impacts. Since this wall satisfies WSDOT feasibility, this configuration of Noise Wall 12 was evaluated for reasonableness.

A minimum reasonable height of 10 to 12 tall and length of 540 feet for Noise Wall 12 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at the one impacted outdoor use site that represents six residences. At a height of 10 to 12 feet, the planning-level cost of Noise Wall 12 would be approximately $316,782, based on wall surface area. Noise Wall 12 would benefit one receiver location, which represents six residences, resulting in a reasonable wall allowance of $322,044. This wall would provide noise level reductions of 7 dBA for the residences located behind Noise Wall 12 predicted to have future noise levels that approach or exceed the NAC. Noise Wall 12 would reduce the number of receptors that would experience noise levels above the NAC without a noise wall from 6 to 0. Because the construction cost of Noise Wall 12 would be less than the allowable cost of the wall, Noise Wall 12 meets WSDOT reasonableness criteria and is recommended for further consideration in final design of the Modified LPA.

NOISE WALL 13

Noise Wall 13 was evaluated to mitigate traffic noise impacts at 24 private residential patios located at the Alera Apartments that is under construction at 400 Washington Street, where noise levels are predicted to approach or exceed the WSDOT NAC. To mitigate traffic noise impacts in this area, Noise Wall 13 was evaluated along the I-5 southbound on-ramp from westbound SR 14. Noise wall placement was chosen at this location as this ramp is the closest roadway carrying high traffic volumes audible at the apartment building with the I-5 mainline located nearly 500 feet to the east. The location of Noise Wall 13 is shown on Figure 7-8. Noise Wall 13 was evaluated at a height of 12 feet and a length of 497 feet in this location; however, the wall would not achieve a 5-dBA reduction at any sites of the impacted first-row receivers located behind the wall. Noise Wall 13 is not able to provide the required noise reduction due in part to the wall height limitations on the ramp and due to traffic on Washington Street contributing to the noise levels at each of these first-row impacted sites that overlook Washington Street. Noise Wall 13 would not achieve the minimum reduction requirements for a feasible noise wall. As a result, Noise Wall 13 is not recommended because it would not be feasible to benefit a majority of the first-row receiver sites with noise impacts in the area.

NOISE WALL 14

Noise Wall 14 was evaluated to mitigate traffic noise impacts at three locations along the Historic Fort Vancouver Park Trail and one location with the Fort Vancouver Historic Village where noise levels are predicted to approach or exceed the WSDOT NAC. This area is located just north of SR 14 and includes the northern portion of the Confluence Land Bridge Trail that connects the Fort Vancouver to Old Apple Tree Park and the Waterfront Renaissance Trail. Noise Wall 14 was evaluated along the edge of pavement of the SR 14 westbound off-ramp to I-5. The location of Noise Wall 14 is shown on Figure 7-9. Noise Wall 14 was evaluated at heights up to 20 feet and at lengths of 1,132 feet and 1,473 feet in this location. A minimum feasible wall height of 8 to 20 feet and length of 1,132 feet would reduce traffic noise levels by at least 5 dBA at the four first-row sites with noise impacts. Since this wall satisfies WSDOT feasibility, Noise Wall 14 was evaluated for reasonableness.

A minimum feasible height of 8 to 20 feet and length of 1,132 feet for Noise Wall 14 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at three sites. At a height of 8 to 20 feet, the planning-level cost of Noise Wall 14 would be approximately $1,062,702, based on wall surface area. This wall would provide noise level reductions of 5 to 8 dBA for all sites located behind Noise Wall 14 predicted to have future noise levels that approach or exceed the NAC. A total of eight benefited noise receiver locations behind Noise Wall 14 represent eight residential equivalent units, resulting in a reasonable wall allowance of $352,185. Additional wall heights and lengths were evaluated in an attempt to gain the necessary wall allowance for the cost of the wall. At a maximum wall height of 20 feet and length of 1,473 feet, Noise Wall 14 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at three sites. At a height of 20 feet, the planning-level cost of Noise Wall 14 would be approximately $1,520,431, based on wall surface area. Noise Wall 14 would benefit eight receiver locations, resulting in a reasonable wall allowance of $352,185. Because the construction cost of Noise Wall 14 would be more than the allowable cost of the wall, Noise Wall 14 does not meet the WSDOT reasonableness criteria and is not recommended.

NOISE WALL 15

Noise Wall 15 was evaluated to mitigate traffic noise impacts at five locations along the Confluence Land Bridge Trail and three locations along the Waterfront Renaissance Trail for a total of eight locations where noise levels are predicted to approach or exceed the WSDOT NAC. The Confluence Land Bridge Trail is located just south of SR 14 and east of Old Apple Tree Park. The Waterfront Renaissance Trail runs just south of SE Columbia Way east of I-5 and south of SR 14. An existing wall located along the eastbound SR 14 on-ramp from I-5 is planned for removal with the Modified LPA. Future noise levels with the Modified LPA do not include the existing wall and mitigated noise levels resulting from Noise Wall 15 do not include the existing noise wall. Noise Wall 15 was evaluated along the edge of pavement of the SR 14 eastbound on-ramp from I-5 northbound. The location of Noise Wall 15 is shown on Figure 7-9. Noise Wall 15 was evaluated at heights up to 20 feet and at length of 1,041 and 1,870 feet in this location. A minimum feasible wall height of 14 feet and length of 1,041 feet would reduce traffic noise levels by at least 5 dBA at three impacted first-row sites with noise impacts. Since this wall satisfies WSDOT feasibility, Noise Wall 15 was evaluated for reasonableness.

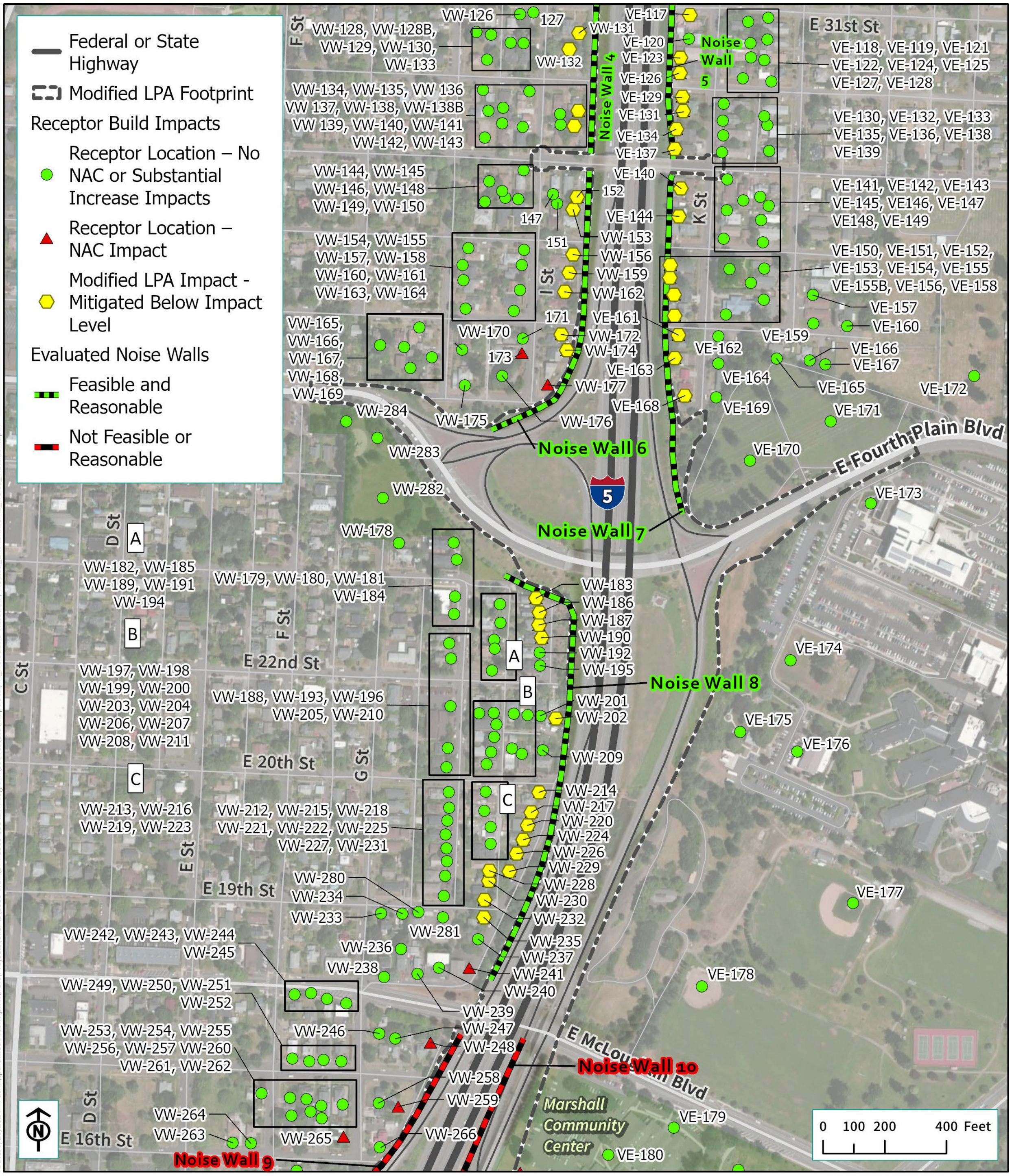
A minimum feasible height of 14 feet and length of 1,041 feet for Noise Wall 15 would achieve ODOT's design goal of at least a 7-dBA noise reduction at one site. At a height of 14 feet, the planning-level cost of Noise Wall 15 would be approximately $719,185, based on wall surface area. This wall would provide noise level reductions of 5 to 7 dBA for three of the eight sites located behind Noise Wall 15 predicted to have future noise levels that approach or exceed the NAC. Noise Wall 15 would benefit three receiver locations, which represent three residential equivalent units, resulting in a reasonable wall allowance of $150,494. Additional wall heights and lengths were evaluated in an attempt to gain the necessary wall allowance for the cost of the wall. At wall heights from 12 to 20 feet and a length of 2,307 feet, Noise Wall 15 would achieve WSDOT's design goal of at least a 7-dBA noise reduction at four sites. At heights 12 to 20 feet and length of 2,307 feet, the planning-level cost of Noise Wall 15 would be approximately $2,068,529, based on wall surface area. Noise Wall 15 would benefit seven receiver locations, resulting in a reasonable wall allowance of $354,663. Because the construction cost of Noise Wall 15 would be more than the allowable cost of the wall, Noise Wall 15 does not meet the ODOT reasonableness criteria and is not recommended.

Figure 7-5. Modified LPA (2045) Traffic Noise Mitigation – Evaluated Noise Walls E 39th Street to North Terminus

Figure 7-6. Modified LPA (2045) Traffic Noise Mitigation – Evaluated Noise Walls E 30th Street to E 39th Street

Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Figure 7-7. Modified LPA (2045) Traffic Noise after Mitigation – McLoughlin Boulevard to E 30th Street



Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Figure 7-8. Modified LPA (2045) Traffic Noise After Mitigation – E 8th Street to E McLoughlin Boulevard

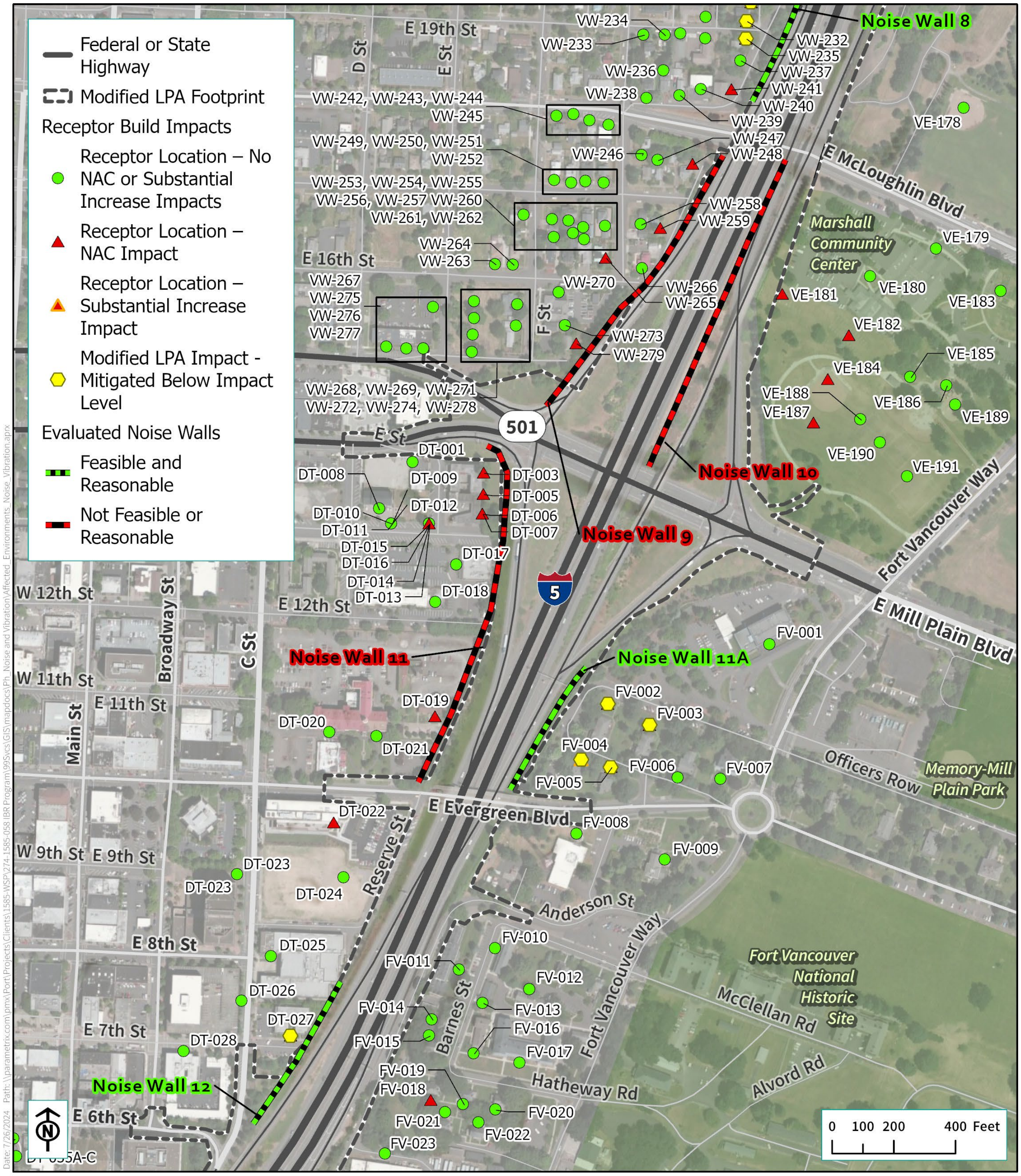
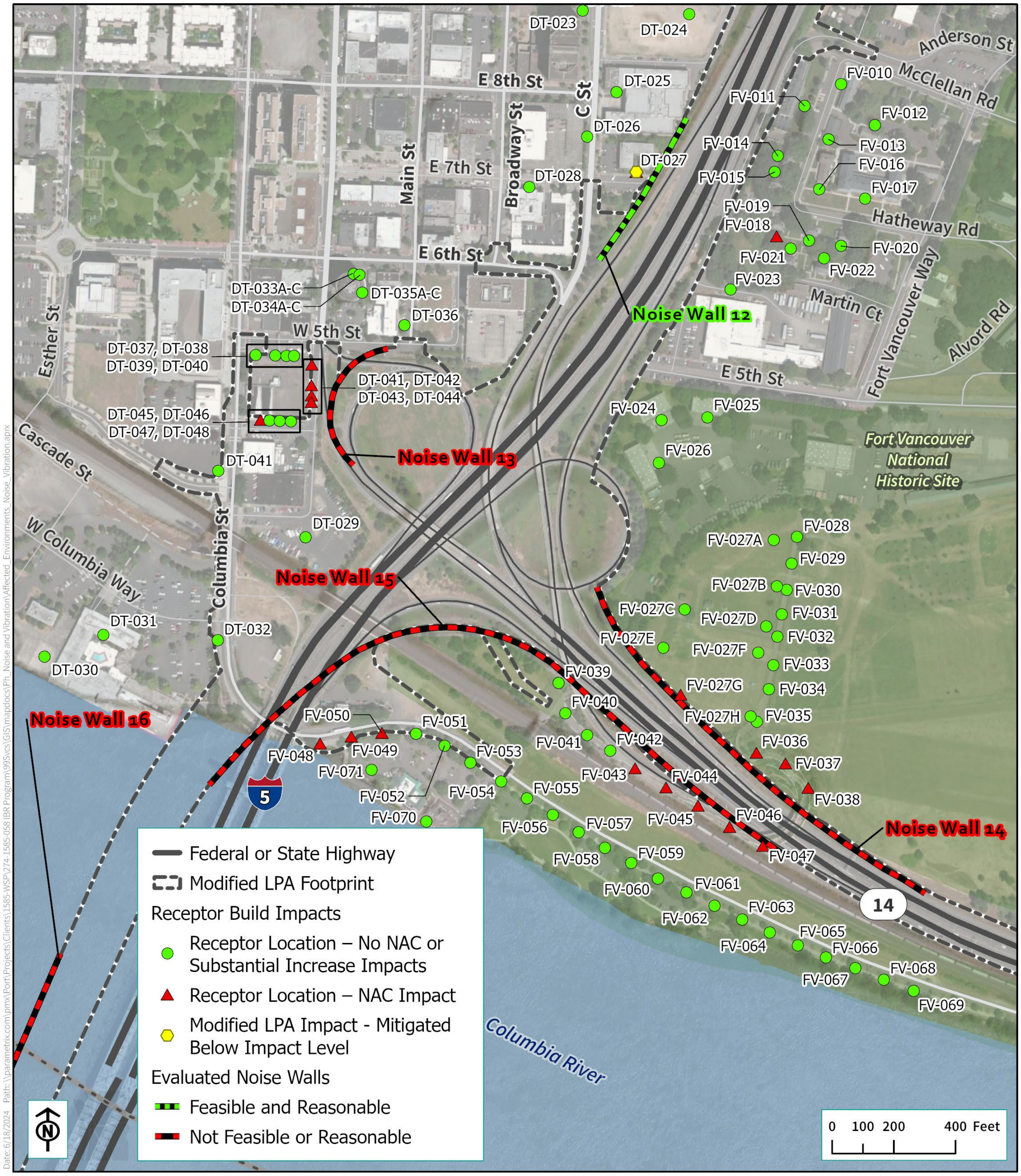


Figure 7-9. Modified LPA (2045) Traffic Noise Mitigation – I-5/SR 14 Interchange



Source: ODOT, WSDOT, Mapbox, OpenStreetMap

7.7.1.3 Portland Noise Walls

NOISE WALL 16

Noise Wall 16 was evaluated to mitigate traffic noise impacts at three locations at the Jantzen Beach RV Park on Hayden Island, located west of I-5. All three impacts at the RV park are substantial increase impacts, i.e., where Modified LPA noise levels are 10 or more dBA over existing conditions noise levels. No sites are predicted to approach or exceed the ODOT NAAC. Noise Wall 16 was evaluated along the edge of the pavement along I-5 southbound on the bridge. The location of Noise Wall 16 is shown on Figure 7-9 and Figure 7-10. Noise Wall 16 was evaluated at heights up to 24 feet and a length of 3,114 feet in this location; however, the wall would not achieve a 5 dBA reduction at any of the three impacted sites. As a result, Noise Wall 16 is not recommended because it would not meet ODOT feasibility criteria, which require that a simple majority of impacted receptors achieve at least a 5-dBA reduction in noise levels.

NOISE WALL 17

Noise Wall 17 was evaluated to mitigate traffic noise impacts at 18 locations at the Jantzen Beach houseboats located west of the proposed new North Portland Harbor bridges. All 18 impacts at the Jantzen Beach houseboats are predicted to approach or exceed the ODOT NAAC, with Modified LPA noise levels ranging from 55 to 70 dBA at current houseboat Rows B to G. In this area on the north shore of Portland Harbor west of I-5, the Modified LPA would displace 13 houseboats.

Noise Wall 17 was evaluated along the edge of pavement along I-5 southbound on the North Portland Harbor Bridge. The location of Noise Wall 17 is shown on Figure 7-10. Noise Wall 17 was evaluated at heights up to 24 feet and a length of 1,828 feet in this location; however, this wall would not achieve a 5-dBA reduction at any of the 18 impacted sites. As a result, Noise Wall 17 is not recommended because it would not meet ODOT feasibility criteria, which require that a simple majority of impacted receptors achieve at least a 5-dBA reduction in noise levels.

NOISE WALL 18

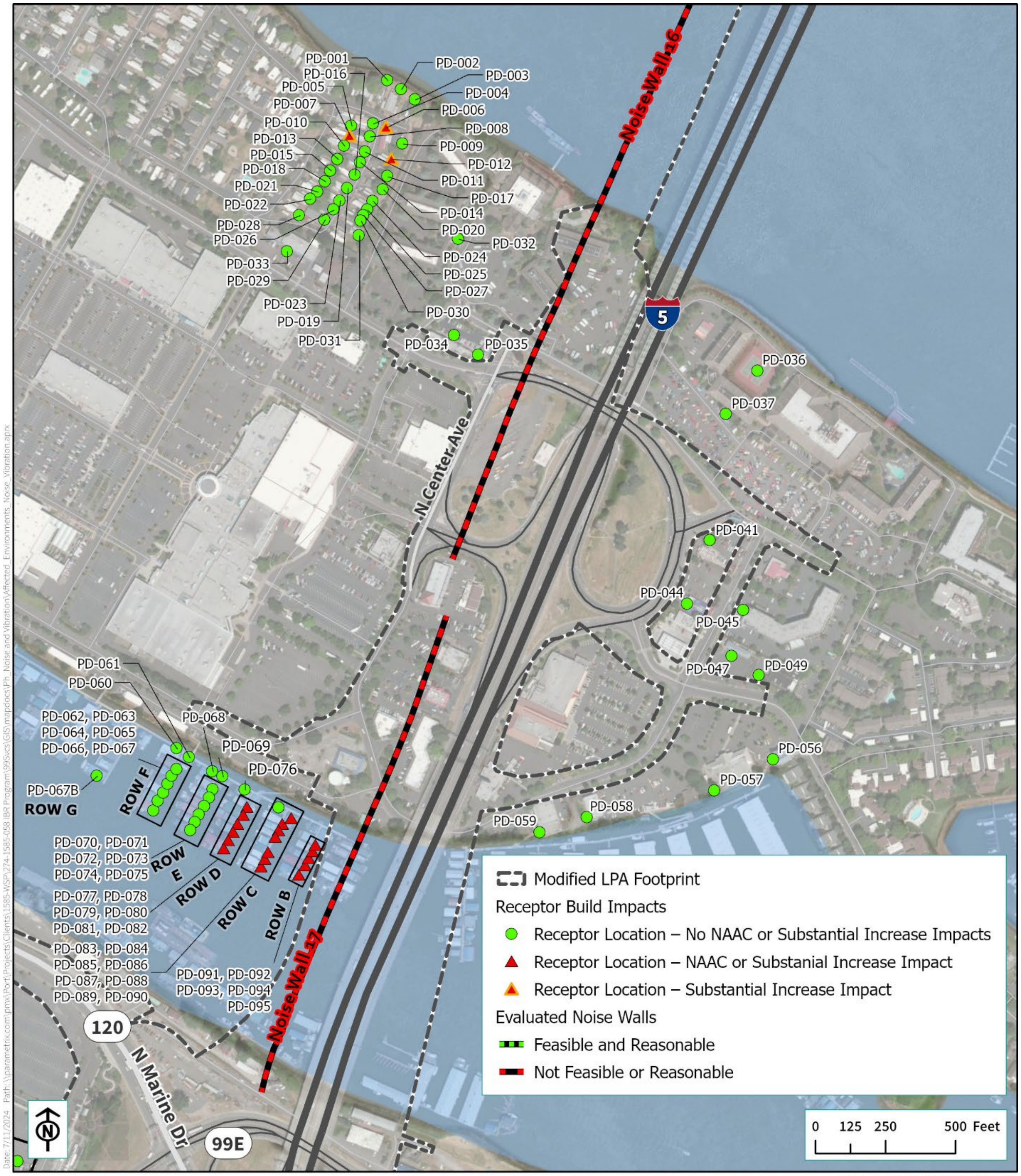
Noise Wall 18 was evaluated to mitigate traffic noise impacts at 12 first-floor apartments at the Newport Apartments located west of I-5 along N Marine Drive. The Modified LPA includes local roadway improvements to N Marine Drive, OR 99E/NE Martin Luther King Jr Boulevard, and several connections to I-5 and area roadways. The Newport Apartment complex includes four buildings located between N Marine Drive and N Anchor Way with private patios on first-, second-, and third-floor units. All 12 impacts at the Newport Apartments are predicted to approach or exceed the ODOT NAAC, with Modified LPA noise levels ranging from 65 dBA at patios facing N Anchor Way to 71 dBA at patios facing N Marine Drive. Traffic noise on N Marine Drive is the primary noise source at this apartment complex, as I-5 is located 1,000 feet to the west.

Noise Wall 18 was evaluated along the westbound edge of pavement of N Marine Drive. The location of Noise Wall 18 is shown on Figure 7-11. Due to the varying terrain in the area and the elevation of first-floor apartment balconies, Noise Wall 18 was evaluated at multiple heights up to 16 feet and a length of 1,029 feet in this location. Noise Wall 18 was evaluated at 12 feet tall along the westernmost

440 linear feet and 16 feet tall along the easternmost 516 linear feet, with a 14-foot-tall wall section 73 feet in length between the 12-foot-tall and 16-foot-tall wall sections. A minimum feasible wall height of 12 to 16 feet and length of 1,029 feet would reduce traffic noise levels by at least 5 dBA at all 12 first-floor apartment balconies facing N Marine Drive, which represent all 12 first-row residences that would experience noise impacts. Since this wall satisfies ODOT feasibility criteria, this configuration of Noise Wall 18 was evaluated for reasonableness.

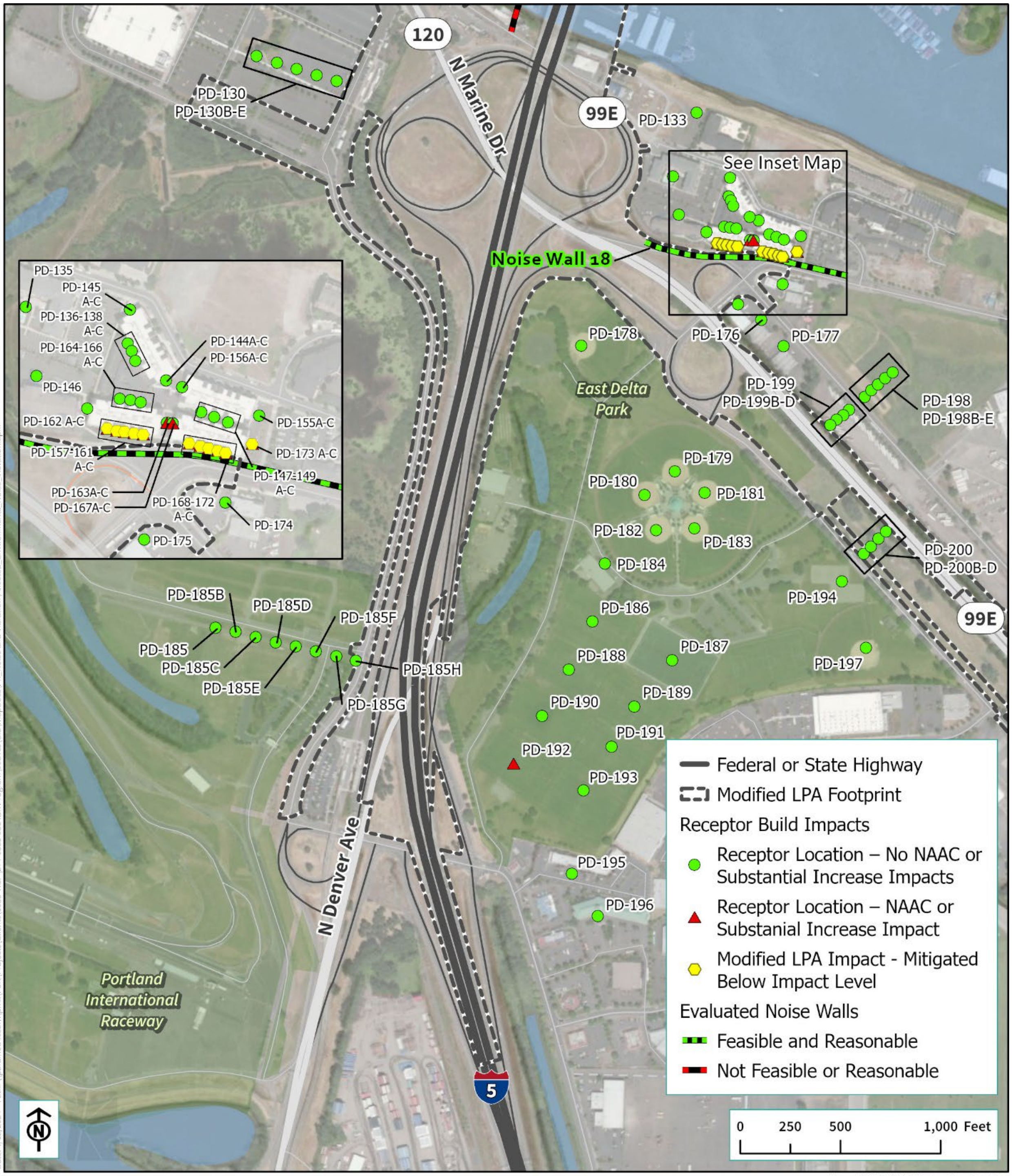
A minimum reasonable height of 12 to 16 feet and length of 1,029 feet for Noise Wall 18 would achieve ODOT's design goal of at least a 7-dBA noise reduction at all 12 first-floor impacted outdoor use sites that represent 12 residences. At a height of 12 to 16 feet, the planning-level cost of Noise Wall 18 would be approximately $436,770, based on wall surface area. Noise Wall 18 would benefit 20 receiver locations, which represents 28 residences, resulting in a cost per benefited receptor of $15,599. Because the cost per benefited receptor of Noise Wall 18 would be less than the ODOT maximum allowable cost per benefited receptor of $37,500, Noise Wall 18 meets ODOT reasonableness criteria and is recommended for further consideration in the final design of the Modified LPA.

Figure 7-10. Modified LPA (2045) Traffic Noise Mitigation – Hayden Island



Source: ODOT, WSDOT, Mapbox, OpenStreetMap

Figure 7-11. Modified LPA Traffic Noise Mitigation – Portland Mainland



7.7.1.4 Noise Mitigation Summary

Noise mitigation was evaluated at all locations where traffic noise impacts were predicted. Noise walls were evaluated to mitigate noise impacts at 16 locations in Washington and three in Oregon. Of the noise walls evaluated, 11 were determined to be feasible and reasonable by ODOT and WSDOT criteria (10 in Washington and one in Oregon). Included in the 10 recommended noise walls, Noise Walls 2 through 8 would replace existing noise walls.

Noise mitigation results would be the same for the Modified LPA with all bridge configurations, one or two auxiliary lanes, and the SR 14 Interchange without C Street ramps. The only difference in highway traffic noise mitigation with the Modified LPA design options is that under the I-5 mainline shifted west design option, Noise Wall 12 would not be recommended as the affected property would be acquired.

The 11 feasible and reasonable noise walls are described in Section 7.7.1.1, above. Table 7-2 summarizes each noise wall evaluation. The general location of each feasible and reasonable noise wall is described below:

- Noise Wall 1: west side of I-5 from the southbound on-ramp from Main Street to E 39th Street.
- Noise Wall 2: west side of I-5 between E 39th Street and E 33rd Street.
- Noise Wall 3 east side of I-5 between E 33rd Street and SR 500.
- Noise Wall 4 west side of I-5 between E 33rd Street and E 29th Street.
- Noise Wall 5 east side of I-5 between E 33rd Street and E 29th Street.
- Noise Wall 6 west side of I-5 between E 29th Street and E 26th Street/E Fourth Plain Boulevard.
- Noise Wall 7 east side of I-5 between E 29th Street and E Fourth Plain Boulevard.
- Noise Wall 8 north side of N Marine Drive at the Newport Apartments.
- Noise Wall 11A east side of I-5 between E Evergreen Boulevard and Officers Row.
- Noise Wall 12 west side of I-5 between E 7th Street and E 8th Street.
- Noise Wall 18 north side of N Marine Drive and east of I-5.

Table 7-2. Noise Wall Analysis Summary

Wall	No. of Impacts [a]	Length (feet)	Height (feet)	No. of Impacts Benefited [b]	Feasible? (Yes/No)	Achieves Design Goal? (Yes/No)	Total Benefits [c]	Planning Level Cost [d]	Cost Allowance / Cost per Benefited Receiver [e]	Cost Reason-able? [f]	Wall Recom-mended?
1	10	898	12	7	Yes	Yes	15	$555,530	$664,736	Yes	Yes
2	10	1,727	8	10	Yes	Yes	15	$712,631	$717,379	Yes	Yes
3	3	1,845	14	3	Yes	Yes	40	$1,333,086	$1,455,607	Yes	Yes
4	1	970	10	10	Yes	Yes	18	$500,617	$794,174	Yes	Yes
5	17	986	10	17	Yes	Yes	18	$509,391	$1,053,875	Yes	Yes
6	10	986	10	8	Yes	Yes	11	$508,875	$579,889	Yes	Yes
7	10	1,104	10	10	Yes	Yes	10	$570,291	$708,706	Yes	Yes
8	21	1,496	16	15	Yes	Yes	38	$1,235,337	$1,723,771	Yes	Yes
9	4	898	18	4	Yes	Yes	8	$834,224	$327,620	No	No
10	6	1,089	16	0	No	No	0	N/A	N/A	No	No
11	11	1,172	18	4	Yes	Yes	6	$1,088,765	$269,404	No	No
11A	4	464	6	3	Yes	Yes	3	$143,682	$150,495	Yes	Yes
12	6	540	10 to 12	6	Yes	Yes	6	$316,782	$322,044	Yes	Yes
13	24	497	12	4	No	No	12	N/A	N/A	No	No

Wall	No. of Impacts [a]	Length (feet)	Height (feet)	No. of Impacts Benefited [b]	Feasible? (Yes/No)	Achieves Design Goal? (Yes/No)	Total Benefits [c]	Planning Level Cost [d]	Cost Allowance / Cost per Benefited Receiver [e]	Cost Reason-able? [f]	Wall Recom-mended?
14	4	1,132	8 to 20	4	Yes	Yes	8	$1,062,702	$352,185	No	No
15	8	1,041	14	3	Yes	Yes	3	$719,185	$150,494	No	No
16	3	3,114	24	0	No	N/A	0	N/A	N/A	No	No
17	18	1,828	24	0	No	N/A	0	N/A	N/A	No	No
18	12	1,029	12 to 16	12	Yes	Yes	28	$436,770	$15,599	Yes	Yes

Note: N/A = not applicable for walls that do not meet feasibility. Details of all wall evaluations are presented in the Noise and Vibration Technical Report.

a Impacts based on WSDOT NAC, ODOT NAAC, and Substantial Increase thresholds with 2045 Modified LPA

b Impacts benefited based on reduction from 2045 Modified LPA with existing noise walls in place

c Total benefits based on reduction from 2045 Modified LPA without existing noise in place

d Planning level cost calculated from WSDOT's planning level cost of $51.61 per square foot and ODOT's planning level cost of $30 per square foot for wall heights up to 16 feet and $37.50 per square feet for wall heights from 17 to 25 feet

e WSDOT cost allowance and ODOT wall cost per benefited receiver

f Cost reasonableness based on WSDOT Noise Policy Reasonableness guidelines and ODOT's Noise Manual Cost Effectiveness Criteria

LPA = Locally Preferred Alternative; NAAC = Noise Abatement Approach Criteria; NAC = Noise Abatement Criteria; ODOT = Oregon Department of Transportation; WSDOT = Washington State Department of Transportation

In total, construction of the 10 noise walls that meet WSDOT feasibility and reasonableness criteria and one noise wall that meets ODOT feasibility and reasonableness criteria would reduce the number of traffic noise impacts with the Modified LPA from 198 to 121, which includes the reducing the number of substantial increase impacts from 10 to 5. With mitigation, the Modified LPA would have 94 fewer traffic noise impacts than under the No-Build Alternative.

All noise wall designs stated in this report should be verified during final design to account for the greater level of design available at that time.

7.7.1.5 Design Options

SR 14 INTERCHANGE WITHOUT C STREET RAMPS

Under the Modified LPA with SR 14 interchange without C Street ramps option, the proposed mitigation would be the same as for the option with C Street ramps because the design would not noticeably shift the I-5 alignment or change peak hour traffic volumes, speeds, or vehicle mix.

I-5 MAINLINE SHIFTED WEST

Under the Modified LPA with I-5 mainline shifted west design option, the proposed mitigation would be the same as the Modified LPA with I-5 mainline centered design option except that Noise Wall 12 would not be constructed as the affected property would be acquired. Shifting the I-5 mainline west would not result in a noticeable change in peak hour traffic volumes, speeds, or vehicle mix and is not anticipated to noticeably change noise levels in the area.

7.7.2 Light-Rail Noise and Vibration Mitigation

Mitigation measures were considered for light-rail noise and vibration impacts as required by the FTA. The following sections provide an overview of noise and vibration mitigation measures and the measures recommended for inclusion with the Modified LPA.

There are several forms of noise mitigation commonly considered when noise impacts are identified. Mitigation measures evaluated for reducing the Modified LPA's noise impacts from light-rail include:

- **Noise Barriers.** Construction of noise barriers between a roadway or guideway and the affected receivers would reduce noise levels by physically blocking the transmission of noise. The heights of barriers depend on the proximity of the roadway or tracks to the barrier, location of the noise-sensitive properties, and topographical conditions. Typically, barriers for light-rail range from 4 to 8 feet tall.
- **Track Lubrication at Curves.** Trackside lubricators can be effective at reducing "wheel squeal," which sometimes occurs on tight-radius curves. There are currently several areas on existing light-rail alignments that use trackside lubricators, and their effectiveness at reducing wheel squeal is documented.
- **Special Trackwork at Crossovers and Turnouts.** The impacts of light-rail wheels over rail gaps at some sections of special trackwork increases light-rail noise by 6 dBA or more. The use

of spring-rail, flange-bearing, and movable-point frogs in place of standard rigid frogs allows the gap to remain closed, thus reducing noise levels. Another option is to install risers on standard crossovers that support the wheels over the gap, thereby reducing noise.

- **Reduced Train Speed.** Although normally in conflict with project objectives, reducing train speed can reduce noise.
- **Building Sound Insulation.** Insulating affected structures can reduce noise levels inside homes that would be impacted by noise. This technique does not reduce exterior noise levels and would be used as a final measure to reduce noise to acceptable levels for sensitive receivers such as residences.

Table 7-3 summarizes the noise impacts, mitigation measures, and future project noise levels after mitigation was applied. The following sections describe the mitigation measures. Aerial photos of the analysis areas and mitigation are provided at the end of this section.

7.7.2.1 Light-Rail Noise Mitigation

PORTLAND LIGHT-RAIL NOISE MITIGATION

No transit noise impacts are predicted in Portland; therefore, no mitigation is needed.

DOWNTOWN VANCOUVER LIGHT-RAIL NOISE MITIGATION

- Install tall safety barriers or sound barriers along the elevated structure to mitigate the noise impacts at site LRT-1, which represents the Normandy Apartments located at E 7th Street and E C Street in downtown Vancouver. A 3- to 4-foot acoustically absorbent wall or 6-foot reflective wall would reduce noise levels at this location by 7 to 10 dBA.
- Equip all light-rail track curves with a radius of less than 300 feet with wayside lubricators. After construction of the alignment, during the initial testing, if additional curves are identified with wheel squeal, install wayside track lubricators, as necessary.

Table 7-3. Transit Noise Mitigation Analysis

Receptor [a]	Area Description [b]	Land Use [c]	Number of Units [d]	Existing Noise [e] (dBA)	Modified LPA Light-Rail Noise Contribution [f] (dBA)	Modified LPA Light-Rail Noise with Mitigation [g] (dBA)	FTA Moderate Impact Criteria [h] (dBA)	Impacts [i]	Mitigation [j]	Residual Impacts [k]
LRT-1	E 7th St./ E C St.	SF	12	83	69	64	66	12	Wall	0

a Receptors shown on Figure 4-1
b General description of the area of analysis
c Land Use: SF = single-family
d Number of individual apartments or homes affected
e Existing noise levels in L_{dn} for category 2 land use, or L_{eq} for category 1 or 3 land uses
f Noise from operation of the light-rail only. This is the noise level used to determine impacts under the FTA criteria.
g Exterior noise level with mitigation
h FTA impact criteria
i Number of units where project noise would approach or exceed the NAC
j Mitigation measures
k Remaining impacts with mitigation
dBA = A-weighted decibels; FTA = Federal Transit Administration; L_{dn} = day-night equivalent sound level; LPA = Locally Preferred Alternative; NAC = Noise Abatement Criteria; St. = Street

7.7.2.2 Light-Rail Vibration Mitigation

Where vibration impacts are considered to be significant, they warrant consideration of reasonable and feasible mitigation. The following vibration mitigation measures were evaluated for use in the Modified LPA:

- Resilient Fasteners. Resilient fasteners are vibration-reducing fasteners that attach between the rail and ties.
- Tire Derived Aggregate (TDA). TDA normally consists of 12 inches of shredded rubber ballast under the standard ballast. This mitigation method has been employed by transit agencies, and further research is needed prior to committing to TDA for vibration mitigation.
- Special Trackwork at Crossovers and Turnouts. The FTA cites evidence that light-rail train wheels over rail gaps of special trackwork may increase light-rail vibration by about 10 VdB in some conditions (FTA 2018). The use of spring-rail, flange-bearing, or movable-point frogs in place of standard rigid frogs allows the gap to remain closed, reducing vibration levels.
- Rail Grinding/Wheel Truing. These regular maintenance activities can address impacts only slightly above the threshold.

PORTLAND VIBRATION MITIGATION

No vibration impacts are predicted in Portland; therefore, no mitigation is needed.

VANCOUVER VIBRATION MITIGATION

- Use resilient rail fasteners to mitigate vibration impacts along direct fixation track way. Resilient rail fasteners typically reduce vibration levels by 5 VdB, which would not reduce all the predicted vibration levels below the FTA 72 VdB criteria for residential land uses. Receivers LRV-1 and LRV-2, with predicted levels of 77 VdB and 81 VdB, respectively, would be the only locations where there is still a potential for vibration impact following mitigation.
- Perform additional testing to ensure that the vibration levels at LRV-1 and LRV-2 would be below the 72 VdB criteria (Figure 4-5).

Table 7-4 summarizes the vibration levels with and without mitigation. Figure 4-8 shows the vibration impacts and proposed mitigation in downtown Vancouver.

Table 7-4. Transit Vibration Mitigation Analysis of Vancouver Receptors

Receptor [a]	Area Description [b]	Land Use [c]	FTA Vibration Criteria [d] (VdB)	Vibration Level [e] (VdB)	Vibration Level with Mitigation [f] (VdB)	Number of Potential Impacts with Mitigation [g]
LRV-1	E 7th St./E C St.	MF	72	77	72	12
LRV-2	E 8th St./E C St.	Movie Theater	75	81	76	Movie Theater

a Receptors shown on Figure 4-1 and Figure 4-2
b General description of the area of analysis
c Land Use: SF = single-family; MF = multi-family
d FTA vibration impact criteria
e Predicted vibration level
f Predicted vibration level with mitigation
g Number of individual structures affected
FTA = Federal Transit Administration; St. = Street; VdB = vibration decibels

7.8 Highway and Transit Mitigation

7.8.1 Noise

The Modified LPA includes one location where highway noise impacts and transit noise impacts include recommended mitigation. The Normandy Apartments located in downtown Vancouver, at 316 E 7th Street, includes highway and transit noise impacts and mitigation. Highway noise impacts would be mitigated by a 10- to 12-foot-tall, 540-foot long-noise wall (Noise Wall 12) reducing peak hour traffic noise levels by at least 7 dBA. Since the traffic noise approaches the transit noise of 69 dBA the noise level from both sources could be 1 to 2 dB higher during the peak traffic hour of the day at this location.

A moderate noise impact in transit noise is predicted at the same apartment building and nearby hotel, the Econo Lodge located at 601 Broadway Street. The moderate transit noise impact would be best mitigated with the installation of tall traffic safety barriers or sound barriers along the elevated structure. While the highway noise barrier on its own would provide reduction in noise levels at the apartment complex to reduce noise levels below FHWA and WSDOT NAC and FTA's moderate impact level, both mitigation measures are recommended in the event project design changes occur resulting in changes to impacts or mitigation.

In accordance with FTA guidance, this change in the cumulative noise is noticeable to most people but might not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other project-specific factors must be considered to determine the need for mitigation. These factors include the number of benefited residences, the effectiveness of the mitigation measures, community views, and the cost of mitigating noise to more acceptable levels. A 5 dBA or more reduction in transit noise is reasonable for further consideration as part of the Modified LPA.

As with all recommended mitigation, further consideration of each of these mitigation measures will occur during final design of the Modified LPA.

7.8.2 Vibration

The Modified LPA does not include any areas where multiple mitigation measures are recommended for vibration.

7.8.3 Statement of Likelihood

Based on the findings of this analysis, ODOT and WSDOT will further evaluate traffic noise abatement measures in the form of noise walls during the final design of the Modified LPA. The 11 noise wall locations (10 in Washington and 1 in Oregon) determined to be feasible and reasonable (Noise Walls 1, 2, 3, 4, 5, 6, 7, 8, 11A, 12, and 18) will be reassessed in detail during final design.

The 11 noise walls would mitigate impacts at 76 residences or residential equivalent receiver locations and would benefit an additional 125 residences or residential equivalents. The combined preliminary cost for the 11 recommended noise walls totals approximately $6,823,000. If conditions change substantially during final design of the Modified LPA, the mitigation measure may no longer be feasible and reasonable and, therefore, would not be constructed as part of the Program. A final decision will be made upon the completion of the final design, a cost-estimating process, and the public involvement process, which includes balloting of benefitted receptors.

The IBR Program Team will also continue to evaluate installation of a tall safety barrier or sound barrier along the elevated light-rail transit structure between E 6th Street and E 8th Street in downtown Vancouver to mitigate transit noise impacts at site LRT-1. LRT-1 represents the Normandy Apartments at 316 E 7th Street in downtown Vancouver. A 3- to 4-foot acoustically absorbent wall or 6-foot reflective wall would be effective at reducing transit noise levels at this location by 7 to 10 dBA.

As described in Section 7.8.1, there is one location (the Normandy Apartments at 316 E 7th Street in downtown Vancouver) where the Modified LPA would have highway noise impacts and transit noise impacts. Additional information is presented in Section 7.8.1 to support the recommendation to include both the highway traffic noise barrier (Noise Wall 12) and a sound barrier along the elevated structure (at site LRT-1).

7.9 Proposed Mitigation for Adverse Effects during Construction

7.9.1 Construction Noise

7.9.1.1 Regulatory Requirements

- Comply with ODOT construction noise abatement measures (§ 00290.32 Noise Control) at the time of construction.
- If a specific noise impact complaint occurs during the construction of the Modified LPA, implement noise mitigation measures as directed by the engineer.

Although WSDOT does not have noise control provisions, WSDOT would voluntarily comply with § 00290.32 for work completed in Washington.

7.9.1.2 Program-Specific Mitigation

In addition to § 0029.32, ODOT and WSDOT would also implement additional noise abatement methods, including:

- Limit activities that produce the highest noise levels (such as hauling, loading spoils, jack hammering, and using other demolition equipment) to 7:00 a.m. to 7:00 p.m. Maximum noise levels associated with pile driving could reach 105 dBA at distances of 50 feet. Mitigation of the noise associated with pile driving would, when possible, include drilled shafts or augering rather than driving piles (however, using an auger is not likely to be feasible or practical for all locations) or limiting the times the activity could take place. Other less effective methods of reducing noise from pile driving include coating the piles, using pile pads, or using piston mufflers. In the event that pile driving exceeds the limits set forth in Table 2-10, a noise variance would be requested from the local jurisdiction.
- Keep a construction log for each of the construction staging areas. The log would contain general construction information such as the time an activity took place, type of equipment used, and other information that might help with potential noise effects.
- Establish a complaint hotline to investigate noise complaints and compare them to the construction logs. A construction monitoring and complaint program would help to ensure that all equipment meets state, local, and any manufacturer's specifications for noise emissions. Equipment not meeting the standards would be removed from service until proper repairs were made and the equipment retested for compliance. This procedure would apply to all haul trucks, loaders, excavators, and other equipment that would be used extensively at the construction sites and that would contribute to potential noise effects.
- Use equipment complying with pertinent equipment noise standards of the U.S. Environmental Protection Agency.

7.9.2 Construction Vibration

7.9.2.1 Regulatory Requirements

- Monitor all activities that might produce vibration levels at or above 0.5 inches per second if structures are near the construction activity, in compliance with WSDOT and ODOT requirements. This would include pile driving, vibratory sheet installation, soil compacting, and other construction activities with the potential to cause high levels of vibration.
- For historic built properties within 500 feet of construction, monitor construction activities where construction-related vibration would exceed 0.2 inches per second for transient vibrations and 0.1 inches per second for continuous vibrations.

7.9.2.2 Program-Specific Mitigation

No Program-specific mitigation measures are proposed for vibration levels during construction.

7.10 Noise/Vibration Mitigation Summary

Table 7-5 provides a summary of IBR Program mitigation related to noise and vibration during operation and construction.

Table 7-5. Noise/Vibration Mitigation Summary

IBR Program Area	Noise/Vibration Mitigation during IBR Program Operation	Noise/Vibration Mitigation during IBR Program Construction
Portland Mainland	Highway: Noise Wall 18 Light-Rail: Equip all light-rail track curves with a radius of less than 300 feet with wayside lubricators. After construction of the alignment, during the initial testing, if additional curves are identified with wheel squeal, install wayside track lubricators, as necessary.	Comply with ODOT construction noise abatement measures (§ 00290.32 Noise Control) at the time of construction. If a specific noise impact complaint occurs during the construction of the Modified LPA, implement noise mitigation measures outlined in this section as directed by the engineer. In addition to § 00290.32, ODOT would also implement additional noise abatement methods, including: Limit activities that produce the highest noise levels (such as hauling, loading spoils, jack hammering, and using other demolition equipment) from 7:00 a.m. to 7:00 p.m. Maximum noise levels associated with pile driving could reach 105 dBA at distances of 50 feet. Mitigation of the noise associated with pile driving would, when possible, include drilled shafts or auguring rather than driving piles (however, using an auger is not likely to be feasible or practical for all locations) or limiting the times the activity could take place. Other less effective methods of reducing noise from pile driving include coating the piles, using pile pads, or using piston mufflers. In the event that pile driving exceeds the limits set forth in Table 2-10, a noise variance would be requested from the local jurisdiction. Keep a construction log for each of the construction staging areas. The log would contain general construction information such as the time an activity took place, type of equipment used, and other information that might help with potential

IBR Program Area	Noise/Vibration Mitigation during IBR Program Operation	Noise/Vibration Mitigation during IBR Program Construction
		noise effects. Establish a complaint hotline to investigate noise complaints and compare them to the construction logs. A construction monitoring and complaint program would help to ensure that all equipment meets state, local, and any manufacturer's specifications for noise emissions. Equipment not meeting the standards would be removed from service until proper repairs were made and the equipment retested for compliance. This procedure would apply to all haul trucks, loaders, excavators, and other equipment that would be used extensively at the construction sites and that would contribute to potential noise effects. Use equipment complying with pertinent equipment noise standards of the EPA. Monitor all activities that might produce vibration levels at or above 0.5 inches per second if structures are near the construction activity, in compliance with WSDOT and ODOT requirements. This would include pile driving, vibratory sheet installation, soil compacting, and other construction activities with the potential to cause high levels of vibration. For historic built properties within 500 feet of construction, monitor construction activities where construction-related vibration would exceed 0.2 inches per second for transient vibrations and 0.1 inches per second for continuous vibrations.

IBR Program Area	Noise/Vibration Mitigation during IBR Program Operation	Noise/Vibration Mitigation during IBR Program Construction
Portland/Hayden Island	Highway: None. Light Rail: Equip all light-rail track curves with a radius of less than 300 feet with wayside lubricators. After construction of the alignment, during the initial testing, if additional curves are identified with wheel squeal, install wayside track lubricators, as necessary.	Same as Portland Mainland.
I-5/SR 14 Interchange	Highway: Noise Wall 11A, Noise Wall 12 Light Rail: Install tall traffic safety barriers or sound barriers along the elevated structure to mitigate the noise impacts at site LRT-1, which represents the Normandy Apartments. A 3- to 4-foot acoustical absorbent wall or 6-foot reflective wall would be effective at reducing noise levels at this location by 7 to 10 dBA. Equip all light-rail track curves with a radius of less than 300 feet with wayside lubricators. After construction of the alignment, during the initial testing, if additional curves are identified with wheel squeal, install wayside track lubricators, as necessary. Use resilient rail fasteners to mitigate for vibration impacts located along direct fixation track way. Resilient rail fasteners typically reduce vibration levels by 5 VdB, which would bring all the predicted vibration levels to, or below, the FTA 72 VdB criteria for residential land uses. Receivers LRV-1 and LRV-2, with predicted levels of 77 VdB and 81 VdB, respectively, would be the only locations where there is still a potential for vibration impact. Perform additional testing to ensure that the vibration levels at LRV-1 and	Same as Portland Mainland with the following clarification for WSDOT: Although WSDOT does not have noise control provisions, WSDOT would voluntarily comply with ODOT Standard Specification for Construction, § 00290.32 Noise Control (2015) for work completed in Washington.

IBR Program Area	Noise/Vibration Mitigation during IBR Program Operation	Noise/Vibration Mitigation during IBR Program Construction
	LRV-2 would be below the 72 VdB criteria	
E 8th Street to McLoughlin Boulevard	Highway: None Light Rail: Equip all light-rail track curves with a radius of less than 300 feet with wayside lubricators. After construction of the alignment, during the initial testing, if additional curves are identified with wheel squeal, install wayside track lubricators, as necessary.	Same as I-5/SR 14 Interchange.
McLoughlin Boulevard to E 30th Street	Highway: Noise Wall 6, Noise Wall 7, Noise Wall 8 Light Rail: None.	Same as I-5/SR 14 Interchange.
E 30th Street to E 39th Street	Highway: Noise Wall 2, Noise Wall 3, Noise Wall 4, Noise Wall 5 Light Rail: None.	Same as I-5/SR 14 Interchange.
E 39th Street to Terminus	Highway: Noise Wall 1 Light Rail: None.	Same as I-5/SR 14 Interchange.

Notes:

A final decision will be made upon the completion of the final design, a cost-estimating process, and the public involvement process.

Additional vibration mitigation measures intended to protect marine life are described in the Ecosystems Technical Report.

Additional vibration mitigation measures related to historic built environment resources will be described in the Section 106 Programmatic Agreement (PA). FHWA and FTA consultation with WSDOT, ODOT, the Oregon State Historic Preservation Office, the Washington Department of Archaeology and Historic Preservation, tribes, and other consulting parties on a draft PA is ongoing. The draft PA will be made available to the public prior to publication of the Final SEIS. The executed PA will be attached to the ROD.

8. PERMITS AND APPROVALS

Construction of the Modified LPA would require nighttime construction activities. In order to perform nighttime construction, a noise variance would be required. For work occurring in the City of Portland, the City of Portland Noise Control Office and the City of Portland Noise Control Program Office review applications for construction noise variances. For nighttime construction work around the Ruby Junction Maintenance Facility, coordination with the City of Portland and City of Gresham may be required. The City of Vancouver is the permitting agency for nighttime construction in Vancouver. No other permits directly related to noise and vibration, except construction work performed over water are anticipated. Permitting related to over water work are discussed in the IBR Program Ecosystems Technical Report.

9. INFORMATION TO LOCAL GOVERNMENTS

The IBR Program will make a copy of this report available to the local planning departments. This report will serve to inform local government officials of the effects of the roadway and roadway construction-related noise in the area studied. The information in this report can assist local governments in their planning processes.

It is recommended that local government officials use this information as a guide when developing future land use plans, zoning, or building code requirements. This information may assist local government with future development plans and thereby result in development that is consistent with the noise environment.

Table 9-1 shows the distances to ODOT's NAAC threshold, and Table 9-2 provides the distances to WSDOT's NAC threshold. Local governments should consider whether residential uses (NAAC B/NAC B), public use areas such as schools and parks (NAAC C/NAC C), and commercial uses (NAAC E/ NAC E) are compatible in these areas.

Table 9-1. Distances to ODOT's Noise Abatement Approach Criteria

I-5 Segment	Distance to NAAC B & C Threshold of 65 dBA (feet)	Distance to NAAC E Threshold of 70 dBA (feet)
N Schmeer Road to North Portland Harbor	300 feet	175 feet
Hayden Island	325 feet	190 feet

Key:
dBA = A-weighted decibels
I-5 = Interstate 5
NAAC = Noise Abatement Approach Criteria
ODOT = Oregon Department of Transportation

Table 9-2. Distances to WSDOT's Noise Abatement Criteria

I-5 Segment	Distance to NAC B & C Threshold of 66 dBA (feet)	Distance to NAC E Threshold of 71 dBA (feet)
Columbia River to E Mill Plain Boulevard	250 feet	100 feet
E Mill Plain Boulevard to E Fourth Plain Boulevard	250 feet	100 feet
E Fourth Plain Boulevard to SR 500 / E 39th Street	250 feet	100 feet
SR 500/E 39th Street to Discovery Trail overcrossing	300 feet	100 feet

Key:
dBA = A-weighted decibels
NAC = Noise Abatement Criteria
SR = State Route
WSDOT = Washington State Department of Transportation

10. REFERENCES

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Appendix A

NOISE ANALYSIS & ABATEMENT PROCESS

WSDOT NOISE ANALYSIS & ABATEMENT PROCESS

When are noise reports and/or recommendations final?

The noise abatement process from the preparation of a noise wall to the final noise wall design (or decision not to build) can be confusing. The following process attempts to provide some clarification to project teams and outlines a recommended "standard" process, but acknowledges that variations to this process are likely because of the differences between projects.

Environmental Discipline Reports

The noise analyst works with the project team to model project elements affecting noise that include traffic, topography, and the location of noise-sensitive receivers. If traffic noise impacts are discovered through modeling, then abatement is evaluated.

Abatement is compared to the feasibility (constructability, effectiveness) and reasonableness (allowable barrier size/cost) for a "standard" project. If abatement is feasible and reasonable, the report recommends the optimal (cost to benefit) noise barrier.

The traffic noise discipline report can be finalized.

Design Phase

Design Phase and Public Involvement steps (below) may be incorporated before the report is finalized.

The project office reviews the recommended noise wall height and horizontal alignment to determine if there are any conflicts that were not realized at the time the discipline report was prepared.

If conflicts from utilities, steep slopes, etc. are present, the details and costs of the conflicts are provided to the noise analyst by the project team. The noise analyst will then add any additional ("but for" the noise wall) costs to the reasonableness evaluation.

If noise wall costs including accommodation of conflicts are still less than the allowable costs for the noise wall, the barrier height and/or alignment are re-evaluated and a new barrier will be recommended. If barrier costs plus the new costs exceed the allowable costs, the barrier may not be recommended by the WSDOT Air, Noise, and Energy (ANE) Program.

If a noise wall is recommended, the ANE Program will review and confirm noise wall dimensions throughout the design process.

Public Involvement

If abatement is recommended in the Traffic Noise Discipline Report, public outreach to determine public desires for abatement must occur. The noise wall discussion may be introduced to the public before the Design Phase, but should happen after the noise wall alignment, height, and length (or other abatement description) is established so that people can understand any effects of the noise wall (or other abatement) on their community.

The final determination whether to construct a noise wall or other abatement that is recommend in the traffic noise analysis cannot be made until public outreach has occurred.

Final Steps

Any updates to the Traffic Noise Discipline report to clarify changes that occurred during the Design Phase or from Public Involvement can be made at the project engineering office's discretion. Addendum or supplementary memorandum to clarify changes can also be added to the discipline report or project file.

The noise wall is constructed or a letter from the ANE Program is added to the project file clarifying why a noise wall was not constructed.

ODOT NOISE BARRIER APPROVAL PROCESS

Communication among the project team is key when noise barriers are identified for inclusion in the project. Final decisions about inclusions of noise abatement ae not made at the time of the noise analysis which occurs before the project's NEPA approval. The final decisions are made later in design once design details have been worked out and the public involvement process has been concluded. The process from Noise Technical Report (NTR) to final approval is outlined below. These steps may not happen in the same order for all projects.

1. The NTR includes the assessment of impacts and consideration of abatement for these impacts. At this time, voting has not happened yet, so only feasibility and two of the three parts of reasonableness (cost-effectiveness and the noise reduction design goal) have been assessed.

2. Consideration of abatement at each area with impacted receptors will either reach the conclusion that a barrier is not feasible, not reasonable, or that abatement appears feasible and reasonable (pending the benefitted receptor voting which has not happened yet). Barriers which are feasible, cost-effective, and meet the design goal are identified for further consideration in design.

3. The NTR includes a "statement of likelihood" to document the status of any barriers moving forward for consideration in further stages of project development.

4. When the NTR is finalized, it is placed in ProjectWise, and the Project Leader is notified by email that the report is available. The email also notifies the Project Leader of the requirement to move forward with including the barrier(s) in the project design. The Region Environmental Coordinator (REC), and design consultant team lead are included in this communication as well.

5. The project's NEPA document includes the "statement of likelihood" to document that noise barrier(s) will be given further consideration in project development. This is also tracked in ODOT's Environmental Commitment Tracking System.

6. The project team investigates whether a barrier at the location identified in the NTR is constructible. The project team may need to shift the location around a bit within the Right of Way to avoid impacts to utilities or drainage features. It's possible that constructability factors could render a barrier not feasible (see Section 7.3 of the ODOT Noise Manual). If this happens the project team is to contact the ODOT Noise Program Coordinator.

7. When the project team's designers are satisfied with the wall location, a Noise Barrier Design Technical Memorandum should be prepared. This analysis uses the exact location where the project team has designed the barrier and determines appropriate heights. At this stage, optimized heights (variable along the length of the wall) may be found, whereas, at the NTR state, only a series of fixed heights is usually examined. The analysis mush show that for the heights chosen, the noise barrier is feasible, cost-effective and meets the design goal. It is at this stage that consideration of whether absorptive barriers need to be used should take place, if applicable as described in Appendix L of the ODOT Noise Manual. The technical memorandum should also identify all of the benefitted receptors so that they can be contacted for the voting process.

8. At this point, if there is little risk of further design changes, the consideration of viewpoints of property owners and residents as described in Section 7.4.1 (of the ODOT Noise Manual) should take place. ODOT Noise Specialists work in coordination with the REC and Environmental Project Manager, Project Leader, consultant team and Community Affairs staff to ensure the public involvement effort is a success.

    a. Barriers which have the support of a simple majority of votes in the benefitted receptor voting shall be included in construction of the project.

    b. Barriers which do not have the support of a simple majority of votes as described in Section 7.4.1 of the ODOT Noise Manual, are found not to be reasonable and are eliminated from the project.

Appendix B

RECENT AND PENDING DEVELOPMENT

Information on recent and pending development in the Interstate Bridge Replacement Program area was compiled from stakeholder interviews with City of Portland staff, field reconnaissance, and previous data-gathering exercises.

Recent and pending development on Hayden Island since the publication of the Columbia River Crossing (CRC) Final Environmental Impact Statement is described below. Projects shown as completed since the publication of the CRC Final Environmental Impact Statement are included in this noise study.

- Portland Expo Center – The Expo Center is located west of Interstate 5 (I-5), north of N Expo Road, and south of N Marine Drive. A study is underway (launched in early 2020) to assess the value and opportunities for development at the Portland Expo Center. Potential future scenarios were presented to community open houses for feedback in spring 2021. The scenarios will be refined to five potential options for further review.
- Harbor Sky Lot 1 Development – A five-story, 113-unit apartment building is under construction (as of fall 2021) at 1245 N Anchor Way.
- Harbor Sky – A multifamily building was built in 2017 east of I-5 along the riverfront at 1055 N Anchor Way.
- Marine View – A multifamily building was built in 2016 at 905 N Marine Drive.
- Floor and Décor – A new 80,000-square-foot, single-story flooring retail store was built in 2021, directly east of and adjacent to I-5.
- Jantzen Beach Center Redevelopment – The commercial center, located west of I-5, north of N Jantzen Avenue, and south of N Hayden Island Drive, was recently redeveloped and includes several available spaces for lease.
- Retail – A new commercial retail building was built in 2013 west of and adjacent to I-5 at 12235 N Center Avenue.
- Wood Springs Inn – This proposed development is in the planning phase and will consist of a 123-room hotel along the north property boundary and a 4,000-square-foot retail store and gas station abutting the N Hayden Island Drive right of way.

Recent and ongoing development projects in the Program area, from south to north, include:

- Vancouver Waterfront – Currently in the construction phase, this project's master plan consists of a pier and parks/open space, hotels, 3,300 new residential units, 1.25 million square feet available for office space, and 250,000 square feet for restaurants and retail space. The development is located west of I-5 along the waterfront.
- Terminal 1 – This project is located west of I-5 along the waterfront. It is currently in the construction phase and consists of approximately 10 acres of land to be developed for a hotel, public marketplace and dock, public spaces, mixed-use development (office, residential, and retail space), a public trail, bulkhead wall replacement, and ground improvements. The

master plan provides a schedule of completion in 2027, with the first three blocks completed in 2023.

- Waterfront Gateway – A 6.4-acre site owned by the City of Vancouver, located west of I-5 between the Columbia River waterfront and historic downtown. The properties are situated south of W 6th Street, north of the railroad berm, west of Columbia Street, and east of Grant Street. Future development is anticipated to include office, commercial, retail, and housing space in a multistory mixed-use environment.
- 103 Columbia Street – A commercial building in the construction phase, consisting of 104,000 square feet, located west of I-5 at 103 Columbia Street.
- Kirkland Renaissance Boardwalk Project – This project, started in 2021, is located to the east of I-5 along the waterfront, and consists of four new buildings, including a mix of residential retail, office, and restaurant space.
- Hurley Building Condominium – A commercial office condominium building built in 2018, is located at 275 W 3rd Street.
- 210 W 4th Street – A commercial office space remodel completed in 2021.
- 400 Washington Street Apartments – A 36,000-square-foot apartment building under review; it is located west of I-5.
- 101 E. 6th Street – Commercial office building built in 2015.
- Vancouver Center Condo – Multifamily mixed-use building with apartments and retail built in 2019 at 608 Washington Street.
- Block 10 – A six-story, mixed-use building at 815 Columbia Street is currently under construction and scheduled to be finished in 2022. The development will include 110 multifamily units, 79,000 square feet of office space, and 10,000 square feet of retail space.
- Vancouver Community Library – The new library was completed in 2011 and consists of 80,000 square feet of space.
- The Academy – This project is under construction and would rehabilitate the Providence Academy building (located adjacent to I-5) and redevelop part of the campus by building mixed-use apartment buildings, including 140 apartments, 13,000 square feet of retail, and a 5,000-square-foot public plaza.
- New Seasons Downtown Vancouver – Projected to open in 2023, the New Seasons grocery store will encompass 26,000 square feet at 1506 Main Street north of Mill Plain Boulevard.
- Vancouver Innovation, Technology and Arts Elementary School – A new elementary school to open in fall of 2022 is located east of the I-5 corridor at 1111 Fort Vancouver Way.
- Several multifamily buildings have been built around Mill Plain Boulevard and to the north, primarily to the west of I-5.
- Vancouver Barracks – The federally established Vancouver National Historic Reserve includes many buildings previously used by the U.S. military.
- In 2012, the East and South Barracks were transferred from the U.S. Army to the National Park Service. The National Park Service completed a master plan for the East and South Barracks in 2012 that envisioned a mix of public offices and museum space, with nonprofit and

private-sector offices, businesses, shops, and restaurants. Rehabilitation and infrastructure improvements were conducted on the Vancouver Barracks between 2013 and 2020. In 2018, design and archaeological work was conducted to move the Vancouver Barracks toward the “public-service campus” envisioned in the master plan.

Appendix C

TRAFFIC DATA

Appendix C provides traffic data that includes traffic volumes, speeds, and vehicle mix by roadway for worst-hour Existing 2019, 2045 No Build, and 2040 Build traffic data used in the traffic noise analysis. In Tables C-1 through C-12, traffic data is divided by noise model segment, Oregon, North Washington, and South Washington. Traffic data was updated for the PM peak and AM Peak Truck volumes affecting some roadway segments. Roadway noise links with zero traffic volumes were not included on the tables presented in this appendix.

Traffic data for noise model development was provided by the IBR Traffic Team. With approval from WDOT and ODOT reviewers, the existing vehicle classification counts for the northbound and southbound ramps and a section of the I-5 mainline near Interstate Bridge were used for the vehicle percentage mix used in the transportation noise analysis. The vehicle percentage mix was then used to balance the traffic in the northbound and southbound directions, accounting for increases and decreases in volume by vehicle type due to the on and off ramps. While balancing the vehicle mix for each section of roadway, the total volume of vehicles provided by the traffic team was not modified, only the vehicle mix was adjusted to represent the existing conditions (i.e., counted conditions).

Local roadway volumes were based on total vehicles and vehicle mixes provided by the traffic team. In locations along the project corridor where the I-5 northbound/southbound on and off ramps feed the local roadways, the balanced vehicle mixes were used to balance the traffic volumes for those sections of local roadway. Similar to the I-5 mainline and on/off ramps, the total vehicle volumes provided by the traffic team were held constant, but the vehicle mixes were adjusted to provide a balanced traffic flow.

OREGON – TRAFFIC DATA

Table C-1. Existing Base Year 2019 – PM Peak Traffic – Oregon

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5 / OREGON								
I-5	NB	NB I-5_OffRVictory to OffR Union- Ln1	Off Ramp Victory Blvd to Off Ramp Union Ct	3	1036	Auto	985	55
		NB I-5_OffRVictory to OffR Union- Ln2				Medium Trucks	10	55
		NB I-5_OffRVictory to OffR Union- Ln3				Heavy Trucks	41	55
I-5	NB	NB I-5_Off Victory - OR Vict Blvd-Ln1	Off / On Ramp Victory Blvd	3	986	Auto	965	55
		NB I-5_Off Victory - OR Vict Blvd-Ln2				Medium Trucks	3	55
		NB I-5_Off Victory - OR Vict Blvd -Ln3				Heavy Trucks	18	55
I-5	NB	NB I-5_OR Victory-OR MLK/Marin-Ln1-2	On Ramp Victory Blvd to On Ramp MLK Blvd / Marine Dr	3	1352	Auto	1305	50
		NB I-5_OR Victory-OR MLK/Marin-Ln2-2				Medium Trucks	25	50
		NB I-5_OR Victory-OR MLK/Marin-Ln3-2				Heavy Trucks	22	50
I-5	NB	NB I-5_OR MLK/Mar-OFFR Hayd-Ln1	On Ramp MLK Blvd / Marine Dr to Off Ramp Hayden Island Dr	4	1394	Auto	1305	50
		NB I-5_OR MLK/Mar-OFFR Hayd-Ln2				Medium Trucks	53	50
		NB I-5_OR MLK/Mar-OFFR Hayden_Ln3				Heavy Trucks	36	50
I-5	NB	NB I-5_OFFR Hayden - OR Hayden-Ln1	On/Off Ramps Hayden Island Dr	3	1733	Auto	1632	50
		NB I-5_OFFR Hayden- OR Hayden-Ln2				Medium Trucks	55	50
		NB I-5_OFFR Hayden - OR Hayden-Ln3				Heavy Trucks	46	50

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5	SB	SB I-5 OFFR Hayden - OR Hayden Ln1 SB I-5 OFFR Hayden - OR Hayden Ln2 SB I-5 OFFR Hayden - OR Hayden Ln3	Off / On Ramps Hayden Island Dr	3	1200	Auto	1118	50
						Medium Trucks	29	50
						Heavy Trucks	53	50
I-5	SB	SB I-5 OR Cent/Hayd-OR MLK/Marin Ln1 SB I-5 OR Cent/Hayd-OR MLK/Marin Ln2 SB I-5 OR Cent/Hayd-OR MLK/Marin Ln3 SB I-5 OR Cent/Hayd-OR MLK/Marin Ln 4	On Ramp Hayden Island Dr to MLK Blvd / Marine Dr	4	987	Auto	918	50
						Medium Trucks	29	50
						Heavy Trucks	40	50
I-5	SB	SBI-5_OFFR MLK- OR MLK/Marine-Ln1 SBI-5_OFFR MLK- OR MLK/Marine Ln2 SBI-5_OFFR MLK- OR MLK/Marine Ln3	On/Off Ramps MLK Blvd / Marine Dr	3	945	Auto	901	55
						Medium Trucks	13	55
						Heavy Trucks	31	55
I-5	SB	SBI-5_OnRmp Marine- OFFR Victory-Ln1 SBI-5_OnRmp Marine- OFFR Victory-Ln2 SBI-5_OnRmp Marine- OFFR Victory Ln3	On Ramp Marine Dr to Victory Blvd Off Ramp	3	993	Auto	941	55
						Medium Trucks	16	55
						Heavy Trucks	36	55
I-5	SB	SB I-5_OFFR Victory - OR Victory Ln1 SB I-5_OFFR Victory - OR Victory Ln2 SB I-5_OFFR Victory - OR Victory Ln3	Off / On Ramp Victory Blvd	3	881	Auto	843	55
						Medium Trucks	3	55
						Heavy Trucks	35	55
CROSS STREETS / OREGON								
Victory Blvd	EB	EB Victory Blvd Ln1 EB Victory Blvd Ln2	EB Victory Blvd	2	290	Auto	268	25
						Medium Trucks	21	25
						Heavy Trucks	1	25
	EB	EB Victory Blvd Ln1.1.1 EB Victory Blvd Ln2.2	EB Victory Blvd	2	125	Auto	118	25
						Medium Trucks	7	25
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Victory Blvd	WB	WB Victory Blvd Ln1 WB Victory Blvd Ln2	WB Victory Blvd	2	486	Auto	449	25
						Medium Trucks	27	25
						Heavy Trucks	10	25
	WB	WB Victory Blvd Ln1-2 WB Victory Blvd Ln2 -2	WB Victory Blvd	2	281	Auto	259	25
						Medium Trucks	14	25
						Heavy Trucks	8	25
	WB	WB Victory Blvd Ln1-3 WB Victory Blvd Ln2 -3	WB Victory Blvd	2	220	Auto	207	25
						Medium Trucks	7	25
						Heavy Trucks	6	25
Whitaker Rd	NB	NB Whitaker Rd	NB Whitaker Rd	1	969	Auto	897	25
						Medium Trucks	53	25
						Heavy Trucks	19	25
	SB	SB Whitaker Rd Ln1 SB Whitaker Rd Ln2	SB Whitaker Rd	2	132	Auto	123	25
						Medium Trucks	8	25
						Heavy Trucks	1	25
MLK Blvd	EB	EB MLK Blvd	EB MLK Blvd	1	196	Auto	140	30
						Medium Trucks	39	30
						Heavy Trucks	17	30
	WB	WB MLK Blvd 5 Ln 1 WB MLK Blvd 5 Ln 2	WB MLK Blvd	2	103	Auto	100	40
						Medium Trucks	1	40
						Heavy Trucks	2	40

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
MLK Blvd	EB	EB MLK Blvd 3 Ln 1 EB MLK Blvd 3 Ln 2	EB MLK Blvd	2	377	Auto	313	30
						Medium Trucks	39	30
						Heavy Trucks	25	30
	WB	WB MLK Blvd 1 Ln 1 WB MLK Blvd 1 Ln 2	WB MLK Blvd	2	345	Auto	321	40
						Medium Trucks	17	40
						Heavy Trucks	7	40
Union CT	NB/WB	WB Union CT	Union CT	1	491	Auto	358	35
						Medium Trucks	93	35
						Heavy Trucks	40	35
	SB/EB	SB Union CT	Union CT	1	300	Auto	222	35
						Medium Trucks	55	35
						Heavy Trucks	23	35
Marine Dr	EB	EB Marine Dr Ln 1-East of I-5 EB Marine Dr Ln 2-East of I-5	EB Marine Dr	1	238	Auto	200	35
						Medium Trucks	27	35
						Heavy Trucks	11	35
	WB	WB Marine Dr 1 WB Marine Dr 2	WB Marine D	1	275	Auto	253	35
						Medium Trucks	15	35
						Heavy Trucks	7	35
Marine Dr	EB	EB Marine Dr/MLK Blvd Ln1 EB Marine Dr/MLK Blvd Ln2	EB Marine Dr	2	531	Auto	451	30
						Medium Trucks	56	30
						Heavy Trucks	24	30
	WB	WB Marine Dr/MLK Blvd 1 Ln2 WB Marine Dr/MLK Blvd Ln2	WB Marine Dr	2	121	Auto	107	40
						Medium Trucks	4	40
						Heavy Trucks	10	40

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
Vancouver Way	EB	EB Vancouver Way 1	EB Vancouver Way	1	195	Auto	123	30.00
						Medium Trucks	50	30.00
						Heavy Trucks	22	30.00
	WB	WB Vancouver Way	WB Vancouver Way	1	150	Auto	117	30.00
						Medium Trucks	23	30.00
						Heavy Trucks	10	30.00
Center Ave	NB/WB	NB/WB Center Ave-2	Tomahawk / I-5 Bridge	1	295	Auto	271	25
						Medium Trucks	23	25
						Heavy Trucks	1	25
	SB/EB	SB/EB Center Ave	Tomahawk / I-5 Bridge	1	305	Auto	302	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
Jantzen St	NB/WB	NB/WB Jantzen St 1-1	I-5 Bridge / Tomahawk Island Dr	1	220	Auto	218	25
						Medium Trucks	2	25
						Heavy Trucks	0	0
	SB/EB	SB/EB Jantzen St 2-2	I-5 Bridge / Tomahawk Island Dr	1	174	Auto	166	25
						Medium Trucks	8	25
						Heavy Trucks	0	0
Jantzen Dr	NB	NB Jantzen Dr 1	Jantzen Dr	1	80	Auto	58	25
						Medium Trucks	21	25
						Heavy Trucks	1	25
	SB	SB Jantzen Dr 1	Jantzen Dr	1	55	Auto	40	25
						Medium Trucks	14	25
						Heavy Trucks	1	25

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Tomahawk Island Dr	EB	EB Tomahawk Island Dr 1	Tomahawk Island Dr - East of I-5	1	158	Auto	109	25
						Medium Trucks	45	25
						Heavy Trucks	4	25
	WB	WB Tomahawk Island Dr Ri	Tomahawk Island Dr - East of I-5	2	90	Auto	176	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
Tomahawk Island Dr	EB	EB Tomahawk Island Dr 2	Tomahawk Island Dr - East of I-5	1	175	Auto	173	25
						Medium Trucks	2	25
						Heavy Trucks	0	0
	WB	WB Tomahawk Island Dr Ln1 WB Tomahawk Island Dr Ln 2	Tomahawk Island Dr - East of I-5	2	90	Auto	88	25
						Medium Trucks	2	25
						Heavy Trucks	0	0
Tomahawk Island Dr	NB	NB Tomahawk 2	Tomahawk Island Dr - West of I-5	1	235	Auto	190	25
						Medium Trucks	44	25
						Heavy Trucks	1	25
	SB	SB Tomahawk 2	Tomahawk Island Dr - West of I-5	1	228	Auto	178	25
						Medium Trucks	49	25
						Heavy Trucks	1	25

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
Hayden Island Dr	EB	EB N Hayden Island Dr	EB Hayden Island Dr	1	540	Auto	500	25
						Medium Trucks	35	25
						Heavy Trucks	5	25
	WB	WB N Hayden Island Dr 2	WB Hayden Island Dr	1	495	Auto	394	30
						Medium Trucks	93	30
						Heavy Trucks	8	30
Hayden Island Dr	EB	EB Hayden Island Dr 3	EB Hayden Island Dr	1	166	Auto	152	25
						Medium Trucks	13	25
						Heavy Trucks	1	25
	WB	WB Hayden Island Dr 3	WB Hayden Island Dr	1	275	Auto	239	25
						Medium Trucks	35	25
						Heavy Trucks	1	25
RAMPS / OREGON								
Off-Ramp	NB	NB I-5_Offramp_to Victory Blvd_Ln-2 NB I-5_Offramp_to Victory Blvd_Ln-1	Off-Ramp	2	13	Auto	10	45
						Medium Trucks	2	45
						Heavy Trucks	1	45
On-Ramp	NB	NB Onramp Victory Blvd_Ln1 to NB I-5 NB Onramp Victory Blvd_Ln2 to NB I-5-2	On-Ramp	2	422	Auto	389	25
						Medium Trucks	28	25
						Heavy Trucks	5	25
Off-Ramp	SB	SB I-5_Offramp_to Interstate Ave-2	Off-Ramp	1	165	Auto	145	45
						Medium Trucks	18	45
						Heavy Trucks	2	45

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
On-Ramp	SB	SB Onramp Victory Blvd_Ln2 to SB I-5 SB Onramp Victory Blvd_Ln1 to SB I-5	On-Ramp	2	122	Auto	104	55
						Medium Trucks	14	55
						Heavy Trucks	4	55
Off-Ramp	SB	SB I-5_ORp_Loop to Vict Blvd	Off-Ramp - Loop	1	170	Auto	150	25
						Medium Trucks	19	25
						Heavy Trucks	1	25
Off-Ramp	NB	NB I-5_Offramp_to Union Ct	Off-Ramp	1	150	Auto	60	45
						Medium Trucks	21	45
						Heavy Trucks	69	45
On-Ramp	NB	N Interstate Ave to NB I-5_Onramp	On-Ramp	1	250	Auto	240	45
						Medium Trucks	10	45
						Heavy Trucks	0	0
Off-Ramp	NB	NB I-5_Offramp_to MLK Blvd	Off-Ramp	1	76	Auto	30	45
						Medium Trucks	11	45
						Heavy Trucks	35	45
On-Ramp	NB	NB I-5_OnRamp from MLK Blvd-2/Marine	On-Ramp - Loop	1	1520	Auto	1307	25
						Medium Trucks	137	25
						Heavy Trucks	76	25
Off-Ramp	SB	SB I-5 OffRamp MLK/ Marine	Off-Ramp	1	1115	Auto	970	30
						Medium Trucks	78	30
						Heavy Trucks	67	30

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
On-Ramp	SB	SB I-5 OnRamp from Marine Dr	On-Ramp	1	146	Auto	122	35
						Medium Trucks	9	35
						Heavy Trucks	15	35
Off-Ramp	NB	NB I-5_Offramp to Hayden Island Dr	Off-Ramp	1	375	Auto	326	30
						Medium Trucks	45	30
						Heavy Trucks	4	30
On-Ramp	NB	NB I-5_Onramp from Hayden Island Dr 1	On-Ramp - Loop	1	540	Auto	500	25
						Medium Trucks	35	25
						Heavy Trucks	5	25
Off-Ramp	SB	SB I-5 Offramp to Hayden Island	Off-Ramp	1	614	Auto	565	25
						Medium Trucks	40	25
						Heavy Trucks	9	25
On-Ramp	SB	SB I-5 OR Center Ave/Hayden Merge	On-Ramp	1	351	Auto	319	25
						Medium Trucks	30	25
						Heavy Trucks	2	25

Table C-2. No Build Year 2045 - PM Peak Traffic – Oregon

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5 / OREGON								
I-5	NB	NB I-5_OffRVictory to OffR Union- Ln1	Off Ramp Victory Blvd to Off Ramp Union Ct	3	1432	Auto	1381	55
		NB I-5_OffRVictory to OffR Union- Ln2				Medium Trucks	12	55
		NB I-5_OffRVictory to OffR Union- Ln3				Heavy Trucks	39	55
I-5	NB	NB I-5_Off Victory - OR Vict Blvd-Ln1	Off / On Ramp Victory Blvd	3	1371	Auto	1357	55
		NB I-5_Off Victory - OR Vict Blvd-Ln2				Medium Trucks	3	55
		NB I-5_Off Victory - OR Vict Blvd -Ln3				Heavy Trucks	11	55
I-5	NB	NB I-5_OR Victory-OR MLK/Marin-Ln1-2	On Ramp Victory Blvd to On Ramp MLK Blvd / Marine Dr	3	1824	Auto	1768	50
		NB I-5_OR Victory-OR MLK/Marin-Ln2-2				Medium Trucks	40	50
		NB I-5_OR Victory-OR MLK/Marin-Ln3-2				Heavy Trucks	16	50
I-5	NB	NB I-5_OR MLK/Mar-OFFR Hayd-Ln1	On Ramp MLK Blvd / Marine Dr to Off Ramp Hayden Island Dr	3	1837	Auto	1721	50
		NB I-5_OR MLK/Mar-OFFR Hayd-Ln2				Medium Trucks	81	50
		NB I-5_OR MLK/Mar-OFFR Hayden_Ln3				Heavy Trucks	35	50
I-5	NB	NB I-5_OFFR Hayden - OR Hayden-Ln1	On/Off Ramps Hayden Island Dr	3	2237	Auto	2105	50
		NB I-5_OFFR Hayden- OR Hayden-Ln2				Medium Trucks	85	50
		NB I-5_OFFR Hayden - OR Hayden-Ln3				Heavy Trucks	47	50

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5	SB	SB I-5 OFFR Hayden - OR Hayden Ln1 SB I-5 OFFR Hayden - OR Hayden Ln2 SB I-5 OFFR Hayden - OR Hayden Ln3	Off / On Ramps Hayden Island Dr	3	1634	Auto	1522	50
						Medium Trucks	51	50
						Heavy Trucks	61	50
I-5	SB	SB I-5 OR Cent/Hayd-OR MLK/Marin Ln1 SB I-5 OR Cent/Hayd-OR MLK/Marin Ln2 SB I-5 OR Cent/Hayd-OR MLK/Marin Ln3 SB I-5 OR Cent/Hayd-OR MLK/Marin Ln 4	On Ramp Hayden Island Dr to MLK Blvd / Marine Dr	4	1363	Auto	1268	50
						Medium Trucks	49	50
						Heavy Trucks	46	50
I-5	SB	SBI-5_OFFR MLK- OR MLK/Marine-Ln1 SBI-5_OFFR MLK- OR MLK/Marine Ln2 SBI-5_OFFR MLK- OR MLK/Marine Ln3	On/Off Ramps MLK Blvd / Marine Dr	3	1332	Auto	1273	55
						Medium Trucks	27	55
						Heavy Trucks	32	55
I-5	SB	SBI-5_OnRmp Marine- OFFR Victory-Ln1 SBI-5_OnRmp Marine- OFFR Victory-Ln2 SBI-5_OnRmp Marine- OFFR Victory Ln3	On Ramp Marine Dr to Victory Blvd Off Ramp	3	1382	Auto	1316	55
						Medium Trucks	30	55
						Heavy Trucks	36	55
I-5	SB	SB I-5_OFFR Victory - OR Victory Ln1 SB I-5_OFFR Victory - OR Victory Ln2 SB I-5_OFFR Victory - OR Victory Ln3	Off / On Ramp Victory Blvd	3	1176	Auto	1135	55
						Medium Trucks	9	55
						Heavy Trucks	32	55

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
CROSS STREETS / OREGON								
Victory Blvd	EB	EB Victory Blvd Ln1 EB Victory Blvd Ln2	EB Victory Blvd	2	375	Auto	349	25
						Medium Trucks	25	25
						Heavy Trucks	1	25
	EB	EB Victory Blvd Ln1.1.1 EB Victory Blvd Ln2.2	EB Victory Blvd	2	206	Auto	195	25
						Medium Trucks	11	25
						Heavy Trucks	0	0
	WB	WB Victory Blvd Ln1 WB Victory Blvd Ln2	WB Victory Blvd	2	658	Auto	625	25
						Medium Trucks	26	25
						Heavy Trucks	7	25
	WB	WB Victory Blvd Ln1-2 WB Victory Blvd Ln2 -2	WB Victory Blvd	2	451	Auto	437	25
						Medium Trucks	7	25
						Heavy Trucks	7	25
	WB	WB Victory Blvd Ln1-3 WB Victory Blvd Ln2 -3	WB Victory Blvd	2	390	Auto	381	25
						Medium Trucks	3	25
						Heavy Trucks	6	25

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Whitaker Rd	NB	NB Whitaker Rd	NB Whitaker Rd	1	1315	Auto	1249	25
						Medium Trucks	53	25
						Heavy Trucks	13	25
	SB	SB Whitaker Rd Ln1 SB Whitaker Rd Ln2	SB Whitaker Rd	2	216	Auto	202	25
						Medium Trucks	13	25
						Heavy Trucks	1	25
MLK Blvd	EB	EB MLK Blvd	EB MLK Blvd	1	360	Auto	296	30
						Medium Trucks	41	30
						Heavy Trucks	23	30
	WB	WB MLK Blvd 5 Ln 1 WB MLK Blvd 5 Ln 2	WB MLK Blvd	2	770	Auto	694	40
						Medium Trucks	51	40
						Heavy Trucks	25	40
MLK Blvd	EB	EB MLK Blvd 3 Ln 1 EB MLK Blvd 3 Ln 2	EB MLK Blvd	2	545	Auto	461	30
						Medium Trucks	50	30
						Heavy Trucks	34	30
	WB	WB MLK Blvd 1 Ln 1 WB MLK Blvd 1 Ln 2	WB MLK Blvd	2	490	Auto	456	40
						Medium Trucks	24	40
						Heavy Trucks	10	40

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Union CT	NB/WB	WB Union CT	Union CT	1	491	Auto	358	35
						Medium Trucks	93	35
						Heavy Trucks	40	35
	SB/EB	SB Union CT	Union CT	1	300	Auto	222	35
						Medium Trucks	55	35
						Heavy Trucks	23	35
Marine Dr	EB	EB Marine Dr Ln 1-East of I-5 EB Marine Dr Ln 2-East of I-5	EB Marine Dr	1	360	Auto	246	35
						Medium Trucks	33	35
						Heavy Trucks	14	35
	WB	WB Marine Dr 1 WB Marine Dr 2	WB Marine Dr	2	293	Auto	331	35
						Medium Trucks	20	35
						Heavy Trucks	9	35
Marine Dr	EB	EB Marine Dr/MLK Blvd Ln1 EB Marine Dr/MLK Blvd Ln2	EB Marine Dr	2	693	Auto	589	35
						Medium Trucks	73	35
						Heavy Trucks	31	35
	WB	WB Marine Dr/MLK Blvd 1 Ln2 WB Marine Dr/MLK Blvd Ln2	WB Marine Dr	2	697	Auto	630	35
						Medium Trucks	33	35
						Heavy Trucks	34	35
Vancouver Way	EB	EB Vancouver Way 1	EB Vancouver Way	1	240	Auto	151	30
						Medium Trucks	62	30
						Heavy Trucks	27	30
	WB	WB Vancouver Way	WB Vancouver Way	1	190	Auto	148	30
						Medium Trucks	29	30
						Heavy Trucks	13	30

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Center Ave	NB/WB	NB/WB Center Ave-2	Tomahawk / I-5 Bridge	1	325	Auto	299	25
						Medium Trucks	25	25
						Heavy Trucks	1	25
	SB/EB	SB/EB Center Ave	Tomahawk / I-5 Bridge	1	385	Auto	381	25
						Medium Trucks	4	25
						Heavy Trucks	0	0
Jantzen St	NB/WB	NB/WB Jantzen St 1-1	I-5 Bridge / Tomahawk Island Dr	1	325	Auto	322	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
	SB/EB	SB/EB Jantzen St 2-2	I-5 Bridge / Tomahawk Island Dr	1	300	Auto	285	25
						Medium Trucks	14	25
						Heavy Trucks	1	25
Jantzen Dr	NB	NB Jantzen Dr 1	Jantzen Dr	1	90	Auto	66	25
						Medium Trucks	23	25
						Heavy Trucks	1	25
	SB	SB Jantzen Dr 1	Jantzen Dr	1	75	Auto	55	25
						Medium Trucks	19	25
						Heavy Trucks	1	25

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Tomahawk Island Dr	EB	EB Tomahawk Island Dr 1	Tomahawk Island Dr - East of I-5	1	213	Auto	190	30
						Medium Trucks	23	30
						Heavy Trucks	0	0
	WB	WB Tomahawk Island Dr Ln1	Tomahawk Island Dr - East of I-5	1	260	Auto	255	25
						Medium Trucks	5	25
						Heavy Trucks	0	0
Tomahawk Island Dr	EB	EB Tomahawk Island Dr 2	Tomahawk Island Dr - East of I-5	1	300	Auto	297	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
	WB	WB Tomahawk Island Dr Ln1	Tomahawk Island Dr - East of I-5	1	260	Auto	255	25
						Medium Trucks	5	25
						Heavy Trucks	0	0
Tomahawk Island Dr	NB	NB Tomahawk	Tomahawk Island Dr - West of I-5	1	260	Auto	255	25
						Medium Trucks	5	25
						Heavy Trucks	0	0
	SB	SB Tomahawk	Tomahawk Island Dr - West of I-5	1	300	Auto	297	25
						Medium Trucks	3	25
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Hayden Island Dr	EB	EB N Hayden Island Dr	EB Hayden Island Dr	1	665	Auto	618	25
						Medium Trucks	40	25
						Heavy Trucks	7	25
	WB	WB N Hayden Island Dr 2	WB Hayden Island Dr	1	686	Auto	635	30
						Medium Trucks	51	30
						Heavy Trucks	0	0
Hayden Island Dr	EB	EB Hayden Island Dr 3	EB Hayden Island Dr	1	575	Auto	558	25
						Medium Trucks	17	25
						Heavy Trucks	0	0
	WB	WB Hayden Island Dr 3	WB Hayden Island Dr	1	395	Auto	379	25
						Medium Trucks	15	25
						Heavy Trucks	1	25
RAMPS / OREGON								
Off-Ramp	NB	NB I-5_Offramp_to Victory Blvd_Ln-2 NB I-5_Offramp_to Victory Blvd_Ln-1	Off-Ramp	2	18	Auto	14	45
						Medium Trucks	3	45
						Heavy Trucks	1	45
On-Ramp	NB	NB Onramp Victory Blvd_Ln1 to NB I-5 NB Onramp Victory Blvd_Ln2 to NB I-5-2	On-Ramp	2	426	Auto	383	25
						Medium Trucks	42	25
						Heavy Trucks	1	25
Off-Ramp	SB	SB I-5_Offramp_to Interstate Ave-2	Off-Ramp	1	405	Auto	360	45
						Medium Trucks	37	45
						Heavy Trucks	8	45

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
On-Ramp	SB	SB Onramp Victory Blvd_Ln2 to SB I-5 SB Onramp Victory Blvd_Ln1 to SB I-5	On-Ramp	2	122	Auto	113	55
						Medium Trucks	7	55
						Heavy Trucks	2	55
Off-Ramp	SB	SB I-5_ORp_Loop to Vict Blvd	Off-Ramp - Loop	1	210	Auto	190	25
						Medium Trucks	19	25
						Heavy Trucks	1	25
Off-Ramp	NB	NB I-5_Offramp_to Union Ct	Off-Ramp	1	180	Auto	72	45
						Medium Trucks	25	45
						Heavy Trucks	83	45
On-Ramp	NB	N Interstate Ave to NB I-5_Onramp	On-Ramp	1	505	Auto	468	45
						Medium Trucks	25	45
						Heavy Trucks	12	45
Off-Ramp	NB	NB I-5_Offramp_to MLK Blvd	Off-Ramp	1	90	Auto	36	45
						Medium Trucks	13	45
						Heavy Trucks	41	45
On-Ramp	NB	NB I-5_OnRamp from MLK Blvd-2/Marine	On-Ramp - Loop	1	1880	Auto	1579	25
						Medium Trucks	207	25
						Heavy Trucks	94	25

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Off-Ramp	SB	SB I-5 OffRamp MLK/ Marine	Off-Ramp	1	1454	Auto	1251	30
						Medium Trucks	116	30
						Heavy Trucks	87	30
On-Ramp	SB	SB I-5 OnRamp from Marine Dr	On-Ramp	1	151	Auto	128	35
						Medium Trucks	9	35
						Heavy Trucks	14	35
Off-Ramp	NB	NB I-5_Offramp to Hayden Island Dr	Off-Ramp	1	640	Auto	570	30
						Medium Trucks	70	30
						Heavy Trucks	0	0
On-Ramp	NB	NB I-5_Onramp from Hayden Island Dr 1	On-Ramp - Loop	1	665	Auto	618	25
						Medium Trucks	40	25
						Heavy Trucks	7	25
Off-Ramp	SB	SB I-5 Offramp to Hayden Island	Off-Ramp	1	765	Auto	704	25
						Medium Trucks	46	25
						Heavy Trucks	15	25
On-Ramp	SB	SB I-5 OR Center Ave/Hayden Merge	On-Ramp	1	550	Auto	506	25
						Medium Trucks	44	25
						Heavy Trucks	0	0

Table C-3. Build Year 2045 – AM Peak Truck Traffic – Oregon

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5 / OREGON								
I-5	NB	NB I-5_OfframpVictoryBlvd- Ln1 NB I-5_OfframpVictoryBlvd- Ln2 NB I-5_OfframpVictoryBlvd- Ln3	Off Ramp Victory Blvd to Off Ramp MLK and Pier 99	3	957	Auto	736	60
						Medium Trucks	77	60
						Heavy Trucks	144	60
I-5	NB	NB I-5_OR Vict Blvd - OR MLK Blvd-Ln1 NB I-5_OR Vict Blvd - OR MLK Blvd-Ln2 NB I-5_OR Vict Blvd - OR MLK Blvd-Ln3	Off / On Ramp Victory Blvd	3	618	Auto	556	60
						Medium Trucks	9	60
						Heavy Trucks	53	60
I-5	NB	NB I-5_OR MLK Blvd-Ln1 NB I-5_OR MLK Blvd-Ln2 NB I-5_OR MLK Blvd-Ln3	On Ramp Victory Blvd to On Ramp MLK Blvd	3	862	Auto	756	60
						Medium Trucks	41	60
						Heavy Trucks	65	60
I-5	NB	NB I-5_OR MLK Blvd-Ln1-2 NB I-5_OR MLK Blvd-Ln2-2 NB I-5_OR MLK Blvd-Ln3-2	On Ramp Victory Blvd to On Ramp MLK Blvd	3	862	Auto	756	60
						Medium Trucks	41	60
						Heavy Trucks	65	60
I-5	NB	NB I-5_OR MLK Blvd-Ln1-3 NB I-5_OR MLK Blvd-Ln2-3 NB I-5_OR MLK Blvd-Ln3-3	On Ramp Victory Blvd to On Ramp MLK Blvd	3	862	Auto	756	60
						Medium Trucks	41	60
						Heavy Trucks	65	60
I-5	NB	NB I-5 OnR Cent Ave - Brdg/Colu.Way 1 NB I-5 OnR Cent Ave - Brdg/Colu.Way 2 NB I-5 OnR Cent Ave - Brdg/Colu.Way 3 NB I-5 OnR Cent Ave - Brdg/Colu.Way 4	On Ramp MLK Blvd to On Ramp Jantzen St	4	966	Auto	810	60
						Medium Trucks	69	60
						Heavy Trucks	87	60

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5	SB	SB I-5 Bridge/Col Wy-OR Cent Ave Ln1 SB I-5 Bridge/Col Wy-OR Cent Ave Ln2 SB I-5 Bridge/Col Wy-OR Cent Ave Ln3 SB I-5 Bridge/Col Wy-OR Cent Ave Ln4	Bridge to Oregon to Off Ramp Jantzen St	4	1210	Auto	1089	60
						Medium Trucks	85	60
						Heavy Trucks	36	60
I-5	SB	SB I-5 Bridge/Col Wy-OR Cent Ave Ln1-2 SB I-5 Bridge/Col Wy-OR Cent Ave Ln2-2 SB I-5 Bridge/Col Wy-OR Cent Ave Ln3-2 SB I-5 Bridge/Col Wy-OR Cent Ave Ln4-2	Off Ramp Jantzen St to Off Ramp MLK	4	1093	Auto	984	60
						Medium Trucks	73	60
						Heavy Trucks	36	60
I-5	SB	SB I-5 OR Cent Ave - OR MLK Blvd Ln1 SB I-5 OR Cent Ave - OR MLK Blvd Ln2 SB I-5 OR Cent Ave - OR MLK Blvd Ln3	Off Ramp MLK - Victory	3	895	Auto	839	60
						Medium Trucks	41	60
						Heavy Trucks	15	60
I-5	SB	SBI-5_OnRmp MLK to Victory Off-Ln1 SBI-5_OnRmp MLK to Victory Off-Ln2 SBI-5_OnRmp MLK to Victory Off-Ln3	On Ramp MLK - Victory	3	671	Auto	629	60
						Medium Trucks	31	60
						Heavy Trucks	11	60
I-5	SB	SBI-5_OnRmp MLK to Victory Off-Ln1-2 SBI-5_OnRmp MLK to Victory Off-Ln2-2 SBI-5_OnRmp MLK to Victory Off-Ln3-2	On Ramp MLK - Loop Victory	3	895	Auto	839	60
						Medium Trucks	41	60
						Heavy Trucks	15	60
I-5	SB	SB I-5_Between Victory Ramps Ln1 SB I-5_Between Victory Ramps 2B SB I-5_Between Victory Ramps 3B	Between Victory Ramps	3	575	Auto	561	60
						Medium Trucks	12	60
						Heavy Trucks	2	60

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5	SB	SB I-5_Between Victory Ramps Ln1-2 SB I-5_Between Victory Ramps 2B-2 SB I-5_Between Victory Ramps 3B-2	Between Victory Ramps	3	795	Auto	697	60
						Medium Trucks	61	60
						Heavy Trucks	37	60
CROSS STREETS / OREGON								
Victory Blvd	EB	EB Victory Blvd Ln1	EB Victory Blvd	2	215	Auto	185	25
						Medium Trucks	28	25
						Heavy Trucks	2	25
	EB	EB Victory Blvd Ln2	EB Victory Blvd	2	254	Auto	206	25
						Medium Trucks	34	25
						Heavy Trucks	14	25
	EB	EB Victory Blvd Ln1.1 EB Victory Blvd Ln2.1	EB Victory Blvd	2	234	Auto	195	25
						Medium Trucks	31	25
						Heavy Trucks	8	25
	EB	EB Victory Blvd Ln1.3 EB Victory Blvd Ln2.3	EB Victory Blvd	2	174	Auto	149	25
						Medium Trucks	19	25
						Heavy Trucks	6	25
	WB	WB Victory Blvd Ln2 -3 WB Victory Blvd Ln1-3	WB Victory Blvd	2	138	Auto	124	25
						Medium Trucks	12	25
						Heavy Trucks	2	25
	WB	WB Victory Blvd Ln1-4 WB Victory Blvd Ln2 -4	WB Victory Blvd	2	138	Auto	124	25
						Medium Trucks	12	25
						Heavy Trucks	2	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
	WB	WB Victory Blvd Ln1 2 WB Victory Blvd Ln2 -2	WB Victory Blvd	2	156	Auto	137	25
						Medium Trucks	16	25
						Heavy Trucks	3	25
Whitaker Rd	NB	NB Whitaker Rd	NB Whitaker Rd	1	500	Auto	420	25
						Medium Trucks	70	25
						Heavy Trucks	10	25
	SB	SB Whitaker Rd Ln1 SB Whitaker Rd Ln2	SB Whitaker Rd	2	206	Auto	174	25
						Medium Trucks	24	25
						Heavy Trucks	8	25
Expo Rd	NB	NB Expo Rd Ln2 NB Expo Rd Ln1	NB Expo Rd	2		Auto	88	35
						Medium Trucks	18	35
						Heavy Trucks	1	35
	SB	SB Expo Rd Ln1 SB Expo Rd Ln2	SB Expo Rd	2		Auto	0	35
						Medium Trucks	0	0
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
MLK Blvd	EB	EB MLK Lane 1 EB MLK Lane 2	EB MLK Blvd	2	932	Auto	662	30
						Medium Trucks	177	30
						Heavy Trucks	93	30
	WB	WB MLK Lane 1-2-2-2 WB MLK Lane 2-2-2-2	WB MLK Blvd	2	1013	Auto	635	40
						Medium Trucks	234	40
						Heavy Trucks	144	40
MLK Blvd	EB	EB MLK Lane 1-2 EB MLK Lane 2-2	EB MLK Blvd	2	506	Auto	338	30
						Medium Trucks	126	30
						Heavy Trucks	42	30
MLK Blvd	EB	EB MLK Lane 1-2-2 EB MLK Lane 2-2-2	EB MLK Blvd	2	462	Auto	317	30
						Medium Trucks	117	30
						Heavy Trucks	28	30
	WB	WB MLK Lane 1-2-2 WB MLK Lane 2-2-2	WB MLK Blvd	2	774	Auto	422	40
						Medium Trucks	217	40
						Heavy Trucks	135	40
MLK Blvd	EB	EB MLK Lane 1-2-2-2 EB MLK Lane 2-2-2-2	EB MLK Blvd	2	1025	Auto	790	30
						Medium Trucks	173	30
						Heavy Trucks	62	30
	WB	WB MLK Lane 1-2 WB MLK Lane 2-2	WB MLK Blvd	2	677	Auto	381	40
						Medium Trucks	202	40
						Heavy Trucks	94	40

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
MLK Blvd	EB	EB MLK Lane 1-2-2-2-2 EB MLK Lane 2-2-2-2-2	EB MLK Blvd	2	1117	Auto	831	30
						Medium Trucks	190	30
						Heavy Trucks	96	30
	WB	WB MLK Lane 1 WB MLK Lane 2	WB MLK Blvd	2	890	Auto	543	40
						Medium Trucks	228	40
						Heavy Trucks	119	40
Loop Union CT	NB/WB	WB Union CT 10	Loop Union CT	1	304	Auto	259	35
						Medium Trucks	32	35
						Heavy Trucks	13	35
	NB/WB	Loop to Union CT 4	Loop Union CT	1	153	Auto	130	35
						Medium Trucks	16	35
						Heavy Trucks	7	35
Union CT	NB/WB	WB Union CT	Union CT	1	611	Auto	519	35
						Medium Trucks	65	35
						Heavy Trucks	27	35
	SB/EB	SB Union CT	Union CT	1	144	Auto	123	35
						Medium Trucks	15	35
						Heavy Trucks	6	35
Vancouver Way	EB	EB Vancouver Way 1	EB Vancouver Way	1	275	Auto	135	30
						Medium Trucks	82	30
						Heavy Trucks	58	30

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
	WB	WB Vancouver Way	WB Vancouver Way	1	85	Auto	37	30
						Medium Trucks	28	30
						Heavy Trucks		30
Marine Dr	EB	EB Marine Dr Ln 1-East of I-5 EB Marine Dr Ln 2-East of I-5	EB Marine Dr	2	107	Auto	91	35
						Medium Trucks	9	35
						Heavy Trucks	7	35
	WB	Marine Dr 1 Inside WB Marine Dr 1	WB Marine Dr	2	195	Auto	150	35
						Medium Trucks	26	35
						Heavy Trucks	19	35
Marine Dr	EB	New EB Marine Dr from roundabout-2	EB Marine Dr	1	20	Auto	17	35
						Medium Trucks	2	35
						Heavy Trucks	1	35
	WB	New WB Marine Dr	WB Marine Dr	1	135	Auto	115	35
						Medium Trucks	14	35
						Heavy Trucks	6	35
Marine Dr	EB	New EB Tomahwak to Marine Dr	EB Marine Dr	1	580	Auto	493	30
						Medium Trucks	62	30
						Heavy Trucks	25	30
	WB	New WB Marine Dr to Tomahawk-2	WB Marine Dr	1	616	Auto	523	30
						Medium Trucks	66	30
						Heavy Trucks	27	30

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Pier 99 Expo / Loop	EB	EB Pier 99 Expo to Marine Way-2-2-2	EB Pier 99 Expo / Loop	1	450	Auto	250	30
						Medium Trucks	50	30
						Heavy Trucks	150	30
	WB	WB Pier 99 Expo from Marine Way	WB Pier 99 Expo / Loop	1	580	Auto	493	25
						Medium Trucks	62	25
						Heavy Trucks	25	25
Pier 99 Expo	NB	NB Expo Rd from Pier 99 St	EB Pier 99 Expo	1	20	Auto	17	25
						Medium Trucks	2	25
						Heavy Trucks	1	25
	SB	SB Expo Rd from Pier 99 St	WB Pier 99 Expo	1	30	Auto	26	35
						Medium Trucks	3	35
						Heavy Trucks	1	35
Jantzen St	NB/WB	NB/WB Jantzen - Parker to SB Off	Jantzen St	1	262	Auto	229	25
						Medium Trucks	30	25
						Heavy Trucks	3	25
	NB/WB	NB/WB Jantzen - SB Off to NB ON	Jantzen St	1	494	Auto	438	25
						Medium Trucks	53	25
						Heavy Trucks	3	25
	NB/WB	NB/WB Jantzen - NB On to Tomhawk	Jantzen St	1	334	Auto	300	25
						Medium Trucks	34	25
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
	SB/EB	SB/EB Jantzen - Tomhawk to NB On	Jantzen St	1	252	Auto	228	25
						Medium Trucks	20	25
						Heavy Trucks	4	25
	SB/EB	SB/EB Jantzen - NB On to SB Off	Jantzen St	1	92	Auto	90	25
						Medium Trucks	1	25
						Heavy Trucks	1	25
Jantzen St	SB/EB	SB/EB Jantzen - SB Off to Parker	Jantzen St	1	324	Auto	299	25
						Medium Trucks	24	25
						Heavy Trucks	1	25
Jantzen St	NB	NB Jantzen L2-Tomhawk to Hayden Isla NB Jantzen L1-Tomhawk to Hayden Isla	Jantzen St	2	160	Auto	157	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
	SB	SB Jantzen L1-Hayden Island to Tomha SB Jantzen L2-Hayden Island to Tomha SB Jantzen L3-Hayden Island to Tomha	Jantzen St	3	48	Auto	47	25
						Medium Trucks	1	25
						Heavy Trucks	0	0
Tomahawk Island Dr	EB	EB Tomhack L3 Tomhawk to Jantxen Dr EB Tomhack L2 Tomhawk to Jantxen Dr EB Tomhack L1 Tomhawk to Jantxen Dr	EB Tomahawk Island Dr	1	130	Auto	120	25
						Medium Trucks	10	25
						Heavy Trucks	0	0
	WB	WB Tomhack L3 Tomhawk to Jantxen Dr WB Tomhack L2 Tomhawk to Jantxen Dr	WB Tomahawk Island Dr	1	77	Auto	76	25
						Medium Trucks	1	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
		WB Tomhack L1 Tomhawk to Jantxen Dr				Heavy Trucks	0	0
Tomahawk Island Dr	NB	NB Tomahawk 2	Tomahawk Island Dr - West of I-5	1	230	Auto	228	25
						Medium Trucks	2	25
						Heavy Trucks	0	0
	SB	SB Tomahawk 2	Tomahawk Island Dr - West of I-5	1	390	Auto	359	25
						Medium Trucks	30	25
						Heavy Trucks	1	25
Hayden Island Dr	EB	EB N Hayden Island Dr EB Hayden Island Dr 2	EB Hayden Island Dr	1	85	Auto	78	25
						Medium Trucks	7	25
						Heavy Trucks	0	0
	WB	WB Hayden Island Dr 1 WB N Hayden Island Dr 2	WB Hayden Island Dr	1	475	Auto	413	25
						Medium Trucks	60	25
						Heavy Trucks	2	25
Hayden Island Dr	EB	EB Out Hayden Isand Center to Jan EB In Hayden Isand Center to Jan	EB Hayden Island Dr	2	42	Auto	39	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
	WB	WB Hayden Isand Center to Jantxen In WB Hayden Is Center to Jantxen Out	WB Hayden Island Dr	2	238	Auto	207	25
						Medium Trucks	30	25
						Heavy Trucks	1	25
Center Ave	NB/WB	NB/WB Center Ave-2-2	Center Ave	1	104	Auto	87	25
						Medium Trucks	17	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
						Heavy Trucks	0	0
	SB/EB	SB/EB Center Ave	Center Ave	1	310	Auto	301	25
						Medium Trucks	9	25
						Heavy Trucks	0	25
Center Ave	NB	NB Center Ave Right Ln NB Center Ave Left Ln	Center Ave	2	53	Auto	44	25
						Medium Trucks	9	25
						Heavy Trucks	0	0
	SB	SB Center Ave Right Ln SB Center Ave Left Ln	Center Ave	2	155	Auto	150	25
						Medium Trucks	5	25
						Heavy Trucks	0	25
RAMPS / OREGON								
Off-Ramp	NB	NB I-5_Offramp_to Victory Blvd_Ln-2 NB I-5_Offramp_to Victory Blvd_Ln-1	Off-Ramp	2	64	Auto	51	45
						Medium Trucks	10	45
						Heavy Trucks	3	45
On-Ramp	NB	NB Onramp Victory Blvd_Ln1 to NB I-5 NB Onramp Victory Blvd_Ln2 to NB I-5-2	On-Ramp	2	167	Auto	131	25
						Medium Trucks	32	25
						Heavy Trucks	4	25
On-Ramp	NB	M Interstate Ave to NB I-5_Onram	On-Ramp	1	396	Auto	336	45
						Medium Trucks	32	45
						Heavy Trucks	28	45
Off-Ramp	SB	SB I-5_Offramp_to Denver Ave-2	Off-Ramp	1	745	Auto	650	45
						Medium Trucks	59	45

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
						Heavy Trucks	36	45
On-Ramp	SB	SB Onramp Victory Blvd_Ln2 to SB I-5 SB Onramp Victory Blvd_Ln1 to SB I-5	On-Ramp	2	38	Auto	27	60
						Medium Trucks	9	60
						Heavy Trucks	2	60
Off-Ramp	SB	SB I-5_ORp_Loop to Vict Blvd	Off-Ramp - Loop	1	215	Auto	185	45
						Medium Trucks	28	45
						Heavy Trucks	2	45
On-Ramp	SB	SB from WB MLK Lane1-2 SB from WB MLK Lane2-2	On-Ramp	2	132	Auto	62	60
						Medium Trucks	29	60
						Heavy Trucks	41	60
Off-Ramp	NB	NB I-5_Offramp_toA MLK and Pier 99	Off-Ramp	1	1015	Auto	538	50
						Medium Trucks	203	50
						Heavy Trucks	274	50
Off-Ramp	NB	NB I-5_Offramp_to Pier 99 St	Off-Ramp	1	460	Auto	288	50
						Medium Trucks	102	50
						Heavy Trucks	70	50
Off-Ramp	NB	NB I-5_Offramp_to MLK	Off-Ramp	1	556	Auto	250	50
						Medium Trucks	102	50
						Heavy Trucks	204	50
Off-Ramp	NB	NB I-5_Offramp_to MLK WB L1 NB I-5_Offramp_to MLK WB L2	Off-Ramp	2	185	Auto	83	35
						Medium Trucks	34	35

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
						Heavy Trucks	68	35
Off-Ramp	NB	NB I-5_Offramp_to MLK EB	Off-Ramp	1	185	Auto	83	35
						Medium Trucks	34	35
						Heavy Trucks	68	35
On-Ramp	NB	WB MLK to NB I-5 L3	On-Ramp	1	426	Auto	324	45
						Medium Trucks	51	45
						Heavy Trucks	51	45
On-Ramp	NB	EB MLK to NB I-5 L1 EB MLK to NB I-5 L2	On-Ramp	2	426	Auto	324	45
						Medium Trucks	51	45
						Heavy Trucks	51	45
Off-Ramp	SB	SB Off to MLK Inside SB Off to MLK Out	Off-Ramp	2	846	Auto	710	45
						Medium Trucks	85	45
						Heavy Trucks	51	45
Off-Ramp	SB	SB Off to MLK WB Off	Off-Ramp	1	563	Auto	473	45
						Medium Trucks	56	45
						Heavy Trucks	34	45
On-Ramp	SB	SB I-5 on from N Pier 99 St	On-Ramp	1	395	Auto	284	60
						Medium Trucks	87	60
						Heavy Trucks	24	60
On-Ramp	SB	EB MLK rT to SB I-5 A	On-Ramp	1	88	Auto	42	30
						Medium Trucks	19	30

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
						Heavy Trucks	27	30
On-Ramp	SB	SB from WB MLK Lane1 SB from WB MLK Lane2	On-Ramp	2	88	Auto	42	30
						Medium Trucks	19	30
						Heavy Trucks	27	30
On-Ramp	SB	SB from WB MLK Lane2-2 SB from WB MLK Lane1-2	On-Ramp	2	132	Auto	62	60
						Medium Trucks	29	60
						Heavy Trucks	41	60
On-Ramp	NB	SB from Jantzen to NB I5 L1 SB from Jantzen to NB I5 L2	On-Ramp	2	160	Auto	138	45
						Medium Trucks	19	45
						Heavy Trucks	3	45
Off-Ramp	SB	SB Off to Jantzen	Off-Ramp	1	466	Auto	419	35
						Medium Trucks	47	35
						Heavy Trucks	0	0

Table C-4. Build Year 2045 –PM Peak Traffic – Oregon

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5 / OREGON								
I-5	NB	NB I-5_OfframpVictoryBlvd- Ln1	Off Ramp Victory Blvd to Off Ramp MLK and Pier 99	3	1343	Auto	1211	60
		NB I-5_OfframpVictoryBlvd- Ln2				Medium Trucks	37	60
		NB I-5_OfframpVictoryBlvd- Ln3				Heavy Trucks	95	60
I-5	NB	NB I-5_OR Vict Blvd - OR MLK Blvd-Ln1	Off / On Ramp Victory Blvd	3	1134	Auto	1106	60
		NB I-5_OR Vict Blvd - OR MLK Blvd-Ln2				Medium Trucks	8	60
		NB I-5_OR Vict Blvd - OR MLK Blvd-Ln3				Heavy Trucks	20	60
I-5	NB	NB I-5_OR MLK Blvd-Ln1	On Ramp Victory Blvd to On Ramp MLK Blvd	3	1597	Auto	1542	60
		NB I-5_OR MLK Blvd-Ln2				Medium Trucks	35	60
		NB I-5_OR MLK Blvd-Ln3				Heavy Trucks	20	60
I-5	NB	NB I-5_OR MLK Blvd-Ln1-2	On Ramp Victory Blvd to On Ramp MLK Blvd	3	1597	Auto	1542	60
		NB I-5_OR MLK Blvd-Ln2-2				Medium Trucks	35	60
		NB I-5_OR MLK Blvd-Ln3-2				Heavy Trucks	20	60
I-5	NB	NB I-5_OR MLK Blvd-Ln1-3	On Ramp Victory Blvd to On Ramp MLK Blvd	3	1597	Auto	1542	60
		NB I-5_OR MLK Blvd-Ln2-3				Medium Trucks	35	60
		NB I-5_OR MLK Blvd-Ln3-3				Heavy Trucks	20	60

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5	NB	NB I-5 OnR Cent Ave - Brdg/Colu.Way 1 NB I-5 OnR Cent Ave - Brdg/Colu.Way 2 NB I-5 OnR Cent Ave - Brdg/Colu.Way 3 NB I-5 OnR Cent Ave - Brdg/Colu.Way 4	On Ramp MLK Blvd to On Ramp Jantzen St	4	1677	Auto	1598	60
						Medium Trucks	55	60
						Heavy Trucks	24	60
I-5	SB	SB I-5 Bridge/Col Wy-OR Cent Ave Ln1 SB I-5 Bridge/Col Wy-OR Cent Ave Ln2 SB I-5 Bridge/Col Wy-OR Cent Ave Ln3 SB I-5 Bridge/Col Wy-OR Cent Ave Ln4	Bridge to Oregon to Off Ramp Jantzen St	4	1335	Auto	1242	60
						Medium Trucks	53	60
						Heavy Trucks	40	60
I-5	SB	SB I-5 Bridge/Col Wy-OR Cent Ave Ln1-2 SB I-5 Bridge/Col Wy-OR Cent Ave Ln2-2 SB I-5 Bridge/Col Wy-OR Cent Ave Ln3-2 SB I-5 Bridge/Col Wy-OR Cent Ave Ln4-2	Off Ramp Jantzen St to Off Ramp MLK	4	1146	Auto	1068	60
						Medium Trucks	42	60
						Heavy Trucks	36	60
I-5	SB	SB I-5 OR Cent Ave - OR MLK Blvd Ln1 SB I-5 OR Cent Ave - OR MLK Blvd Ln2 SB I-5 OR Cent Ave - OR MLK Blvd Ln3	Off Ramp MLK - Victory	3	1049	Auto	997	60
						Medium Trucks	23	60
						Heavy Trucks	29	60
I-5	SB	SBI-5_OnRmp MLK to Victory Off-Ln1 SBI-5_OnRmp MLK to Victory Off-Ln2 SBI-5_OnRmp MLK to Victory Off-Ln3	On Ramp MLK - Victory	3	787	Auto	748	60
						Medium Trucks	17	60
						Heavy Trucks	22	60

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5	SB	SBI-5_OnRmp MLK to Victory Off-Ln1-2 SBI-5_OnRmp MLK to Victory Off-Ln2-2 SBI-5_OnRmp MLK to Victory Off-Ln3-2	On Ramp MLK - Loop Victory	3	1049	Auto	997	60
						Medium Trucks	23	60
						Heavy Trucks	29	60
I-5	SB	SB I-5_Between Victory Ramps Ln1 SB I-5_Between Victory Ramps 2B SB I-5_Between Victory Ramps 3B	Between Victory Ramps	3	845	Auto	814	60
						Medium Trucks	4	60
						Heavy Trucks	27	60
I-5	SB	SB I-5_Between Victory Ramps Ln1-2 SB I-5_Between Victory Ramps 2B-2 SB I-5_Between Victory Ramps 3B-2	Between Victory Ramps	3	1037	Auto	986	60
						Medium Trucks	18	60
						Heavy Trucks	33	60
CROSS STREETS / OREGON								
Victory Blvd	EB	EB Victory Blvd Ln1	EB Victory Blvd	1	210	Auto	177	25
						Medium Trucks	31	25
						Heavy Trucks	2	25
	EB	EB Victory Blvd Ln2	EB Victory Blvd	1	484	Auto	442	25
						Medium Trucks	28	25
						Heavy Trucks	14	25
	EB	EB Victory Blvd Ln2.1	EB Victory Blvd	2	347	Auto	309	25
						Medium Trucks	30	25
						Heavy Trucks	8	25
	EB	EB Victory Blvd Ln2.3 EB Victory Blvd Ln1.3	EB Victory Blvd	2	165	Auto	140	25
						Medium Trucks	24	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
						Heavy Trucks	1	25
	EB	EB Victory Blvd Ln1	EB Victory Blvd	1	210	Auto	177	25
						Medium Trucks	31	25
						Heavy Trucks	2	25
	WB	WB Victory Blvd Ln1 2 WB Victory Blvd Ln2 -2	WB Victory Blvd	2	339	Auto	337	25
						Medium Trucks	2	25
						Heavy Trucks	0	0
	WB	WB Victory Blvd Ln1-3 WB Victory Blvd Ln2 -3	WB Victory Blvd	2	271	Auto	271	25
						Medium Trucks	0	0
						Heavy Trucks	0	0
Whitaker Rd	NB	NB Whitaker Rd	NB Whitaker Rd	1	1085	Auto	1052	25
						Medium Trucks	33	25
						Heavy Trucks	0	0
	SB	SB Whitaker Rd Ln1 SB Whitaker Rd Ln2	SB Whitaker Rd	2	183	Auto	155	25
						Medium Trucks	27	25
						Heavy Trucks	1	25
Expo Rd	NB	NB Expo Rd Ln2 NB Expo Rd Ln1	NB Expo Rd	2	257	Auto	242	35
						Medium Trucks	15	35
						Heavy Trucks	0	0
	SB	SB Expo Rd Ln1	SB Expo Rd	2	155	Auto	152	35

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
		SB Expo Rd Ln2				Medium Trucks	3	35
						Heavy Trucks	0	0
MLK Blvd	EB	EB MLK Lane 1 EB MLK Lane 2	EB MLK Blvd	2	735	Auto	625	30
						Medium Trucks	74	30
						Heavy Trucks	36	30
	WB	WB MLK Lane 1-2-2-2 WB MLK Lane 2-2-2-2	WB MLK Blvd	2	318	Auto	252	40
						Medium Trucks	32	40
						Heavy Trucks	34	40
MLK Blvd	EB	EB MLK Lane 1-2 EB MLK Lane 2-2	EB MLK Blvd	2	165	Auto	107	30
						Medium Trucks	35	30
						Heavy Trucks	23	30
MLK Blvd	EB	EB MLK Lane 1-2-2 EB MLK Lane 2-2-2	EB MLK Blvd	2	132	Auto	79	30
						Medium Trucks	33	30
						Heavy Trucks	20	30
	WB	WB MLK Lane 1-2-2 WB MLK Lane 2-2-2	WB MLK Blvd	2	78	Auto	38	40
						Medium Trucks	15	40
						Heavy Trucks	25	40
MLK Blvd	EB	EB MLK Lane 1-2-2-2 EB MLK Lane 2-2-2-2	EB MLK Blvd	2	612	Auto	506	30
						Medium Trucks	67	30
						Heavy Trucks	39	30
	WB	WB MLK Lane 1-2 WB MLK Lane 2-2	WB MLK Blvd	2	78	Auto	63	40
						Medium Trucks	10	40

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
						Heavy Trucks	5	40
MLK Blvd	EB	EB MLK Lane 1-2-2-2-2 EB MLK Lane 2-2-2-2-2	EB MLK Blvd	2	645	Auto	522	30
						Medium Trucks	71	30
						Heavy Trucks	52	30
	WB	WB MLK Lane 1 WB MLK Lane 2	WB MLK Blvd	2	445	Auto	408	40
						Medium Trucks	27	40
						Heavy Trucks	10	40
Loop Union CT	NB/WB	WB Union CT 10	Loop Union CT	1	363	Auto	308	35
						Medium Trucks	17	35
						Heavy Trucks	38	35
	NB/WB	Loop to Union CT 4	Loop Union CT	1	181	Auto	154	35
						Medium Trucks	8	35
						Heavy Trucks	19	35
Union CT	NB/WB	WB Union CT	Union CT	1	724	Auto	616	35
						Medium Trucks	33	35
						Heavy Trucks	75	35
	SB/EB	SB Union CT	Union CT	1	330	Auto	281	35
						Medium Trucks	15	35
						Heavy Trucks	34	35

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Vancouver Way	EB	EB Vancouver Way 1	EB Vancouver Way	1	240	Auto	151	30
						Medium Trucks	44	30
						Heavy Trucks	45	30
	WB	WB Vancouver Way	WB Vancouver Way	1	200	Auto	156	30
						Medium Trucks	22	30
						Heavy Trucks	22	30
Marine Dr	EB	EB Marine Dr Ln 1-East of I-5 EB Marine Dr Ln 2-East of I-5	EB Marine Dr	2	297	Auto	250	35
						Medium Trucks	23	35
						Heavy Trucks	24	35
	WB	Marine Dr 1 Inside WB Marine Dr 1	WB Marine Dr	1	188	Auto	173	35
						Medium Trucks	7	35
						Heavy Trucks	8	35
Marine Dr	EB	New EB Marine Dr from roundabout-2	EB Marine Dr	1	20	Auto	17	35
						Medium Trucks	1	35
						Heavy Trucks	2	35
	WB	New WB Marine Dr	WB Marine Dr	1	195	Auto	166	35
						Medium Trucks	9	35
						Heavy Trucks	20	35
Marine Dr	EB	New EB Tomahwak to Marine Dr	EB Marine Dr	1	391	Auto	332	30
						Medium Trucks	18	30
						Heavy Trucks	41	30

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
	WB	New WB Marine Dr to Tomahawk-2	WB Marine Dr	1	610	Auto	519	30
						Medium Trucks	28	30
						Heavy Trucks	63	30
Pier 99 Expo / Loop	EB	EB Pier 99 Expo to Marine Way-2-2-2	EB Pier 99 Expo / Roundabout	1	393	Auto	218	30
						Medium Trucks	44	30
						Heavy Trucks	131	30
	WB	WB Pier 99 Expo from Marine Way	WB Pier 99 Expo / Roundabout	1	391	Auto	332	25
						Medium Trucks	18	25
						Heavy Trucks	41	25
Pier 99 Expo	NB	NB Expo Rd from Pier 99 St	EB Pier 99 Expo	1	20	Auto	18	25
						Medium Trucks	0	0
						Heavy Trucks	2	25
	SB	SB Expo Rd from Pier 99 St	WB Pier 99 Expo	1	30	Auto	26	35
						Medium Trucks	1	35
						Heavy Trucks	3	35
Jantzen St	NB/WB	NB/WB Jantzen - Parker to SB Off	Jantzen St	1	260	Auto	247	25
						Medium Trucks	12	25
						Heavy Trucks	1	25
	NB/WB	NB/WB Jantzen - SB Off to NB ON	Jantzen St	1	638	Auto	594	25
						Medium Trucks	35	25
						Heavy Trucks	9	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Jantzen St	NB/WB	NB/WB Jantzen - NB On to Tomhawk	Jantzen St	1	279	Auto	279	25
						Medium Trucks	0	0
						Heavy Trucks	0	0
	SB/EB	SB/EB Jantzen - Tomhawk to NB On	Jantzen St	1	359	Auto	356	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
	SB/EB	SB/EB Jantzen - NB On to SB Off	Jantzen St	1	41	Auto	41	25
						Medium Trucks	0	0
						Heavy Trucks	0	0
	SB/EB	SB/EB Jantzen - SB Off to Parker	Jantzen St	1	419	Auto	388	25
						Medium Trucks	23	25
						Heavy Trucks	8	25
Jantzen St	NB	NB Jantzen L2-Tomhawk to Hayden Isla NB Jantzen L1-Tomhawk to Hayden Isla	Jantzen St	2	193	Auto	141	25
						Medium Trucks	50	25
						Heavy Trucks	2	25
	SB	SB Jantzen L1-Hayden Island to Tomha SB Jantzen L2-Hayden Island to Tomha SB Jantzen L3-Hayden Island to Tomha	Jantzen St	3	90	Auto	66	25
						Medium Trucks	23	25
						Heavy Trucks	1	25
Tomahawk Island Dr	EB	EB Tomhack L3 Tomhawk to Jantxen Dr EB Tomhack L2 Tomhawk to Jantxen Dr EB Tomhack L1 Tomhawk to Jantxen Dr	EB Tomahawk Island Dr	1	150	Auto	149	25
						Medium Trucks	1	25
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
	WB	WB Tomhack L3 Tomhawk to Jantxen Dr WB Tomhack L2 Tomhawk to Jantxen Dr WB Tomhack L1 Tomhawk to Jantxen Dr	WB Tomahawk Island Dr	1	118	Auto	116	25
						Medium Trucks	2	25
						Heavy Trucks	0	0
Tomahawk Island Dr	NB	NB Tomahawk 2	Tomahawk Island Dr - West of I-5	1	355	Auto	348	25
						Medium Trucks	7	25
						Heavy Trucks	0	0
	SB	SB Tomahawk 2	Tomahawk Island Dr - West of I-5	1	450	Auto	446	25
						Medium Trucks	4	25
						Heavy Trucks	0	0
Hayden Island Dr	EB	EB N Hayden Island Dr EB Hayden Island Dr 2	EB Hayden Island Dr	1	155	Auto	150	25
						Medium Trucks	5	25
						Heavy Trucks	0	0
	WB	WB Hayden Island Dr 1 WB N Hayden Island Dr 2	WB Hayden Island Dr	1	425	Auto	408	25
						Medium Trucks	16	25
						Heavy Trucks	1	25
Hayden Island Dr	EB	EB Out Hayden Isand Center to Jan EB In Hayden Isand Center to Jan	EB Hayden Island Dr	2	77	Auto	75	25
						Medium Trucks	2	25
						Heavy Trucks	0	0
	WB	WB Hayden Isand Center to Jantxen In WB Hayden Is Center to Jantxen Out	WB Hayden Island Dr	2	212	Auto	204	25
						Medium Trucks	8	25
						Heavy Trucks	0	0
Center	NB/WB	NB/WB Center Ave-2-2	Center Ave	1	65	Auto	60	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Ave						Medium Trucks	5	25
						Heavy Trucks	0	0
	SB/EB	SB/EB Center Ave	Center Ave	1	310	Auto	307	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
Center Ave	NB	NB Center Ave Right Ln NB Center Ave Left Ln	Center Ave	2	33	Auto	30	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
	SB	SB Center Ave Right Ln SB Center Ave Left Ln	Center Ave	2	155	Auto	153	25
						Medium Trucks	2	25
						Heavy Trucks	0	0
RAMPS / OREGON								
Off-Ramp	NB	NB I-5_Offramp_to Victory Blvd_Ln-2 NB I-5_Offramp_to Victory Blvd_Ln-1	Off-Ramp	2	37	Auto	30	45
						Medium Trucks	6	45
						Heavy Trucks	1	45
On-Ramp	NB	NB Onramp Victory Blvd_Ln1 to NB I-5 NB Onramp Victory Blvd_Ln2 to NB I-5-2	On-Ramp	2	430	Auto	396	25
						Medium Trucks	34	25
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
On-Ramp	NB	M Interstate Ave to NB I-5_Onram	On-Ramp	1	551	Auto	534	45
						Medium Trucks	17	45
						Heavy Trucks	0	0
Off-Ramp	SB	SB I-5_Offramp_to Denver Ave-2	Off-Ramp	1	400	Auto	372	45
						Medium Trucks	24	45
						Heavy Trucks	4	45
On-Ramp	SB	SB Onramp Victory Blvd_Ln2 to SB I-5 SB Onramp Victory Blvd_Ln1 to SB I-5	On-Ramp	2	145	Auto	133	60
						Medium Trucks	9	60
						Heavy Trucks	3	60
Off-Ramp	SB	SB I-5_ORp_Loop to Vict Blvd	Off-Ramp - Loop	1	210	Auto	177	45
						Medium Trucks	31	45
						Heavy Trucks	2	45
On-Ramp	SB	SB from WB MLK Lane1-2 SB from WB MLK Lane2-2	On-Ramp	2	288	Auto	259	60
						Medium Trucks	20	60
						Heavy Trucks	9	60
Off-Ramp	NB	NB I-5_Offramp_toA MLK and Pier 99	Off-Ramp	1	630	Auto	315	50
						Medium Trucks	88	50
						Heavy Trucks	227	50
Off-Ramp	NB	NB I-5_Offramp_to Pier 99 St	Off-Ramp	1	435	Auto	222	50
						Medium Trucks	65	50

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
						Heavy Trucks	148	50
Off-Ramp	NB	NB I-5_Offramp_to MLK	Off-Ramp	1	195	Auto	94	50
						Medium Trucks	23	50
						Heavy Trucks	78	50
Off-Ramp	NB	NB I-5_Offramp_to MLK WB L1 NB I-5_Offramp_to MLK WB L2	Off-Ramp	2	65	Auto	31	35
						Medium Trucks	8	35
						Heavy Trucks	26	35
Off-Ramp	NB	NB I-5_Offramp_to MLK EB	Off-Ramp	1	65	Auto	31	35
						Medium Trucks	8	35
						Heavy Trucks	26	35
On-Ramp	NB	WB MLK to NB I-5 L3	On-Ramp	1	735	Auto	690	45
						Medium Trucks	34	45
						Heavy Trucks	11	45
On-Ramp	NB	EB MLK to NB I-5 L1 EB MLK to NB I-5 L2	On-Ramp	2	570	Auto	518	45
						Medium Trucks	39	45
						Heavy Trucks	13	45
Off-Ramp	SB	SB Off to MLK Inside SB Off to MLK Out	Off-Ramp	2	720	Auto	641	45
						Medium Trucks	50	45
						Heavy Trucks	29	45
Off-Ramp	SB	SB Off to MLK WB Off	Off-Ramp	1	480	Auto	427	45
						Medium Trucks	34	45
						Heavy Trucks	19	45

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
On-Ramp	SB	SB I-5 on from N Pier 99 St	On-Ramp	1	380	Auto	350	60
						Medium Trucks	30	60
						Heavy Trucks	0	0
On-Ramp	SB	EB MLK rT to SB I-5 A	On-Ramp	1	65	Auto	56	30
						Medium Trucks	3	30
						Heavy Trucks	6	30
On-Ramp	SB	SB from WB MLK Lane1 SB from WB MLK Lane2	On-Ramp	2	65	Auto	56	30
						Medium Trucks	3	30
						Heavy Trucks	6	30
On-Ramp	SB	SB from WB MLK Lane2-2 SB from WB MLK Lane1-2	On-Ramp	2	288	Auto	259	60
						Medium Trucks	20	60
						Heavy Trucks	9	60
On-Ramp	NB	SB from Jantzen to NB I5 L1 SB from Jantzen to NB I5 L2	On-Ramp	2	341	Auto	315	45
						Medium Trucks	19	45
						Heavy Trucks	7	45
Off-Ramp	SB	SB Off to Jantzen	Off-Ramp	1	755	Auto	695	35
						Medium Trucks	45	35
						Heavy Trucks	15	35

NORTH WASHINGTON – TRAFFIC DATA

Table C-5. Existing Base Year 2019 - PM Peak Traffic - Washington North

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5 / WASHINGTON NORTH								
I-5	NB	NB I-5 4th Plain Blvd - 29th St Ln1-2	4th Plain Blvd to 29th Street	3	2027	Auto	1923	60
		NB I-5 4th Plain Blvd - 29th St Ln 2-2				Medium Trucks	54	60
		NB I-5 4th Plain Blvd - 29th St OP Ln 3-2				Heavy Trucks	50	60
I-5	NB	NB I-5 29th Street - 33rd Street Ln1-2	29th Street to 33rd Street	3	1702	Auto	1617	60
		NB I-5 29th Street - 33rd Street Ln 2-2				Medium Trucks	48	60
		NB I-5 29th Street - 33rd Street Ln 3-2				Heavy Trucks	37	60
I-5	NB	NB I-5 33rd Street - 39th Street Ln 1-3	33rd Street to 39th Street	3	1583	Auto	1524	60
		NB I-5 33rd Street - 39th Street Ln 2-3				Medium Trucks	16	60
		NB I-5 33rd Street - 39th Street Ln 3-3				Heavy Trucks	43	60
I-5	NB	NB I-5 39th Street - Hwy99/Main Ln 1-4	39th Street to Main Street/Hwy 99	3	1772	Auto	1703	60
		NB I-5 39th Street - Hwy99/Main Ln 2-4				Medium Trucks	25	60
		NB I-5 39th Street - Hwy99/Main Ln 3-4				Heavy Trucks	44	60
I-5	NB	NB I-5 39th Street - Hwy99/Main Ln 1-5	39th Street to Main Street/Hwy 99 (Cont.)	3	1772	Auto	1703	60
		NB I-5 39th Street - Hwy99/Main Ln 2-5				Medium Trucks	25	60
		NB I-5 39th Street - Hwy99/Main Ln 3-5				Heavy Trucks	44	60
I-5	SB	SB I-5 Hwy99/Main - 39th St Ln 1	Main Street/Hwy 99 to 39th Street	3	1254	Auto	1200	60
		SB I-5 Hwy99/Main - 39th St Ln 2				Medium Trucks	12	60
		SB I-5 Hwy99/Main - 39th St Ln 3				Heavy Trucks	42	60

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5	SB	SB I-5 Hwy99/Main - 39th St Ln 1-2 SB I-5 Hwy99/Main- 39th St Ln 2-2 SB I-5 Hwy99/Main - 39th St Ln 3-2	Main Street/Hwy 99 to 39th Street (Cont.)	3	1254	Auto	1200	60
						Medium Trucks	12	60
						Heavy Trucks	42	60
I-5	SB	SB I-5 39th Str - 33 St Ln 1-3 SB I-5 39th Str - 33 St Ln 2-3 SB I-5 39th Street - 33 St Ln 3-3	39th Street to 33rd Street	3	1089	Auto	1045	60
						Medium Trucks	2	60
						Heavy Trucks	42	60
I-5	SB	SB I-5 39th Street - 29TH St Ln 1-4 SB I-5 39th Street - 29TH St Ln 2-4 SB I-5 39th Street - 29TH St Ln 3-4	39th Street to 29th Street	3	1547	Auto	1457	60
						Medium Trucks	34	60
						Heavy Trucks	56	60
I-5	SB	SB I-5 29TH St - 4th Plain Blvd Ln 1-5 SB I-5 29TH St - 4th Plain Blvd Ln 2-5 SB I-5 29TH St - 4th Plain Blvd Ln 3-5 SB I-5 29th St - 4th Plain Blvd OP L4	29th Street to 4th Plain Blvd	4	975	Auto	919	60
						Medium Trucks	16	60
						Heavy Trucks	40	60

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
CROSS STREETS / WASHINGTON NORTH								
4th Plain Blvd	EB	EB 4th Plain Blvd Ln1 EB 4th Plain Blvd Ln2	EB 4th Plain Blvd	2	293	Auto	284	25
						Medium Trucks	8	25
						Heavy Trucks	1	25
	EB	EB 4th Plain Blvd Ln1-2 EB 4th Plain Blvd Ln2-2	EB 4th Plain Blvd	2	478	Auto	458	25
						Medium Trucks	18	25
						Heavy Trucks	3	25
	EB	EB 4th Plain Blvd Ln1-3 EB 4th Plain Blvd Ln2-3	EB 4th Plain Blvd	2	296	Auto	283	25
						Medium Trucks	10	25
						Heavy Trucks	3	25
	EB	EB 4th Plain Blvd Ln1-4 EB 4th Plain Blvd Ln2-4	EB 4th Plain Blvd	2	469	Auto	445	25
						Medium Trucks	20	25
						Heavy Trucks	4	25
	WB	WB 4th Plain Blvd Ln 1 WB 4th Plain Blvd Ln 2	WB 4th Plain Blvd	2	471	Auto	447	25
						Medium Trucks	21	25
						Heavy Trucks	3	25
	WB	WB 4th Plain Blvd Ln 1 BRIDGE WB 4th Plain Blvd Ln 2 BRIDGE	WB 4th Plain Blvd	2	461	Auto	434	25
						Medium Trucks	23	25
						Heavy Trucks	4	25

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
4th Plain Blvd	WB	WB 4th Plain Blvd Ln1-3	WB 4th Plain Blvd	1	502	Auto	477	25
						Medium Trucks	25	25
						Heavy Trucks	0	0
39th St	EB	EB 39TH St 1	EB 39th St	1	840	Auto	817	25
						Medium Trucks	16	25
						Heavy Trucks	7	25
	EB	EB 39TH St 2	EB 39th St	1	793	Auto	774	25
						Medium Trucks	16	25
						Heavy Trucks	3	25
	EB	EB 39TH St 3	EB 39th St	1	716	Auto	696	25
						Medium Trucks	16	25
						Heavy Trucks	4	25
	WB	WB 39TH St 1	WB 39th St	1	525	Auto	511	25
						Medium Trucks	10	25
						Heavy Trucks	4	25
	WB	WB 39TH St 2	WB 39th St	1	448	Auto	433	25
						Medium Trucks	10	25
						Heavy Trucks	5	25
	WB	WB 39TH St 3	WB 39th St	1	696	Auto	666	25
						Medium Trucks	25	25
						Heavy Trucks	5	25

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
RAMPS / WASHINGTON NORTH								
Off-Ramp	SB	SB I-5 OR to 4th Plain Blvd ft Ln1 SB I-5 OR to 4th Plain Blvd Rt Ln2	Off-Ramp	2	371	Auto	348	35
						Medium Trucks	19	35
						Heavy Trucks	4	35
On-Ramp	SB	WB 4th Plain Blvd OR Lp to SB I-5	On-Ramp - Loop	1	420	Auto	391	20
						Medium Trucks	21	20
						Heavy Trucks	8	20
On-Ramp	NB	4th Plain Blvd OnRamp to NB I-5-2	On-Ramp	1	730	Auto	701	45
						Medium Trucks	29	45
						Heavy Trucks	0	0
Off-Ramp	NB	NB I-5 OffRamp to 39TH St.	Off-Ramp	1	410	Auto	378	55
						Medium Trucks	28	55
						Heavy Trucks	4	55
Off-Ramp	NB	NB I-5 OS OffRamp to 500_Ln 2 NB I-5 IS OffRamp to 500_Ln 2	Off-Ramp	2	825	Auto	759	55
						Medium Trucks	58	55
						Heavy Trucks	8	55
On-Ramp	NB	NB I-5 OnRamp from 39TH St_1	On-Ramp	1	564	Auto	534	25
						Medium Trucks	28	25
						Heavy Trucks	2	25
Off-Ramp	SB	SB I-5 OffRamp Loop to 39TH St Left L1-2	Off-Ramp-Loop	1	495	Auto	465	35
						Medium Trucks	30	35
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
On-Ramp	SB	SB I-5 OnRamp from 39TH St	On-Ramp	1	295	Auto	276	35
						Medium Trucks	15	35
						Heavy Trucks	4	35
On-Ramp	SB	WB 500 OnRamp OS Ln 1 WB 500 OnRamp IS Ln 1	On-Ramp	2	540	Auto	481	55
						Medium Trucks	41	55
						Heavy Trucks	18	55

Table C-6. No Build Year 2045 - PM Peak Traffic - Washington North

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5 / WASHINGTON NORTH								
I-5	NB	NB I-5 4th Plain Blvd - 29th St Ln1-2 NB I-5 4th Plain Blvd - 29th St Ln 2-2 NB I-5 4th Plain Blvd - 29th St OP Ln 3-2	4th Plain Blvd to 29th Street	3	2333	Auto	2218	60
						Medium Trucks	66	60
						Heavy Trucks	49	60
I-5	NB	NB I-5 29th Street - 33rd Street Ln1-2 NB I-5 29th Street - 33rd Street Ln 2-2 NB I-5 29th Street - 33rd Street Ln 3-2	29th Street to 33rd Street	3	1951	Auto	1856	60
						Medium Trucks	58	60
						Heavy Trucks	37	60
I-5	NB	NB I-5 33rd Street - 39th Street Ln 1-3 NB I-5 33rd Street - 39th Street Ln 2-3 NB I-5 33rd Street - 39th Street Ln 3-3	33rd Street to 39th Street	3	1815	Auto	1752	60
						Medium Trucks	22	60
						Heavy Trucks	41	60
I-5	NB	NB I-5 39th Street - Hwy99/Main Ln 1-4 NB I-5 39th Street - Hwy99/Main Ln 2-4 NB I-5 39th Street - Hwy99/Main Ln 3-4	39th Street to Main Street/Hwy 99	3	2006	Auto	1934	60
						Medium Trucks	31	60
						Heavy Trucks	41	60
I-5	NB	NB I-5 39th Street - Hwy99/Main Ln 1-5 NB I-5 39th Street - Hwy99/Main Ln 2-5 NB I-5 39th Street - Hwy99/Main Ln 3-5	39th Street to Main Street/Hwy 99 (Cont.)	3	2006	Auto	1934	60
						Medium Trucks	31	60
						Heavy Trucks	41	60
I-5	SB	SB I-5 Hwy99/Main - 39th St Ln 1 SB I-5 Hwy99/Main - 39th St Ln 2 SB I-5 Hwy99/Main - 39th St Ln 3	Main Street/Hwy 99 to 39th Street	3	1517	Auto	1411	60
						Medium Trucks	47	60
						Heavy Trucks	59	60
I-5	SB	SB I-5 Hwy99/Main - 39th St Ln 1-2 SB I-5 Hwy99/Main- 39th St Ln 2-2 SB I-5 Hwy99/Main - 39th St Ln 3-2	Main Street/Hwy 99 to 39th Street (Cont.)	3	1517	Auto	1411	60
						Medium Trucks	47	60
						Heavy Trucks	59	60
I-5	SB	SB I-5 39th Str - 33 St Ln 1-3 SB I-5 39th Str - 33 St Ln 2-3 SB I-5 39th Street - 33 St Ln 3-3	39th Street to 33rd Street	3	1345	Auto	1247	60
						Medium Trucks	39	60
						Heavy Trucks	59	60

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
I-5	SB	SB I-5 39th Street - 29TH St Ln 1-4 SB I-5 39th Street - 29TH St Ln 2-4 SB I-5 39th Street - 29TH St Ln 3-4	39th Street to 29th Street	3	1924	Auto	1760	60
						Medium Trucks	93	60
						Heavy Trucks	71	60
I-5	SB	SB I-5 29TH St - 4th Plain Blvd Ln 1-5 SB I-5 29TH St - 4th Plain Blvd Ln 2-5 SB I-5 29TH St - 4th Plain Blvd Ln 3-5 SB I-5 29th St - 4th Plain Blvd OP L4	29th Street to 4th Plain Blvd	4	1246	Auto	1140	60
						Medium Trucks	55	60
						Heavy Trucks	51	60
CROSS STREETS / WASHINGTON NORTH								
4th Plain Blvd	EB	EB 4th Plain Blvd Ln1 EB 4th Plain Blvd Ln2	EB 4th Plain Blvd	2	318	Auto	286	25
						Medium Trucks	29	25
						Heavy Trucks	2	25
	EB	EB 4th Plain Blvd Ln1-2 EB 4th Plain Blvd Ln2-2	EB 4th Plain Blvd	2	515	Auto	466	25
						Medium Trucks	44	25
						Heavy Trucks	5	25
	EB	EB 4th Plain Blvd Ln1-3 EB 4th Plain Blvd Ln2-3	EB 4th Plain Blvd	2	315	Auto	274	25
						Medium Trucks	36	25
						Heavy Trucks	5	25
	EB	EB 4th Plain Blvd Ln1-4 EB 4th Plain Blvd Ln2-4	EB 4th Plain Blvd	2	490	Auto	435	25
						Medium Trucks	47	25
						Heavy Trucks	8	25
	WB	WB 4th Plain Blvd Ln 1 WB 4th Plain Blvd Ln 2	WB 4th Plain Blvd	2	512	Auto	466	25
						Medium Trucks	41	25
						Heavy Trucks	5	25

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
4th Plain Blvd	WB	WB 4th Plain Blvd Ln 1 BRIDGE WB 4th Plain Blvd Ln 2 BRIDGE	WB 4th Plain Blvd	2	512	Auto	466	25
						Medium Trucks	41	25
						Heavy Trucks	5	25
	WB	WB 4th Plain Blvd Ln1-3	WB 4th Plain Blvd	1	487	Auto	435	25
						Medium Trucks	44	25
						Heavy Trucks	8	25
39th St	EB	EB 39TH St 1	EB 39th St	1	950	Auto	922	25
						Medium Trucks	27	25
						Heavy Trucks	1	25
	EB	EB 39TH St 2	EB 39th St	1	1043	Auto	1013	25
						Medium Trucks	30	25
						Heavy Trucks	0	0
	EB	EB 39TH St 3	EB 39th St	1	746	Auto	945	25
						Medium Trucks	32	25
						Heavy Trucks	1	25
	WB	WB 39TH St 1	WB 39th St	1	610	Auto	592	25
						Medium Trucks	17	25
						Heavy Trucks	1	25
	WB	WB 39TH St 2	WB 39th St	1	545	Auto	524	25
						Medium Trucks	19	25
						Heavy Trucks	2	25
	WB	WB 39TH St 3	WB 39th St	1	637	Auto	615	25
						Medium Trucks	22	25
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
RAMPS / WASHINGTON NORTH								
Off-Ramp	SB	SB I-5 OR to 4th Plain Blvd ft Ln1 SB I-5 OR to 4th Plain Blvd Rt Ln2	Off-Ramp	2	395	Auto	360	35
						Medium Trucks	29	35
						Heavy Trucks	6	35
On-Ramp	SB	WB 4th Plain Blvd OR Lp to SB I-5	On-Ramp - Loop	1	555	Auto	500	20
						Medium Trucks	47	20
						Heavy Trucks	8	20
On-Ramp	NB	4th Plain Blvd OnRamp to NB I-5-2	On-Ramp	1	800	Auto	768	45
						Medium Trucks	32	45
						Heavy Trucks	0	0
Off-Ramp	NB	NB I-5 OffRamp to 39TH St.	Off-Ramp	1	445	Auto	410	55
						Medium Trucks	33	55
						Heavy Trucks	2	55
Off-Ramp	NB	NB I-5 OS OffRamp to 500_Ln 2 NB I-5 IS OffRamp to 500_Ln 2	Off-Ramp	2	955	Auto	878	55
						Medium Trucks	66	55
						Heavy Trucks	11	55
On-Ramp	NB	NB I-5 OnRamp from 39TH St_1	On-Ramp	1	575	Auto	546	25
						Medium Trucks	29	25
						Heavy Trucks	0	0
Off-Ramp	SB	SB I-5 OffRamp Loop to 39TH St Left L1-2	Off-Ramp-Loop	1	515	Auto	490	25
						Medium Trucks	25	25
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
On-Ramp	SB	SB I-5 OnRamp from 39TH St	On-Ramp	1	330	Auto	307	55
						Medium Trucks	20	55
						Heavy Trucks	3	55
On-Ramp	SB	WB 500 OnRamp OS Ln 1 WB 500 OnRamp IS Ln 1	On-Ramp	2	706	Auto	617	55
						Medium Trucks	72	55
						Heavy Trucks	17	55

Table C-7. Build Year 2045 - AM Peak Truck Traffic - Washington North

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5 / WASHINGTON NORTH								
I-5	NB	NB I-5 Off SR 500/39th to OR 39th Ln1 NB I-5 Off SR 500/39th to OR 39th Ln2 NB I-5 Off SR 500/39th to OR 39th Ln3 NB I-5 Off SR 500/39th to OR 39th Ln4-1	500/39th Off Ramp to On Ramp 39th	4	635	Auto	538	60
						Medium Trucks	36	60
						Heavy Trucks	61	60
I-5	NB	NB I-5 OR 39th Street to Main St Ln1 NB I-5 OR 39th Street to Main St Ln2 NB I-5 OR 39th Street to Main St Ln3 NB I-5 OR 39th Street to Main St Ln4	500/39th Off Ramp to On Ramp 39th	4	720	Auto	616	60
						Medium Trucks	42	60
						Heavy Trucks	62	60
I-5	NB	NB I-5 OR 39th Street to Main St Ln1-1	39th Street to Main Street/Hwy 99	3	825	Auto	703	60
		NB I-5 OR 39th Street to Main St Ln2-1				Medium Trucks	43	60
		NB I-5 OR 39th Street to Main St Ln3-1				Heavy Trucks	79	60
I-5	SB	SB I-5 Hwy 99 Flyover - 39th St Ln 1	Main Street/Hwy 99 to 39th Street	3	1034	Auto	985	60
		SB I-5 Hwy 99 Flyover - 39th St Ln 2				Medium Trucks	34	60
		SB I-5 Hwy 99 Flyover - 39th St Ln 3				Heavy Trucks	15	60
I-5	SB	SB I-5 Hwy 99 Flyover - 39th St Ln 1-2	Main Street/Hwy 99 to 39th Street (Cont.)	3	1118	Auto	1060	60
		SB I-5 Hwy 99 Flyover - 39th St Ln 2-2				Medium Trucks	42	60
		SB I-5 Hwy 99 Flyover - 39th St Ln 3-2				Heavy Trucks	16	60
I-5	SB	SB I-5 39th/4th Street Off -500 OR Ln 1	Off / On Ramp 39th Street	3	781	Auto	767	60
		SB I-5 39th/4th Street Off -500 OR Ln 2				Medium Trucks	8	60
		SB I-5 39th/4th Street Off -500 OR Ln 3				Heavy Trucks	6	60

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
CROSS STREETS / WASHINGTON NORTH								
4th Plain Blvd / 39th St	EB	WB 4th Plain Blvd OS Ln1 WB 4th Plain Blvd IS Ln1	4th Plain Blvd	2	296	Auto	266	25
						Medium Trucks	25	25
						Heavy Trucks	5	25
	EB	EB 4th Plain Blvd OS Ln2 EB 4th Plain Blvd IS Ln2	4th Plain Blvd	2	414	Auto	336	25
						Medium Trucks	58	25
						Heavy Trucks	20	25
	EB	EB 4th Plain Blvd OS Ln4 EB 4th Plain Blvd IS Ln4	4th Plain Blvd	2	300	Auto	237	25
						Medium Trucks	46	25
						Heavy Trucks	17	25
	EB	EB 4th Plain Blvd OS Ln5 EB 4th Plain Blvd IS Ln5	4th Plain Blvd	2	336	Auto	267	25
						Medium Trucks	50	25
						Heavy Trucks	19	25
	WB	WB 4th Plain Blvd IS Ln4 WB 4th Plain Blvd OS Ln4	4th Plain Blvd	2	518	Auto	461	25
						Medium Trucks	43	25
						Heavy Trucks	14	25
	WB	WB 4th Plain Blvd IS Ln3 WB 4th Plain Blvd OS Ln3	4th Plain Blvd	2	414	Auto	373	25
						Medium Trucks	32	25
						Heavy Trucks	9	25
	WB	WB 4th Plain Blvd OS Ln1 BRIDGE WB 4th Plain Blvd IS Ln1 BRIDGE	4th Plain Blvd	2	538	Auto	479	25
						Medium Trucks	45	25
						Heavy Trucks	14	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
	WB	WB 4th Plain Blvd IS Ln2 WB 4th Plain Blvd OS Ln2	4th Plain Blvd	2	470	Auto	428	25
						Medium Trucks	37	25
						Heavy Trucks	5	25
	WB	WB 4th Plain Blvd Ln 1A	4th Plain Blvd	1	939	Auto	855	25
						Medium Trucks	74	25
						Heavy Trucks	10	25
	EB	EB 39TH St 1	EB 39th St	1	955	Auto	926	25
						Medium Trucks	26	25
						Heavy Trucks	3	25
	EB	EB 39TH St 2	EB 39th St	1	1230	Auto	1167	25
						Medium Trucks	60	25
						Heavy Trucks	3	25
	EB	EB 39TH St 3	EB 39th St	1	1193	Auto	1128	25
						Medium Trucks	63	25
						Heavy Trucks	2	25
	WB	WB 39TH Str, 1	WB 39th St	1	530	Auto	514	25
						Medium Trucks	15	25
						Heavy Trucks	1	25
	WB	WB 39TH Str, 2	WB 39th St	1	494	Auto	475	25
						Medium Trucks	18	25
						Heavy Trucks	1	25
	WB	WB 39TH St 3	WB 39th St	1	379	Auto	365	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
						Medium Trucks	13	25
						Heavy Trucks	1	25
RAMPS / WASHINGTON NORTH								
Off-Ramp	NB	NB I-5 OffRamp to 39TH St.	Off-Ramp	1	265	Auto	233	45
						Medium Trucks	29	45
						Heavy Trucks	3	45
Off-Ramp	NB	NB I-5 OS OffRamp to 500_Ln 2 NB I-5 IS OffRamp to 500_Ln 2	Off-Ramp	2	424	Auto	357	60
						Medium Trucks	52	60
						Heavy Trucks	15	60
On-Ramp	NB	NB I-5 OnRamp from 39TH St_1	On-Ramp	1	340	Auto	313	25
						Medium Trucks	24	25
						Heavy Trucks	3	25
Off-Ramp	SB	SB I-5 OffRamp Loop to 39TH St Ln1-2-2	Off-Ramp-Loop	1	390	Auto	351	25
						Medium Trucks	39	25
						Heavy Trucks	0	0
Off-Ramp	SB	SB I-5 OFF to 4th Plain Blvd SL	Off-Ramp	1	620	Auto	527	55
						Medium Trucks	63	55
						Heavy Trucks	30	55
On-Ramp	SB	SB I-5 OnRamp from 39TH St	On-Ramp	1	230	Auto	220	35
						Medium Trucks	10	35
						Heavy Trucks	0	0
On-Ramp	SB	WB 500 OS Ln 1 before 39th WB 500 IS Ln 1 before 39th	On-Ramp	2	813	Auto	716	55
						Medium Trucks	69	55

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
						Heavy Trucks	28	55

Table C-8. Build Year 2045 - PM Peak Traffic - Washington North

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5 / WASHINGTON NORTH								
I-5	NB	NB I-5 Off SR 500/39th to OR 39th Ln1 NB I-5 Off SR 500/39th to OR 39th Ln2 NB I-5 Off SR 500/39th to OR 39th Ln3 NB I-5 Off SR 500/39th to OR 39th Ln4-1	500/39th Off Ramp to On Ramp 39th	4	1533	Auto	1464	60
						Medium Trucks	45	60
						Heavy Trucks	24	60
I-5	NB	NB I-5 OR 39th Street to Main St Ln1 NB I-5 OR 39th Street to Main St Ln2 NB I-5 OR 39th Street to Main St Ln3 NB I-5 OR 39th Street to Main St Ln4	500/39th Off Ramp to On Ramp 39th	4	1686	Auto	1613	60
						Medium Trucks	49	60
						Heavy Trucks	24	60
I-5	NB	NB I-5 OR 39th Street to Main St Ln1-1 NB I-5 OR 39th Street to Main St Ln2-1 NB I-5 OR 39th Street to Main St Ln3-1	39th Street to Main Street/Hwy 99	3	2249	Auto	2151	60
						Medium Trucks	66	60
						Heavy Trucks	32	60
I-5	SB	SB I-5 Hwy 99 Flyover - 39th St Ln 1 SB I-5 Hwy 99 Flyover - 39th St Ln 2	Main Street/Hwy 99	3	1513	Auto	1439	60
						Medium Trucks	35	60

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
		SB I-5 Hwy 99 Flyover - 39th St Ln 3	to 39th Street			Heavy Trucks	39	60
I-5	SB	SB I-5 Hwy 99 Flyover - 39th St Ln 1-2 SB I-5 Hwy 99 Flyover - 39th St Ln 2-2 SB I-5 Hwy 99 Flyover - 39th St Ln 3-2	Main Street/Hwy 99 to 39th Street (Cont.)	3	1513	Auto	1439	60
						Medium Trucks	35	60
						Heavy Trucks	39	60
I-5	SB	SB I-5 39th/4th Street Off -500 OR Ln 1 SB I-5 39th/4th Street Off -500 OR Ln 2 SB I-5 39th/4th Street Off -500 OR Ln 3	Off / On Ramp 39th Street	3	1067	Auto	1020	60
						Medium Trucks	8	60
						Heavy Trucks	39	60
CROSS STREETS / WASHINGTON NORTH								
4th Plain Blvd	EB	WB 4th Plain Blvd OS Ln1 WB 4th Plain Blvd IS Ln1	4th Plain Blvd	2	440	Auto	396	25
						Medium Trucks	41	25
						Heavy Trucks	3	25
	EB	EB 4th Plain Blvd OS Ln2 EB 4th Plain Blvd IS Ln2	4th Plain Blvd	2	521	Auto	468	25
						Medium Trucks	48	25
						Heavy Trucks	5	25
	EB	EB 4th Plain Blvd OS Ln4 EB 4th Plain Blvd IS Ln4	4th Plain Blvd	2	383	Auto	340	25
						Medium Trucks	40	25
						Heavy Trucks	3	25
	EB	EB 4th Plain Blvd OS Ln5 EB 4th Plain Blvd IS Ln5	4th Plain Blvd	2	653	Auto	595	25
						Medium Trucks	55	25
						Heavy Trucks	3	25
	WB	WB 4th Plain Blvd IS Ln4 WB 4th Plain Blvd OS Ln4	4th Plain Blvd	2	277	Auto	248	25
						Medium Trucks	28	25
						Heavy Trucks	1	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
	WB	WB 4th Plain Blvd IS Ln3 WB 4th Plain Blvd OS Ln3	4th Plain Blvd	2	510	Auto	466	25
						Medium Trucks	40	25
						Heavy Trucks	4	25
	WB	WB 4th Plain Blvd IS Ln2 WB 4th Plain Blvd OS Ln2	4th Plain Blvd	2	512	Auto	466	25
						Medium Trucks	41	25
						Heavy Trucks	5	25
	WB	WB 4th Plain Blvd Ln 1A	4th Plain Blvd	1	1025	Auto	933	25
						Medium Trucks	82	25
						Heavy Trucks	10	25
39th St	EB	EB 39TH St 1	EB 39th St	1	965	Auto	936	25
						Medium Trucks	28	25
						Heavy Trucks	1	25
	EB	EB 39TH St 2	EB 39th St	1	803	Auto	782	25
						Medium Trucks	20	25
						Heavy Trucks	1	25
	EB	EB 39TH St 3	EB 39th St	1	723	Auto	693	25
						Medium Trucks	28	25
						Heavy Trucks	2	25
	WB	WB 39TH Str, 1	WB 39th St	1	595	Auto	577	25
						Medium Trucks	16	25
						Heavy Trucks	2	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
	WB	WB 39TH Str, 2	WB 39th St	1	516	Auto	489	25
						Medium Trucks	24	25
						Heavy Trucks	3	25
	WB	WB 39TH St 3	WB 39th St	1	353	Auto	334	25
						Medium Trucks	16	25
						Heavy Trucks	3	25
RAMPS / WASHINGTON NORTH								
Off-Ramp	NB	NB I-5 OffRamp to 39TH St.	Off-Ramp	1	455	Auto	420	45
						Medium Trucks	33	45
						Heavy Trucks	2	45
Off-Ramp	NB	NB I-5 OS OffRamp to 500_Ln 2 NB I-5 IS OffRamp to 500_Ln 2	Off-Ramp	2	1037	Auto	966	60
						Medium Trucks	59	60
						Heavy Trucks	12	60
On-Ramp	NB	NB I-5 OnRamp from 39TH St_1	On-Ramp	1	615	Auto	597	25
						Medium Trucks	18	25
						Heavy Trucks	0	0
Off-Ramp	SB	SB I-5 OffRamp Loop to 39TH St Ln1-2	Off-Ramp-Loop	1	530	Auto	496	35
						Medium Trucks	34	35
						Heavy Trucks	0	0
Off-Ramp	SB	SB I-5 OFF to 4th Plain Blvd SL	Off-Ramp	1	270	Auto	255	55
						Medium Trucks	15	55
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
On-Ramp	SB	SB I-5 OnRamp from 39TH St	On-Ramp	1	325	Auto	309	35
						Medium Trucks	16	35
						Heavy Trucks	0	0
On-Ramp	SB	WB 500 OS Ln 1 before 39th WB 500 IS Ln 1 before 39th	On-Ramp	2	711	Auto	640	55
						Medium Trucks	62	55
						Heavy Trucks	9	55

SOUTH WASHINGTON – TRAFFIC DATA

Table C-9. Existing Base Year 2019 – PM Peak Traffic - Washington South

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5 / WASHINGTON SOUTH								
I-5	NB	NB I-5 OnRamp Center Ave Ln 1	Hayden Island Dr - Bridge to Washington	3	1914	Auto	1799	50
		NB I-5 OnRamp Center Ave Ln 2				Medium Trucks	67	50
		NB I-5 OnRamp Center Ave Ln 3				Heavy Trucks	48	50
I-5	NB	NB I-5 OR L&CHwy/SR to EG Blv OP Ln1-NB I-5 Brid	Ramp L&C Hwy / SR14 to Evergreen Blvd	3	1522	Auto	1442	50
		NB I-5 OR L&CHwy/SR to EG Blv OP Ln2-NB I-5 Brid				Medium Trucks	36	50
		NB I-5 OR L&CHwy/SR to EG Blv OP Ln3-NB I-5 Brid				Heavy Trucks	44	50
I-5	NB	NB I-5 EG OP - LCHwy & W 6th St Ln1	North of L&C Hwy / SR14 to Evergreen Blvd	3	1440	Auto	1369	50
		NB I-5 EG OP - LCHwy & W 6th St Ln2				Medium Trucks	27	50
		NB I-5 EG OP - LCHwy & W 6th St Ln3				Heavy Trucks	44	50
I-5	NB	NB I-5 EG OP - SR14 & E Mill Plain Ln1	North of L&C Hwy / SR14 to Evergreen Blvd	3	1947	Auto	1825	50
		NB I-5 EG OP - SR14 & E Mill Plain Ln2				Medium Trucks	73	50
		NB I-5 EG OP - SR14 & E Mill Plain Ln3				Heavy Trucks	49	50
I-5	NB	NB I-5 EG OP - McLoughlin Blvd Ln1	Evergreen Blvd to McLoughlin Blvd	3	1525	Auto	1441	60
		NB I-5 EG OP - McLoughlin Blvd Ln2				Medium Trucks	39	60
		NB I-5 EG OP - McLoughlin Blvd Ln3				Heavy Trucks	45	60
I-5	NB	NB I-5 McLoughlin Blvd - 4th Plain Ln1	McLoughlin Blvd to 4th Plain Blvd	3	2027	Auto	1923	60
		NB I-5 McLoughlin Blvd - 4th Plain Ln 2				Medium Trucks	54	60
		NB I-5 McLoughlin Blvd - 4th Plai OP Ln 3				Heavy Trucks	50	60

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5	SB	SB I-5 29TH St - 4th Plain Blvd Ln 1-5 SB I-5 29TH St - 4th Plain Blvd Ln 2-5 SB I-5 29TH St - 4th Plain Blvd Ln 3-5 SB I-5 29th St - 4th Plain Blvd OP L4	29TH St to 4th Plain Blvd	4	975	Auto	919	60
						Medium Trucks	16	60
						Heavy Trucks	40	60
I-5	SB	SB I-5 4th Plain Blvd -McLoughli Ln 1-5-2 SB I-5 4th Plain Blvd -McLoughli Ln 2-5-2 SB I-5 4th Plain Blvd -McLoughlin 3-5-2	McLoughlin Blvd to 4th Plain Blvd	3	1440	Auto	1356	60
						Medium Trucks	28	60
						Heavy Trucks	56	60
I-5	SB	SB I-5 4th Plain Blvd -McLoughlin 3-5-2.1 SB I-5 4th Plain - McLoughli Ln 2-5-2.1 SB I-5 4th Plain - McLoughli Ln 1-5-2.1	McLoughlin Blvd to 4th Plain Blvd	3	1144	Auto	1089	60
						Medium Trucks	8	60
						Heavy Trucks	47	60
I-5	SB	SB I-5 McLoug Blvd - Evergrn OP L1-2 SB I-5 McLoug Blvd - Evergrn OP L2-2 SB I-5 McLoug Blvd - Evergrn OP L3-2	Evergreen Blvd to McLoughlin Blvd	3	1144	Auto	1089	60
						Medium Trucks	8	60
						Heavy Trucks	47	60
I-5	SB	SB I-5 Evergreen OP - L&CHwy/SR14 L1-2 SB I-5 Evergreen OP - L&CHwy/SR14 L2-2 SB I-5 Evergreen OP - L&CHwy/SR14 L3-2	North of L&C Hwy / SR14 to Evergreen Blvd	3	990	Auto	925	50
						Medium Trucks	13	50
						Heavy Trucks	52	50
I-5	SB	SB I-5 OnRamp L&CHwy/SR14 - Bridge1 SB I-5 OnRamp L&CHwy/SR14 - Bridge2	Ramp L&C Hwy to Bridge	2	1405	Auto	1307	50
						Medium Trucks	42	50
						Heavy Trucks	56	50

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
CROSS STREETS / WASHINGTON SOUTH								
Columbia Way	EB/WB	Columbia Way - 24'	Columbia Way	1	85	Auto	84	25
						Medium Trucks	1	25
						Heavy Trucks	0	0
Washington St	EB	Washington St to EB L & C Hwy 1	Washington St	1	460	Auto	451	50
						Medium Trucks	9	50
						Heavy Trucks	0	0
	WB	WB Lewis & Clark Hwy/SR 14 Ln 2-2-WB Lewis & Cla-2 SB I-5 OnRamp L&C Hwy Loop 2	Washington St	1	940	Auto	853	25
						Medium Trucks	75	25
						Heavy Trucks	12	25
Lewis & Clark Hwy/SR14	EB	EB Lewis & Clark Hwy/SR14 Ln_1-2 EB Lewis & Clark Hwy Ln 2	EB Lewis & Clark Hwy/SR14	2	1022	Auto	950	60
						Medium Trucks	63	60
						Heavy Trucks	9	60
	WB	WB Lewis & Clark Hwy/SR 14 Ln 1.1 WB Lewis & Clark Hwy/SR 14 Ln 2-2-WB Lewis & Cla	WB Lewis & Clark Hwy/SR14	2	610	Auto	522	50
						Medium Trucks	87	50
						Heavy Trucks	1	50
Evergreen Blvd	EB	EB Evergreen Blvd	EB Evergreen Blvd	1	185	Auto	176	25
						Medium Trucks	8	25
						Heavy Trucks	1	25
	WB	WB Evergreen Blvd	WB Evergreen Blvd	1	106	Auto	100	25
						Medium Trucks	5	25
						Heavy Trucks	1	25

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 EB Mill Plain Blvd Ln2 EB Mill Plain Blvd Ln3	EB Mill Plain Blvd - West of I-5	3	518	Auto	492	25
						Medium Trucks	21	25
						Heavy Trucks	5	25
	WB	WB Mill Plain Blvd west of Ramps_Ln1 WB Mill Plain Blvd west of Ramps_Ln2 WB Mill Plain Blvd west of Ramps_Ln3	WB Mill Plain Blvd - West of I-5	3	141	Auto	131	25
						Medium Trucks	10	25
						Heavy Trucks	0	0
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 East of Ramps EB Mill Plain Blvd Ln2 East of Ramps	Mill Plain Blvd - East of Ramps	2	900	Auto	859	25
						Medium Trucks	33	25
						Heavy Trucks	8	25
	WB	WB Mill Plain Blvd to NB I-5 WB Mill Plain Blvd Ln 1-1-2 WB Mill Plain Blvd Ln 2.2	Mill Plain Blvd - East of Ramps	3	372	Auto	346	25
						Medium Trucks	24	25
						Heavy Trucks	2	25
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1-1 EB Mill Plain Blvd Ln2-1 EB Mill Plain Blvd Ln3-1	Mill Plain Blvd	3	356	Auto	355	25
						Medium Trucks	1	25
						Heavy Trucks	0	0
	WB	WB Mill Plain Blvd west of Ramps_Ln1 WB Mill Plain Blvd west of Ramps_Ln2 WB Mill Plain Blvd west of Ramps_Ln3	Mill Plain Blvd	3	141	Auto	131	25
						Medium Trucks	10	25
						Heavy Trucks	0	0
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 Between Ramps EB Mill Plain Blvd Ln2 Between Ramps	Mill Plain Blvd	2	758	Auto	733	25
						Medium Trucks	18	25
						Heavy Trucks	7	25

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
	WB	WB Mill Plain Blvd Between Ramp_Ln3 WB Mill Plain Blvd Between Ramp_Ln2 WB Mill Plain Blvd Between Ramp_Ln1	Mill Plain Blvd	3	300	Auto	269	25
						Medium Trucks	29	25
						Heavy Trucks	2	25
Mill Plain Blvd	EB	EB Mill Plain Blvd east of Vancouver Ln2 EB Mill Plain Blvd east of Vancouver Ln1	Mill Plain Blvd	2	345	Auto	342	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
	WB	WB Mill Plain Blvd Ln 2-1 WB Mill Plain Blvd Ln 1-1	Mill Plain Blvd	2	557	Auto	518	25
						Medium Trucks	36	25
						Heavy Trucks	3	25
Fort Vancouver Way	NB	NB Fort Vancouver Way Ln NB Fort Vancouver Way Right Ln	Fort Vancouver Way	2	119	Auto	116	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
	SB	SB Fort Vancouver Way Ln 2	Fort Vancouver Way	1	170	Auto	167	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
McLoughlin Blvd	EB	EB McLoughlin Blvd_1 20'	EB McLoughlin Blvd	1	105	Auto	100	25
						Medium Trucks	5	25
						Heavy Trucks	0	0
	WB	WB McLoughlin Blvd_14'	WB McLoughlin Blvd	1	124	Auto	121	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
4th Plain	EB	WB 4th Plain Blvd Ln1	4th Plain Blvd	1		Auto	284	25

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Blvd		EB 4th Plain Blvd Ln2				Medium Trucks	8	25
						Heavy Trucks	1	25
	WB	WB 4th Plain Blvd	4th Plain Blvd	1		Auto	447	25
						Medium Trucks	21	25
						Heavy Trucks	3	25
4th Plain Blvd	EB	EB 4th Plain Blvd Ln2-2	4th Plain Blvd	2	479	Auto	458	25
						Medium Trucks	18	25
						Heavy Trucks	3	25
	WB	WB 4th Plain Blvd _6	4th Plain Blvd	2	471	Auto	447	25
						Medium Trucks	21	25
						Heavy Trucks	3	25
4th Plain Blvd	EB	EB 4th Plain Blvd Ln2 BRIDGE EB 4th Plain Blvd Ln2-3	4th Plain Blvd	2	296	Auto	283	25
						Medium Trucks	10	25
						Heavy Trucks	3	25
4th Plain Blvd	WB	WB 4th Plain Blvd _6 WB 4th Plain Blvd Ln 2	4th Plain Blvd	2	471	Auto	447	25
						Medium Trucks	21	25
						Heavy Trucks	3	25
4th Plain Blvd	EB	EB 4th Plain Blvd Ln2-4 WB 4th Plain Blvd Ln1-4	4th Plain Blvd	2	469	Auto	445	25
						Medium Trucks	20	25
						Heavy Trucks	4	25
4th Plain Blvd	WB	WB 4th Plain Blvd Ln 1.1.1.1.1 WB 4th Plain Blvd Ln 2	4th Plain Blvd	2	471	Auto	447	25
						Medium Trucks	21	25

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
						Heavy Trucks	3	25
RAMPS / WASHINGTON SOUTH								
Off-Ramp	NB	NB I-5 OnRamp L&C Hwy/SR 14	Off-Ramp	1	1175	Auto	1069	50
						Medium Trucks	94	50
						Heavy Trucks	12	50
Off-Ramp	NB	WB L&CHwy/SR14 OffRamp to 6TH St 2	Off-Ramp	1	263	Auto	255	25
						Medium Trucks	8	25
						Heavy Trucks	0	0
Off-Ramp	NB	WB L&C Hwy/SR14 OffRamp to NB I-5	Off-Ramp	1	1520	Auto	1368	50
						Medium Trucks	137	50
						Heavy Trucks	15	50
Off-Ramp	NB	NB I-5 OffRamp to 6TH St	Off-Ramp	1	246	Auto	221	25
						Medium Trucks	25	25
						Heavy Trucks	0	0
Off-Ramp	SB	SB I-5_OffRamp to Lewis&Clark/SR14	Off-Ramp	1	1430	Auto	1316	40
						Medium Trucks	100	40
						Heavy Trucks	14	40
On-Ramp	SB	SB I-5 OnRamp L&C Hwy Loop 1-2	On-Ramp - Loop	1	1244	Auto	1145	25
						Medium Trucks	87	25
						Heavy Trucks	12	25
Off-Ramp	NB	NB I-5 OffRamp to Mill Plain Blvd-2	Off-Ramp	1	633	Auto	576	45
						Medium Trucks	51	45

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
						Heavy Trucks	6	45
On-Ramp	NB	NB I-5_OR from Mill Plain Blvd L2-2 NB I-5_OnRamp from Mill Plain Blvd Ln1-2 WB Mill Plain Blvd to NB I-5_3-2	On-Ramp	3	502	Auto	482	35
						Medium Trucks	15	35
						Heavy Trucks	5	35
Off-Ramp	NB	NB I-5 OffRamp to 4th Plain Blvd Ln1.1-2 NB I-5 OffRamp to 4th Plain Blvd Ln2	Off-Ramp	2	347	Auto	325	55
						Medium Trucks	19	55
						Heavy Trucks	3	55
Off-Ramp	SB	SB I-5 OffRamp to 15TH St-2 SB I-5 OffRamp to 15TH St Ln2-2	Off-Ramp	2	445	Auto	401	35
						Medium Trucks	31	35
						Heavy Trucks	13	35
On-Ramp	SB	SB Mill Plain Blvd OR to SB I-5 Ln2	On-Ramp	1	970	Auto	825	50
						Medium Trucks	116	50
						Heavy Trucks	29	50
Off-Ramp	NB	NB I-5 OffRamp to 4th Plain Blvd_2	Off-Ramp	1	695	Auto	650	55
						Medium Trucks	38	55
						Heavy Trucks	7	55
On-Ramp	NB	4th Plain Blvd OnRamp to NB I-5-2	On-Ramp	1	730	Auto	701	45
						Medium Trucks	29	45
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	EXISTING BASE YEAR 2019 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Off-Ramp	SB	SB I-5 OR to 4th Plain Blvd ft Ln1 SB I-5 OR to 4th Plain Blvd Rt Ln2	Off-Ramp	2	371	Auto	348	35
						Medium Trucks	19	35
						Heavy Trucks	4	35
On-Ramp	SB	WB 4th Plain Blvd OR Lp to SB I-5-2	On-Ramp	1	420	Auto	391	45
						Medium Trucks	21	45
						Heavy Trucks	8	45

Table C-10. No Build Year 2045 - PM Peak Traffic - Washington South

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5 / WASHINGTON SOUTH								
I-5	NB	NB I-5 OnRamp Center Ave Ln 1 NB I-5 OnRamp Center Ave Ln 2 NB I-5 OnRamp Center Ave Ln 3	Hayden Island Dr - Bridge to Washington	3	2458	Auto	2311	50
						Medium Trucks	98	50
						Heavy Trucks	49	50
I-5	NB	NB I-5 OR L&CHwy/SR to EG Blv OP Ln1-NB I-5 Brid NB I-5 OR L&CHwy/SR to EG Blv OP Ln2-NB I-5 Brid NB I-5 OR L&CHwy/SR to EG Blv OP Ln3-NB I-5 Brid	Ramp L&C Hwy / SR14 to Evergreen Blvd	3	1969	Auto	1866	50
						Medium Trucks	59	50
						Heavy Trucks	44	50
I-5	NB	NB I-5 EG OP - LCHwy & W 6th St Ln1 NB I-5 EG OP - LCHwy & W 6th St Ln2 NB I-5 EG OP - LCHwy & W 6th St Ln3	North of L&C Hwy / SR14 to Evergreen Blvd	3	1843	Auto	1752	50
						Medium Trucks	47	50
						Heavy Trucks	44	50
I-5	NB	NB I-5 EG OP - SR14 & E Mill Plain Ln1 NB I-5 EG OP - SR14 & E Mill Plain Ln2 NB I-5 EG OP - SR14 & E Mill Plain Ln3	North of L&C Hwy / SR14 to Evergreen Blvd	3	2351	Auto	2210	50
						Medium Trucks	92	50
						Heavy Trucks	49	50
I-5	NB	NB I-5 EG OP - McLoughlin Blvd Ln1 NB I-5 EG OP - McLoughlin Blvd Ln2 NB I-5 EG OP - McLoughlin Blvd Ln3	Evergreen Blvd to McLoughlin Blvd	3	1836	Auto	1741	60
						Medium Trucks	51	60
						Heavy Trucks	44	60
I-5	NB	NB I-5 McLoughlin Blvd - 4th Plain Ln1 NB I-5 McLoughlin Blvd - 4th Plain Ln 2 NB I-5 McLoughlin Blvd - 4th Plai OP Ln 3	McLoughlin Blvd to 4th Plain Blvd	3	2333	Auto	2218	60
						Medium Trucks	66	60
						Heavy Trucks	49	60

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5	SB	SB I-5 29TH St - 4th Plain Blvd Ln 1-5 SB I-5 29TH St - 4th Plain Blvd Ln 2-5 SB I-5 29TH St - 4th Plain Blvd Ln 3-5 SB I-5 29th St - 4th Plain Blvd OP L4	29TH St to 4th Plain Blvd	4	1246	Auto	1140	60
						Medium Trucks	55	60
						Heavy Trucks	51	60
I-5	SB	SB I-5 4th Plain Blvd -McLoughli Ln 1-5-2 SB I-5 4th Plain Blvd -McLoughli Ln 2-5-2 SB I-5 4th Plain Blvd -McLoughlin 3-5-2	McLoughlin Blvd to 4th Plain Blvd	3	1846	Auto	1687	60
						Medium Trucks	89	60
						Heavy Trucks	70	60
I-5	SB	SB I-5 4th Plain Blvd -McLoughlin 3-5-2.1 SB I-5 4th Plain - McLoughli Ln 2-5-2.1 SB I-5 4th Plain - McLoughli Ln 1-5-2.1	McLoughlin Blvd to 4th Plain Blvd	3	1485	Auto	1357	60
						Medium Trucks	60	60
						Heavy Trucks	68	60
I-5	SB	SB I-5 McLoug Blvd - Evergrn OP L1-2 SB I-5 McLoug Blvd - Evergrn OP L2-2 SB I-5 McLoug Blvd - Evergrn OP L3-2	Evergreen Blvd to McLoughlin Blvd	3	1485	Auto	1357	60
						Medium Trucks	60	60
						Heavy Trucks	68	60
I-5	SB	SB I-5 Evergreen OP - L&CHwy/SR14 L1-2 SB I-5 Evergreen OP - L&CHwy/SR14 L2-2 SB I-5 Evergreen OP - L&CHwy/SR14 L3-2	North of L&C Hwy / SR14 to Evergreen Blvd	3	1379	Auto	1278	50
						Medium Trucks	38	50
						Heavy Trucks	63	50
I-5	SB	SB I-5 OnRamp L&CHwy/SR14 - Bridge1 SB I-5 OnRamp L&CHwy/SR14 - Bridge2	Ramp L&C Hwy to Bridge	2	1888	Auto	1756	50
						Medium Trucks	66	50
						Heavy Trucks	66	50

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
CROSS STREETS / WASHINGTON SOUTH								
Columbia Way	EB/WB	Columbia Way - 24'	Columbia Way	1	255	Auto	252	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
Washington St	EB	Washington St to EB L & C Hwy 1 EB Lewis & Clark Hwy/SR14 Ln_1	Washington St	1	670	Auto	657	50
						Medium Trucks	13	50
						Heavy Trucks	0	50
	WB	WB Lewis & Clark Hwy/SR 14 Ln 2-3 SB I-5 OnRamp L&C Hwy Loop 2	Washington St	1	760	Auto	737	25
						Medium Trucks	23	25
						Heavy Trucks	0	0
Lewis & Clark Hwy/SR14	EB	EB Lewis & Clark Hwy/SR14 Ln_1-2 EB Lewis & Clark Hwy Ln 2	EB Lewis & Clark Hwy/SR14	2	1212	Auto	1127	60
						Medium Trucks	75	60
						Heavy Trucks	10	60
	WB	WB Lewis & Clark Hwy/SR 14 Ln 1.1 WB Lewis & Clark Hwy/SR 14 Ln 2-2	WB Lewis & Clark Hwy/SR14	2	668	Auto	572	50
						Medium Trucks	94	50
						Heavy Trucks	2	50
Evergreen Blvd	EB	EB Evergreen Blvd	EB Evergreen Blvd	1	220	Auto	209	25
						Medium Trucks	10	25
						Heavy Trucks	1	25
	WB	WB Evergreen Blvd	WB Evergreen Blvd	1	165	Auto	157	25
						Medium Trucks	7	25
						Heavy Trucks	1	25

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 EB Mill Plain Blvd Ln2 EB Mill Plain Blvd Ln3	EB Mill Plain Blvd - West of I-5	3	587	Auto	481	25
						Medium Trucks	97	25
						Heavy Trucks	9	25
	WB	WB Mill Plain Blvd west of Ramps_Ln1 WB Mill Plain Blvd west of Ramps_Ln2 WB Mill Plain Blvd west of Ramps_Ln3	WB Mill Plain Blvd - West of I-5	3	264	Auto	228	25
						Medium Trucks	36	25
						Heavy Trucks	0	0
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 East of Ramps EB Mill Plain Blvd Ln2 East of Ramps	Mill Plain Blvd - East of Ramps	2	819	Auto	656	25
						Medium Trucks	154	25
						Heavy Trucks	9	25
	WB	WB Mill Plain Blvd Ln 1-1-2 WB Mill Plain Blvd Ln 2.2	Mill Plain Blvd - East of Ramps	2	479	Auto	416	25
						Medium Trucks	59	25
						Heavy Trucks	4	25
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1-1 EB Mill Plain Blvd Ln2-1 EB Mill Plain Blvd Ln3-1	Mill Plain Blvd	3	587	Auto	481	25
						Medium Trucks	97	25
						Heavy Trucks	9	25
	WB	WB Mill Plain Blvd west of Ramps_Ln1 WB Mill Plain Blvd west of Ramps_Ln2 WB Mill Plain Blvd west of Ramps_Ln3	Mill Plain Blvd	3	445	Auto	393	25
						Medium Trucks	51	25
						Heavy Trucks	1	25

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 Between Ramps EB Mill Plain Blvd Ln2 Between Ramps	Mill Plain Blvd	2	608	Auto	465	25
						Medium Trucks	135	25
						Heavy Trucks	8	25
	WB	WB Mill Plain Blvd Between Ramp_Ln3 WB Mill Plain Blvd Between Ramp_Ln2 WB Mill Plain Blvd Between Ramp_Ln1	Mill Plain Blvd	3	460	Auto	405	25
						Medium Trucks	52	25
						Heavy Trucks	3	25
Fort Vancouver Way	NB	NB Fort Vancouver Way Ln NB Fort Vancouver Way Right Ln	Fort Vancouver Way	2	141	Auto	136	25
						Medium Trucks	4	25
						Heavy Trucks	1	25
	SB	SB Fort Vancouver Way Ln 2	Fort Vancouver Way	1	200	Auto	196	25
						Medium Trucks	4	25
						Heavy Trucks	0	0
McLoughlin Blvd	EB	EB McLoughlin Blvd_1 20'	EB McLoughlin Blvd	1	140	Auto	125	25
						Medium Trucks	14	25
						Heavy Trucks	1	25
	WB	WB McLoughlin Blvd_20'	WB McLoughlin Blvd	1	165	Auto	147	25
						Medium Trucks	16	25
						Heavy Trucks	2	25

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
4th Plain Blvd	EB	WB 4th Plain Blvd Ln1 EB 4th Plain Blvd Ln2	4th Plain Blvd	2	317	Auto	286	25
						Medium Trucks	29	25
						Heavy Trucks	2	25
	WB	WB 4th Plain Blvd Ln 1-3	4th Plain Blvd	1	420	Auto	371	25
						Medium Trucks	42	25
						Heavy Trucks	7	25
4th Plain Blvd	EB	EB 4th Plain Blvd Ln2-2 EB 4th Plain Blvd Ln1-2	4th Plain Blvd	2	515	Auto	466	25
						Medium Trucks	44	25
						Heavy Trucks	5	25
	WB	WB 4th Plain Blvd Ln 1-2	4th Plain Blvd	1	420	Auto	371	25
						Medium Trucks	42	25
						Heavy Trucks	7	25
4th Plain Blvd	EB	EB 4th Plain Blvd Ln1 BRIDGE EB 4th Plain Blvd Ln2 BRIDGE	4th Plain Blvd	2	315	Auto	274	25
						Medium Trucks	36	25
						Heavy Trucks	5	25
	WB	WB 4th Plain Blvd Ln 1 Bridge WB 4th Plain Blvd Ln 2 BRIDGE	4th Plain Blvd	2	487	Auto	435	25
						Medium Trucks	44	25
						Heavy Trucks	8	25
4th Plain Blvd	EB	EB 4th Plain Blvd Ln2-4 EB 4th Plain Blvd Ln1-4	4th Plain Blvd	2	490	Auto	435	25
						Medium Trucks	47	25
						Heavy Trucks	8	25
	WB	WB 4th Plain Blvd Ln 2 WB 4th Plain Blvd Ln 1	4th Plain Blvd	2	512	Auto	466	25
						Medium Trucks	41	25

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
						Heavy Trucks	5	25
RAMPS / WASHINGTON SOUTH								
Off-Ramp	NB	NB I-5 OnRamp L&C Hwy/SR 14	Off-Ramp	1	1465	Auto	1333	50
						Medium Trucks	117	50
						Heavy Trucks	15	50
Off-Ramp	NB	WB L&CHwy/SR14 OffRamp to 6TH St 2	Off-Ramp	1	575	Auto	407	25
						Medium Trucks	165	25
						Heavy Trucks	3	25
Off-Ramp	NB	WB L&C Hwy/SR14 OffRamp to NB I-5	Off-Ramp	1	1525	Auto	1373	50
						Medium Trucks	137	50
						Heavy Trucks	15	50
Off-Ramp	NB	NB I-5 OffRamp to 6TH St	Off-Ramp	1	380	Auto	342	25
						Medium Trucks	38	25
						Heavy Trucks	0	0
Off-Ramp	SB	SB I-5_OffRamp to Lewis&Clark/SR14	Off-Ramp	1	1500	Auto	1300	40
						Medium Trucks	164	40
						Heavy Trucks	36	40
On-Ramp	SB	SB I-5 OnRamp L&C Hwy Loop 1-2	On-Ramp - Loop	1	1530	Auto	1435	25
						Medium Trucks	85	25
						Heavy Trucks	10	25
Off-Ramp	NB	NB I-5 OffRamp to Mill Plain Blvd-2	Off-Ramp	1	773	Auto	703	45
						Medium Trucks	62	45

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
						Heavy Trucks	8	45
On-Ramp	NB	NB I-5_OR from Mill Plain Blvd L2-2 NB I-5_OnRamp from Mill Plain Blvd Ln1-2 WB Mill Plain Blvd to NB I-5_3-2	On-Ramp	3	497	Auto	477	35
						Medium Trucks	15	35
						Heavy Trucks	5	35
Off-Ramp	NB	NB I-5 OffRamp to 4th Plain Blvd Ln1.1-2 NB I-5 OffRamp to 4th Plain Blvd Ln2	Off-Ramp	2	350	Auto	322	55
						Medium Trucks	23	55
						Heavy Trucks	5	55
Off-Ramp	SB	SB I-5 OffRamp to 15TH St-2 SB I-5 OffRamp to 15TH St Ln2-2	Off-Ramp	2	542	Auto	495	35
						Medium Trucks	44	35
						Heavy Trucks	3	35
On-Ramp	SB	SB Mill Plain Blvd OR to SB I-5 Ln2	On-Ramp	1	1180	Auto	1062	50
						Medium Trucks	98	50
						Heavy Trucks	20	50
Off-Ramp	NB	NB I-5 OffRamp to 4th Plain Blvd_2	Off-Ramp	1	701	Auto	644	55
						Medium Trucks	46	55
						Heavy Trucks	11	55
On-Ramp	NB	4th Plain Blvd OnRamp to NB I-5-2	On-Ramp	1	800	Auto	768	45
						Medium Trucks	32	45
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	NO BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Off-Ramp	SB	SB I-5 OR to 4th Plain Blvd ft Ln1 SB I-5 OR to 4th Plain Blvd Rt Ln2	Off-Ramp	2	395	Auto	360	35
						Medium Trucks	29	35
						Heavy Trucks	6	35
On-Ramp	SB	WB 4th Plain Blvd OR Lp to SB I-5-2	On-Ramp	1	555	Auto	500	45
						Medium Trucks	47	45
						Heavy Trucks	8	45

Table C-11. Build Year 2045 – AM Peak Truck Traffic - Washington South

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5 / WASHINGTON SOUTH								
I-5	NB	NB I-5 IS Ln1 NB I-5 Mid Ln1 NB I-5 OS Ln1 NB I-5 OR to Lewis/Clark	On Ramp Jantzen St to Off Ramp Lewis Clark	4	1046	Auto	879	60
						Medium Trucks	78	60
						Heavy Trucks	89	60
I-5	NB	NB I-5 IS to McLoughlin Blvd Ln2 NB I-5 Mid to McLoughlin Blvd Ln2 NB I-5 OS to McLoughlin Blvd Ln2	Off Ramp Lewis Clark to Off Ramp Loop 7th	3	803	Auto	682	60
						Medium Trucks	49	60
						Heavy Trucks	72	60
I-5	NB	NB I-5 IS to McLoughlin Blvd Ln3 NB I-5 Mid to McLoughlin Blvd Ln3 NB I-5 OS to McLoughlin Blvd Ln3	Off Ramp Loop 7th to Off Ramp Mill Plain	3	715	Auto	605	60
						Medium Trucks	41	60
						Heavy Trucks	69	60
I-5	NB	NB I-5 IS to McLoughlin Blvd Ln4 NB I-5 Mid to McLoughlin Blvd Ln4 NB I-5 OS to McLoughlin Blvd Ln4	Off Ramp Mill Plain to On Ramp Mill Plain Blvd	3	474	Auto	403	60
						Medium Trucks	7	60
						Heavy Trucks	64	60
I-5	NB	NB I-5 IS to McLoughlin Blvd Ln5 NB I-5 Mid to McLoughlin Blvd Ln5 NB I-5 OS to McLoughlin Blvd Ln5	Off Ramp Mill Plain to On Ramp Mill Plain Blvd	3	474	Auto	403	60
						Medium Trucks	7	60
						Heavy Trucks	64	60
I-5	NB	NB I-5 Mill Plain Off- Mill PlainOR Ln1 NB I-5 Mill Plain Off- Mill PlainOR Ln2 NB I-5 Mill Plain Off- Mill PlainOR Ln3 NB I-5 Mill Plain Off- Mill PlainOR Ln4	On Ramp Mill Plain Blvd to 4th Plain Blvd Off Ramp	4	650	Auto	538	60
						Medium Trucks	47	60
						Heavy Trucks	65	60

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5	NB	NB I-5 Mill PlainBlv OR- 4th Plain OR Ln1 NB I-5 Mill PlainBlv OR- 4thPlainOR Ln2 NB I-5 Mill PlainBlv OR- 4thPlainOR Ln3 NB I-5 Mill PlainBlv OR- 4thPlainOR Ln4	4th Plain Blvd Off Ramp to 4th Plain Blvd On Ramp	4	640	Auto	541	60
						Medium Trucks	46	60
						Heavy Trucks	53	60
I-5	SB	SB I-5 4th PlainOR -Mill PlainBlv Off L1 SB I-5 4th PlainOR -Mill PlainBlv Off L2 SB I-5 4th PlainOR -Mill PlainBlv Off L3	On ramp Loop 4th Plain Blvd to Off Ramp 15th St	3	1563	Auto	1458	60
						Medium Trucks	74	60
						Heavy Trucks	31	60
I-5	SB	SB I-5 McLoughlin to 4th Plain Ln1 SB I-5 McLoughlin to 4th Plain Ln2 SB I-5 McLoughlin to 4th Plain Blvd IS Ln	Off Ramp 15th St to Off Ramp to L&C	3	863	Auto	818	60
						Medium Trucks	25	60
						Heavy Trucks	20	60
I-5	SB	SB I-5 4th Plain - McLoughli Ln1 SB I-5 4th Plain - McLoughli Ln2 SB I-5 4th Plain - McLoughlin Ln3	Off Ramp to L&C to On Ramp 7th St	3	966	Auto	935	60
						Medium Trucks	13	60
						Heavy Trucks	18	60
I-5	SB	SB I-5 to Bridge Ln1 SB I-5 to Bridge Ln2 SB I-5 to Bridge Ln3 SB I-5 Bridge Lane SL	On Ramp 7th St - Bridge to Oregon	4	946	Auto	857	60
						Medium Trucks	58	60
						Heavy Trucks	31	60

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
CROSS STREETS / WASHINGTON SOUTH								
Columbia Way	EB/WB	Columbia Way - 24'	Columbia Way	1	150	Auto	141	25
						Medium Trucks	9	25
						Heavy Trucks	0	0
Columbia Way	EB/WB	Columbia Way - 24'-2	Columbia Way	1	235	Auto	219	25
						Medium Trucks	16	25
						Heavy Trucks	0	0
Columbia St	NB	Columbia St NB to 3rd	Columbia St	1	750	Auto	713	25
						Medium Trucks	36	25
						Heavy Trucks	132	25
	SB	Columbia St SB 6th to 3rd	Columbia St	1	140	Auto	8	25
						Medium Trucks	0	0
Lewis & Clark Hwy/SR14	EB	EB Lewis & Clark Hwy Ln 1 EB Lewis & Clark Hwy Ln 2 EB L&C Hwy OR to Col. Shr. Blvd	Lewis & Clark Hwy/SR14	1	583	Auto	489	50
						Medium Trucks	63	50
						Heavy Trucks	31	50
	WB	WB Lewis & Clark Hwy/SR 14 Ln 2 WB Lewis & Clark Hwy/SR 14 Ln 1 WB Lewis & Clark Hwy/SR 14 Ln 3	Lewis & Clark Hwy/SR14	1	566	Auto	454	50
						Medium Trucks	91	50
						Heavy Trucks	21	50

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Lewis & Clark Hwy/SR14	EB	EB Lewis & Clark Hwy/SR14 Ln_1	EB Lewis & Clark Hwy/SR14 (from Loop)	EB	225	Auto	216	50
						Medium Trucks	9	50
						Heavy Trucks	0	0
	WB	WB Lewis & Clark Hwy/SR 14 Ln 1-2 WB Lewis & Clark Hwy/SR 14 Ln 2-2	WB Lewis & Clark Hwy/SR14	WB	260	Auto	247	25
						Medium Trucks	13	25
						Heavy Trucks	0	0
Lewis & Clark Hwy/SR14	EB	EB Lewis & Clark Hwy/SR14 Ln_1	EB Lewis & Clark Hwy/SR14 (from Loop)	1	225	Auto	216	50
						Medium Trucks	9	50
						Heavy Trucks	0	0
	WB	WB Lewis & Clark Hwy/SR 14 Ln 1-2 WB Lewis & Clark Hwy/SR 14 Ln 2-2	WB Lewis & Clark Hwy/SR14	1	260	Auto	247	25
						Medium Trucks	13	25
						Heavy Trucks	0	0
Main from RA to 6th	NB	Main from RA to 6th	Main from RA to 6th	1	15	Auto	15	30
						Medium Trucks	0	0
						Heavy Trucks	0	0
	SB	Main from 6th to RA	Main from 6th to RA	1	495	Auto	485	30
						Medium Trucks	10	30
						Heavy Trucks	0	0
Evergreen Blvd	EB	EB Evergreen Blvd	EB Evergreen Blvd	1	65	Auto	57	25
						Medium Trucks	7	25
						Heavy Trucks	1	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
	WB	WB Evergreen Blvd	WB Evergreen Blvd	1	185	Auto	176	25
						Medium Trucks	8	25
						Heavy Trucks	1	25
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 EB Mill Plain Blvd Ln2 EB Mill Plain Blvd Ln3	EB Mill Plain Blvd	3	402	Auto	321	25
						Medium Trucks	66	25
						Heavy Trucks	15	25
	WB	WB Mill Plain Blvd west of Ramps_Ln1 WB Mill Plain Blvd west of Ramps_Ln2 WB Mill Plain Blvd west of Ramps_Ln3	WB Mill Plain Blvd	3	983	Auto	881	25
						Medium Trucks	95	25
						Heavy Trucks	7	25
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 East of Ramps EB Mill Plain Blvd Ln2 East of Ramps	Mill Plain Blvd - East of Ramps	2	658	Auto	547	25
						Medium Trucks	96	25
						Heavy Trucks	15	25
	WB	WB Mill Plain Blvd to NB I-5 WB Mill Plain Blvd Ln 1-1-2 WB Mill Plain Blvd Ln 2.2	Mill Plain Blvd - East of Ramps	3	767	Auto	690	25
						Medium Trucks	72	25
						Heavy Trucks	5	25
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 Between Ramps EB Mill Plain Blvd Ln2 Between Ramps	Mill Plain Blvd	2	490	Auto	418	25
						Medium Trucks	66	25
						Heavy Trucks	6	25
	WB	WB Mill Plain Blvd Left Turn to NB-I5 Rmp WB Mill Plain Blvd Between Ramp_Ln3	Mill Plain Blvd	2	924	Auto	801	25
						Medium Trucks	107	25
						Heavy Trucks	16	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
NB Fort Vancouver Way Ln	NB	NB Fort Vancouver Way Ln NB Fort Vancouver Way Right Ln	NB Fort Vancouver Way Ln	2	55	Auto	48	25
						Medium Trucks	6	25
						Heavy Trucks	1	25
	SB	SB Fort Vancouver Way Ln 2.2 SB Fort Vancouver Right 1 Ln	NB Fort Vancouver Way Ln	2	117	Auto	114	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
McLoughlin Blvd	EB	EB McLoughlin Blvd_1 20'	EB McLoughlin Blvd	1	75	Auto	67	25
						Medium Trucks	7	25
						Heavy Trucks	1	25
	WB	WB McLoughlin Blvd_20'	WB McLoughlin Blvd	1	75	Auto	67	25
						Medium Trucks	7	25
						Heavy Trucks	1	25
4th Plain Blvd	EB	EB Mill Plain Blvd Ln3 EB Mill Plain Blvd Ln2 EB Mill Plain Blvd Ln1	4th Plain Blvd	3	402	Auto	321	25
						Medium Trucks	66	25
						Heavy Trucks	15	25
	WB	WB Mill Plain Blvd west of Ramps_Ln3 WB Mill Plain Blvd west of Ramps_Ln2 WB Mill Plain Blvd west of Ramps_Ln1	4th Plain Blvd	3	983	Auto	881	25
						Medium Trucks	95	25
						Heavy Trucks	7	25
4th Plain Blvd	EB	EB Mill Plain Blvd Ln1-2 EB Mill Plain Blvd Ln2-2 EB Mill Plain Blvd Ln3-2	4th Plain Blvd	3	253	Auto	217	25
						Medium Trucks	33	25
						Heavy Trucks	3	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
4th Plain Blvd	EB	EB Mill Plain Blvd Ln1 Between Ramps EB Mill Plain Blvd Ln2 Between Ramps	4th Plain Blvd	2	490	Auto	418	25
						Medium Trucks	66	25
						Heavy Trucks	6	25
	WB	WB Mill Plain Blvd Left Turn to NB-I5 Rmp WB Mill Plain Blvd Between Ramp_Ln3 WB Mill Plain Blvd Between Ramp_Ln1	4th Plain Blvd	3	924	Auto	801	25
						Medium Trucks	107	25
						Heavy Trucks	16	25
4th Plain Blvd	EB	EB Mill Plain Blvd Ln1 East of Ramps EB Mill Plain Blvd Ln2 East of Ramps	4th Plain Blvd	2	658	Auto	547	25
						Medium Trucks	96	25
						Heavy Trucks	15	25
	WB	WB Mill Plain Blvd Ln 2.2 WB Mill Plain Blvd Ln 1-1-2	4th Plain Blvd	3	767	Auto	690	25
						Medium Trucks	72	25
						Heavy Trucks	5	25
RAMPS / WASHINGTON SOUTH								
Off-Ramp	NB	NB I-5 OR to Lewis/Clark 2	Off-Ramp	1	970	Auto	786	50
						Medium Trucks	116	50
						Heavy Trucks	68	50
Off-Ramp	NB	NB I-5 OR to 4th Plan	Off-Ramp	1	803	Auto	682	60
						Medium Trucks	49	60
						Heavy Trucks	72	60
Off-Ramp	NB	NB I-5 IS Collector NB I-5 Mid Collector NB I-5 OS Collector	Off-Ramp	3	875	Auto	694	50
						Medium Trucks	131	50
						Heavy Trucks	50	50

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Off-Ramp	NB	NB I-5 Loop OR to 7th St	Off-Ramp - Loop	1	351	Auto	308	25
						Medium Trucks	32	25
						Heavy Trucks	11	25
On-Ramp	NB	WB L&C Hwy On Ramp to NB I-5-2	On-Ramp	1	1180	Auto	868	50
						Medium Trucks	248	50
						Heavy Trucks	64	50
Off-Ramp	SB	SB I-5_OffRamp to Lewis&Clark/SR14-2	Off-Ramp	1	555	Auto	466	40
						Medium Trucks	64	40
						Heavy Trucks	25	40
On-Ramp	SB	SB I-5 OnRamp L&C Hwy Loop	On-Ramp	1	740	Auto	657	25
						Medium Trucks	68	25
						Heavy Trucks	15	25
On-Ramp	SB	SB On from 7TH St. 2-2	On-Ramp	1	528	Auto	464	35
						Medium Trucks	53	35
						Heavy Trucks	11	35
Off-Ramp	NB	NB I-5 OffRamp to 4th Plain Blvd SL-2	Off-Ramp	1	435	Auto	361	60
						Medium Trucks	48	60
						Heavy Trucks	26	60
Off-Ramp	NB	NB OS Off Ramp to 4th Plain Blvd Ln1	Off-Ramp	1	505	Auto	389	45
						Medium Trucks	90	45
						Heavy Trucks	26	45

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Off-Ramp	NB	NB OS Off Ramp to 4th Plain Rt Turn NB IS Off Ramp to 4th Plain Lt Turn 2	Off-Ramp	2	337	Auto	259	45
						Medium Trucks	60	45
						Heavy Trucks	18	45
Off-Ramp	NB	NB IS Off Ramp to 4th Plain Blvd Ln1	Off-Ramp	1	505	Auto	389	45
						Medium Trucks	90	45
						Heavy Trucks	26	45
On-Ramp	NB	WB Mill Plain Blvd On Ramp to NB I-5 EB Mill Plain Blvd Out Left Turn to NB-I5 EB Mill Plain Blvd In Left Turn to NB-I5 Rm	On-Ramp	3	200	Auto	184	25
						Medium Trucks	14	25
						Heavy Trucks	2	25
Off-Ramp	SB	SB I-5 OffRamp to 15TH St-2 SB I-5 OffRamp to 15TH St Ln2-2-2	Off-Ramp	2	620	Auto	552	35
						Medium Trucks	62	35
						Heavy Trucks	6	35
On-Ramp	SB	SB Mill Plain Blvd OR to SB I-5 Ln1 WB Mill Plain Blvd OnRamp to SB I-5 Ln2	On-Ramp	2	445	Auto	312	35
						Medium Trucks	99	35
						Heavy Trucks	34	35
Off-Ramp	NB	NB I-5 OffRamp to 4th Plain Blvd 3 NB I-5 OffRamp to 4th Plain Blvd 2	Off-Ramp	2	218	Auto	181	35
						Medium Trucks	24	35
						Heavy Trucks	13	35
On-Ramp	NB	4th Plain Blvd OnRamp to NB I-5 Inside WB 4th Plain Blvd Right Ln 2 Out	On-Ramp	1	228	Auto	198	35
						Medium Trucks	25	35
						Heavy Trucks	5	35

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - AM PEAK TRUCK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
Off-Ramp	SB	SB I-5 OR to 4th Plain Blvd SL	Off-Ramp	1	620	Auto	527	35
						Medium Trucks	63	35
						Heavy Trucks	30	35
On-Ramp	SB	WB 4th Plain Blvd OR Lp to SB I-5	On-Ramp - Loop	1	246	Auto	211	20
						Medium Trucks	25	20
						Heavy Trucks	10	20

Table C-12. Build Year 2045 - PM Peak Traffic - Washington South

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
I-5 / WASHINGTON SOUTH								
I-5	NB	NB I-5 IS Ln1 NB I-5 Mid Ln1 NB I-5 OS Ln1 NB I-5 OR to Lewis/Clark	On Ramp Jantzen St to Off Ramp Lewis Clark	4	1848	Auto	1755	60
						Medium Trucks	65	60
						Heavy Trucks	28	60
I-5	NB	NB I-5 IS to McLoughlin Blvd Ln2 NB I-5 Mid to McLoughlin Blvd Ln2 NB I-5 OS to McLoughlin Blvd Ln2	Off Ramp Lewis Clark to Off Ramp Loop 7th	3	1471	Auto	1405	60
						Medium Trucks	44	60
						Heavy Trucks	22	60

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
I-5	NB	NB I-5 IS to McLoughlin Blvd Ln3 NB I-5 Mid to McLoughlin Blvd Ln3 NB I-5 OS to McLoughlin Blvd Ln3	Off Ramp Loop 7th to Off Ramp Mill Plain	3	1829	Auto	1747	60
						Medium Trucks	53	60
						Heavy Trucks	29	60
I-5	NB	NB I-5 IS to McLoughlin Blvd Ln4 NB I-5 Mid to McLoughlin Blvd Ln4 NB I-5 OS to McLoughlin Blvd Ln4	Off Ramp Mill Plain to On Ramp Mill Plain Blvd	3	1426	Auto	1376	60
						Medium Trucks	25	60
						Heavy Trucks	25	60
I-5	NB	NB I-5 IS to McLoughlin Blvd Ln5 NB I-5 Mid to McLoughlin Blvd Ln5 NB I-5 OS to McLoughlin Blvd Ln5	Off Ramp Mill Plain to On Ramp Mill Plain Blvd	3	1426	Auto	1376	60
						Medium Trucks	25	60
						Heavy Trucks	25	60
I-5	NB	NB I-5 Mill Plain Off- Mill PlainOR Ln1 NB I-5 Mill Plain Off- Mill PlainOR Ln2 NB I-5 Mill Plain Off- Mill PlainOR Ln3 NB I-5 Mill Plain Off- Mill PlainOR Ln4	On Ramp Mill Plain Blvd to 4th Plain Blvd Off Ramp	4	1398	Auto	1321	60
						Medium Trucks	55	60
						Heavy Trucks	22	60
I-5	NB	NB I-5 Mill PlainBlv OR- 4th PlainOR Ln1 NB I-5 Mill PlainBlv OR- 4thPlainOR Ln2 NB I-5 Mill PlainBlv OR- 4thPlainOR Ln3 NB I-5 Mill PlainBlv OR- 4thPlainOR Ln4	4th Plain Blvd Off Ramp to 4th Plain Blvd On Ramp	4	1547	Auto	1468	60
						Medium Trucks	57	60
						Heavy Trucks	22	60
I-5	SB	SB I-5 4th PlainOR -Mill PlainBlv Off L1 SB I-5 4th PlainOR -Mill PlainBlv Off L2 SB I-5 4th PlainOR -Mill PlainBlv Off L3	On ramp Loop 4th Plain Blvd to Off Ramp 15th St	3	1831	Auto	1719	60
						Medium Trucks	65	60
						Heavy Trucks	47	60

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
I-5	SB	SB I-5 McLoughlin to 4th Plain Ln1 SB I-5 McLoughlin to 4th Plain Ln2 SB I-5 McLoughlin to 4th Plain Blvd IS Ln	Off Ramp 15th St to Off Ramp to L&C	3	1061	Auto	1002	60
						Medium Trucks	26	60
						Heavy Trucks	33	60
I-5	SB	SB I-5 4th Plain - McLoughli Ln1 SB I-5 4th Plain - McLoughli Ln2 SB I-5 4th Plain - McLoughlin Ln3	Off Ramp to L&C to On Ramp 7th St	3	998	Auto	953	60
						Medium Trucks	5	60
						Heavy Trucks	40	60
I-5	SB	SB I-5 to Bridge Ln1 SB I-5 to Bridge Ln2 SB I-5 to Bridge Ln3 SB I-5 Bridge Lane SL	On Ramp 7th St - Bridge to Oregon	4	955	Auto	892	60
						Medium Trucks	29	60
						Heavy Trucks	34	60

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
CROSS STREETS / WASHINGTON SOUTH								
Columbia Way	EB/WB	Columbia Way - 24'	Columbia Way	1	305	Auto	302	25
						Medium Trucks	3	25
						Heavy Trucks	0	0
Columbia Way	EB/WB	Columbia Way - 24'-2	Columbia Way	1	170	Auto	170	25
						Medium Trucks	0	0
						Heavy Trucks	0	0
Columbia St	NB	Columbia St NB to 3rd	Columbia St	1	750	Auto	735	25
						Medium Trucks	15	25
						Heavy Trucks	0	0
	SB	Columbia St SB 6th to 3rd	Columbia St	1	235	Auto	226	25
						Medium Trucks	9	25
						Heavy Trucks	0	0
Lewis & Clark Hwy/SR14	EB	EB Lewis & Clark Hwy Ln 2 EB L&C Hwy OR to Col. Shr. Blvd-2	Lewis & Clark Hwy/SR14	1	1154	Auto	1063	50
						Medium Trucks	75	50
						Heavy Trucks	16	50
	EB	NB I-5 OR to Lewis/Clark 2	Lewis & Clark Hwy/SR14	1	1506	Auto	1400	50
						Medium Trucks	83	50
						Heavy Trucks	23	50

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Lewis & Clark Hwy/SR14	EB	EB Lewis & Clark Hwy/SR14 Ln_1	EB Lewis & Clark Hwy/SR14 (from Loop)	1	360	Auto	353	50
						Medium Trucks	7	50
						Heavy Trucks	0	0
	WB	WB Lewis & Clark Hwy/SR 14 Ln 1-2 WB Lewis & Clark Hwy/SR 14 Ln 2-2	WB Lewis & Clark Hwy/SR14	1	307	Auto	298	25
						Medium Trucks	9	25
						Heavy Trucks	0	0
	WB	WB Lewis & Clark Hwy/SR 14 Ln 2 WB Lewis & Clark Hwy/SR 14 Ln 1 WB Lewis & Clark Hwy/SR 14 Ln 3	WB Lewis & Clark Hwy/SR14	3	829	Auto	729	50
						Medium Trucks	90	50
						Heavy Trucks	10	50
Main from RA to 6th	NB	Main from RA to 6th	Main from RA to 6th	1	15	Auto	15	30
						Medium Trucks	0	0
						Heavy Trucks	0	0
	SB	Main from 6th to RA	Main from 6th to RA	1	495	Auto	485	30
						Medium Trucks	10	30
						Heavy Trucks	0	0

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
Evergreen Blvd	EB	EB Evergreen Blvd	EB Evergreen Blvd	1	230	Auto	219	25
						Medium Trucks	10	25
						Heavy Trucks	1	25
	WB	WB Evergreen Blvd	WB Evergreen Blvd	1	205	Auto	195	25
						Medium Trucks	9	25
						Heavy Trucks	1	25
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 EB Mill Plain Blvd Ln2 EB Mill Plain Blvd Ln3	EB Mill Plain Blvd	3	667	Auto	547	25
						Medium Trucks	110	25
						Heavy Trucks	10	25
	WB	WB Mill Plain Blvd west of Ramps_Ln1 WB Mill Plain Blvd west of Ramps_Ln2 WB Mill Plain Blvd west of Ramps_Ln3	WB Mill Plain Blvd	3	480	Auto	427	25
						Medium Trucks	52	25
						Heavy Trucks	1	25
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 East of Ramps EB Mill Plain Blvd Ln2 East of Ramps	Mill Plain Blvd - East of Ramps	2	451	Auto	302	25
						Medium Trucks	146	25
						Heavy Trucks	3	25
	WB	WB Mill Plain Blvd to NB I-5 WB Mill Plain Blvd Ln 1-1-2 WB Mill Plain Blvd Ln 2.2	Mill Plain Blvd	3	510	Auto	459	25
						Medium Trucks	47	25
						Heavy Trucks	4	25
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1-2 EB Mill Plain Blvd Ln2-2	Mill Plain Blvd	2	471	Auto	381	25
						Medium Trucks	85	25
						Heavy Trucks	5	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
	WB	WB Mill Plain Blvd west of Ramps_Ln3 WB Mill Plain Blvd west of Ramps_Ln2	Mill Plain Blvd	2	480	Auto	427	25
						Medium Trucks	52	25
						Heavy Trucks	1	25
Mill Plain Blvd	EB	EB Mill Plain Blvd Ln1 Between Ramps EB Mill Plain Blvd Ln2 Between Ramps	Mill Plain Blvd	2	307	Auto	174	25
						Medium Trucks	130	25
						Heavy Trucks	3	25
	WB	WB Mill Plain Blvd Left Turn to NB-I5 Rmp WB Mill Plain Blvd Between Ramp_Ln3	Mill Plain Blvd	2	465	Auto	401	25
						Medium Trucks	61	25
						Heavy Trucks	3	25
Mill Plain Blvd	EB	EB Mill Plain Blvd east of Vancouver Ln2 EB Mill Plain Blvd east of Vancouver Ln1	Mill Plain Blvd	2	451	Auto	302	25
						Medium Trucks	146	25
						Heavy Trucks	3	25
	WB	WB Mill Plain Blvd Ln 2-1 WB Mill Plain Blvd Ln 1-1	Mill Plain Blvd	2	766	Auto	689	25
						Medium Trucks	70	25
						Heavy Trucks	7	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
NB Fort Vancouver Way Ln	NB	NB Fort Vancouver Way Ln NB Fort Vancouver Way Right Ln	NB Fort Vancouver Way Ln	2	147	Auto	143	25
						Medium Trucks	4	25
						Heavy Trucks	0	0
	SB	SB Fort Vancouver Way Ln 2.2 SB Fort Vancouver Right 1 Ln	NB Fort Vancouver Way Ln	1	95	Auto	93	25
						Medium Trucks	2	25
						Heavy Trucks	0	0
McLoughlin Blvd	EB	EB McLoughlin Blvd_1 20'	EB McLoughlin Blvd	1	120	Auto	107	25
						Medium Trucks	12	25
						Heavy Trucks	1	25
	WB	WB McLoughlin Blvd_20'	WB McLoughlin Blvd	1	145	Auto	129	25
						Medium Trucks	14	25
						Heavy Trucks	2	25
4th Plain Blvd	EB	WB 4th Plain Blvd OS Ln1 WB 4th Plain Blvd IS Ln1	4th Plain Blvd	2	440	Auto	396	25
						Medium Trucks	41	25
						Heavy Trucks	3	25
	WB	WB 4th Plain Blvd OS Ln4 WB 4th Plain Blvd IS Ln4	4th Plain Blvd	2	653	Auto	595	25
						Medium Trucks	55	25
						Heavy Trucks	3	25
4th Plain Blvd	EB	EB 4th Plain Blvd OS Ln2 EB 4th Plain Blvd IS Ln2	4th Plain Blvd	2	510	Auto	466	25
						Medium Trucks	40	25
						Heavy Trucks	4	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
	WB	WB 4th Plain Blvd OS Ln3 WB 4th Plain Blvd IS Ln3	4th Plain Blvd	2	383	Auto	340	25
						Medium Trucks	40	25
						Heavy Trucks	3	25
4th Plain Blvd	EB	EB 4th Plain Blvd Ln2 BRIDGE EB 4th Plain Blvd Ln1 BRIDGE	4th Plain Blvd	2	510	Auto	466	25
						Medium Trucks	40	25
						Heavy Trucks	4	25
	WB	WB 4th Plain Blvd IS Ln1 BRIDGE WB 4th Plain Blvd OS Ln1 BRIDGE	4th Plain Blvd	2	521	Auto	468	25
						Medium Trucks	48	25
						Heavy Trucks	5	25
4th Plain Blvd	EB	EB 4th Plain Blvd OS Ln3 EB 4th Plain Blvd IS Ln3	4th Plain Blvd	2	277	Auto	248	25
						Medium Trucks	28	25
						Heavy Trucks	1	25
	WB	WB 4th Plain Blvd IS Ln2 WB 4th Plain Blvd OS Ln2	4th Plain Blvd	2	512	Auto	466	25
						Medium Trucks	41	25
						Heavy Trucks	5	25
4th Plain Blvd	EB	EB 4th Plain Blvd OS Ln4 EB 4th Plain Blvd IS Ln4	4th Plain Blvd	2	338	Auto	303	25
						Medium Trucks	33	25
						Heavy Trucks	2	25
	WB	WB 4th Plain Blvd Ln 1A	4th Plain Blvd	1	1025	Auto	933	25
						Medium Trucks	82	25
						Heavy Trucks	10	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		Speed (mph)
RAMPS / WASHINGTON SOUTH								
Off-Ramp	NB	NB I-5 OR to Lewis/Clark 2	Off-Ramp	1	1506	Auto	1400	50
						Medium Trucks	83	50
						Heavy Trucks	23	50
Off-Ramp	NB	NB I-5 OR to 4th Plan	Off-Ramp	1	1471	Auto	1405	60
						Medium Trucks	44	60
						Heavy Trucks	22	60
Off-Ramp	NB	NB I-5 IS Collector NB I-5 Mid Collector NB I-5 OS Collector	Off-Ramp	3	966	Auto	859	50
						Medium Trucks	99	50
						Heavy Trucks	8	50
Off-Ramp	NB	NB I-5 Loop OR to 7th St	Off-Ramp - Loop	1	395	Auto	379	25
						Medium Trucks	16	25
						Heavy Trucks	0	0
On-Ramp	NB	WB L&C Hwy On Ramp to NB I-5-2	On-Ramp	1	1690	Auto	1465	50
						Medium Trucks	213	50
						Heavy Trucks	12	50
Off-Ramp	SB	SB I-5_OffRamp to Lewis&Clark/SR14-2	Off-Ramp	1	1596	Auto	1436	40
						Medium Trucks	134	40
						Heavy Trucks	26	40
On-Ramp	SB	SB I-5 OnRamp L&C Hwy Loop	On-Ramp	1	950	Auto	855	25
						Medium Trucks	76	25
						Heavy Trucks	19	25

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
On-Ramp	SB	SB On from 7TH St. 2-2	On-Ramp	1	759	Auto	699	35
						Medium Trucks	49	35
						Heavy Trucks	11	35
Off-Ramp	NB	NB I-5 OffRamp to 4th Plain Blvd SL-2	Off-Ramp	1	720	Auto	656	60
						Medium Trucks	57	60
						Heavy Trucks	7	60
Off-Ramp	NB	NB OS Off Ramp to 4th Plain Blvd Ln1	Off-Ramp	1	433	Auto	383	45
						Medium Trucks	48	45
						Heavy Trucks	2	45
Off-Ramp	NB	NB OS Off Ramp to 4th Plain Rt Turn NB IS Off Ramp to 4th Plain Lt Turn 2	Off-Ramp	2	288	Auto	255	45
						Medium Trucks	32	45
						Heavy Trucks	1	45
Off-Ramp	NB	NB IS Off Ramp to 4th Plain Blvd Ln1	Off-Ramp	1	433	Auto	383	45
						Medium Trucks	48	45
						Heavy Trucks	2	45
On-Ramp	NB	WB Mill Plain Blvd On Ramp to NB I-5 EB Mill Plain Blvd Out Left Turn to NB-I5 EB Mill Plain Blvd In Left Turn to NB-I5 Rm	On-Ramp	3	713	Auto	685	25
						Medium Trucks	21	25
						Heavy Trucks	7	25
Off-Ramp	SB	SB I-5 OffRamp to 15TH St-2 SB I-5 OffRamp to 15TH St Ln2-2-2	Off-Ramp	2	625	Auto	575	35
						Medium Trucks	46	35
						Heavy Trucks	4	35

Roadway	Direction	TNM Link	Segment	# of Lanes	BUILD YEAR 2045 - PM PEAK TRAFFIC			Speed (mph)
					Total Vehicle (per lane)	TNM Traffic Volumes (per lane)		
On-Ramp	SB	SB Mill Plain Blvd OR to SB I-5 Ln1 WB Mill Plain Blvd OnRamp to SB I-5 Ln2	On-Ramp	2	585	Auto	497	35
						Medium Trucks	73	35
						Heavy Trucks	15	35
Off-Ramp	NB	NB I-5 OffRamp to 4th Plain Blvd 3 NB I-5 OffRamp to 4th Plain Blvd 2	Off-Ramp	2	360	Auto	328	35
						Medium Trucks	28	35
						Heavy Trucks	4	35
On-Ramp	NB	4th Plain Blvd OnRamp to NB I-5 Inside WB 4th Plain Blvd Right Ln 2 Out	On-Ramp	1	463	Auto	435	35
						Medium Trucks	23	35
						Heavy Trucks	5	35
Off-Ramp	SB	SB I-5 OR to 4th Plain Blvd SL	Off-Ramp	1	810	Auto	764	35
						Medium Trucks	46	35
						Heavy Trucks	0	0
On-Ramp	SB	WB 4th Plain Blvd OR Lp to SB I-5	On-Ramp - Loop	1	276	Auto	256	20
						Medium Trucks	17	20
						Heavy Trucks	3	20

Appendix D

FIELD DATA SHEETS

Appendix D contains data sheets that describe noise measurements conducted in support of the noise analysis for the IBR Project from April 2022 to September 2022. The field data sheets include measured noise levels, descriptions of measurement activities and locations, site observations, site photographs, traffic data collected during all short-term measurements.

Field data sheets for sites ST-1 to ST-46 relate to short-term measurements conducted to validate the FHWA Traffic Noise Modeled developed for this project.

Field data sheets for sites LT-1 to LT-12 describe long-term measurement conducted in support of the transit analysis and project construction. Appendix E contains hourly data plotted for each long-term measurement.

The final two field data sheets provide details on the measurements conducted to assess structure-borne noise from the North Portland Harbor Bridge.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-1	Address: Vancouver Community Library
Staff: Romero, Rubin, Doschka	Location: East side of parking lot
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 72◦F / 0-2 southeast
Instrumentation / S/N: LD720 / 0161 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/22/2022 – 9/23/2022	Start Time / Duration: 4:00 p.m. / 24-hour

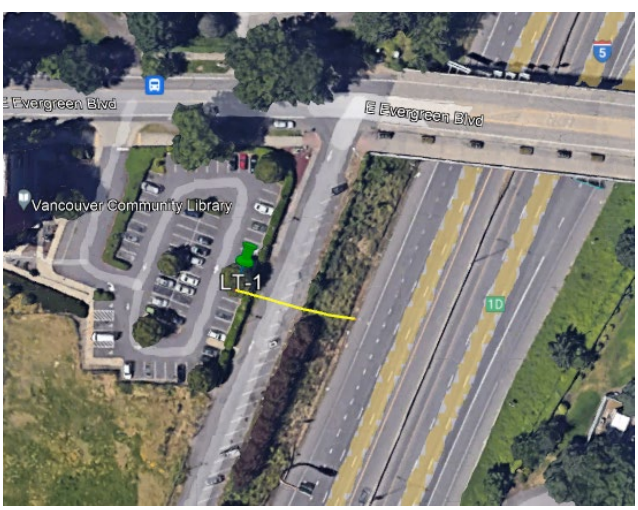
Notes:

Sound level meter contained in Pelican case with mic running outside to collect hourly noise levels. Measurement conducted from tree located on the east side of the Vancouver Community Library parking lot. Measured noise levels used to assess noise levels near future LRT station.

Sound Level Results

LDN:	77
Daytime Average:	72.8
Nighttime Average:	70.4
Peak Hour:	73.8
Peak Hour Time:	7:00 a.m.

Site Layout:



LT-1 located approximately 100 feet west of I-5 southbound.

Photographs:


View east to I-5 from parking lot.


View west showing Pelican case in tree.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-2	Address: Adjacent to Normandy Apartments at 316 E 7th St
Staff: Romero, Rubin, Doschka	Location: At I-5 right-of-way
Weather: Mostly clear, no precipitation	Temperature / Wind (mph): 80°F / 0-4 east
Instrumentation / S/N: LD720 / 0161 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 8/1/2022 – 8/2/2022	Start Time / Duration: 12:00 p.m. / 24-hour

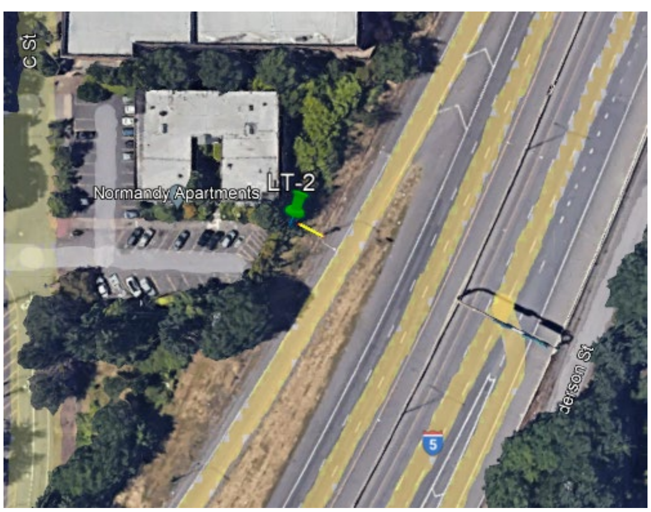
Notes:

Sound level meter contained in Pelican case with mic running outside to collect hourly noise levels. Measurement conducted from right-of-way located east of the Normandy Apartments. Measured noise levels used to assess noise levels near future LRT alignment.

Sound Level Results

LDN:	83
Daytime Average:	79.2
Nighttime Average:	76.5
Peak Hour:	80.1
Peak Hour Time:	9:00 p.m.

Site Layout:



LT-2 located approximately 25 feet west of southbound I-5.

Photographs:

View east to I-5 with sound level meter at right-of-way.

View northwest of frontage at Normandy Apartments.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-3	Address: Columbia Street south of Hilton Hotel at 301 W 6th St
Staff: Romero, Rubin, Doschka	Location: Public right-of-way, street tree
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 67◦F / 0-4 east
Instrumentation / S/N: LD720 / 0161 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/21/2022 – 9/22/2022	Start Time / Duration: 10:00 a.m. / 24-hour

Photograph:

View south along Columbia Street with sound level meter located in sidewalk tree.

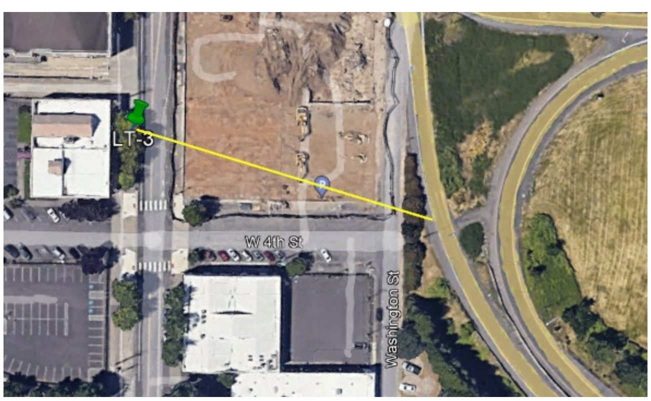
Notes:

Sound level meter contained in Pelican case with microphone outside to collect hourly noise levels. Measurement conducted from right-of-way located south of Hilton Hotel at 301 W 6th Street. Measured noise levels used to assess noise levels near future LRT alignment.

Sound Level Results

LDN:	77
Daytime Average:	74.1
Nighttime Average:	69.7
Peak Hour:	76.9
Peak Hour Time:	9:00 p.m.

Site Layout:



LT-3 located approximately 325 feet west of the nearest I-5 ramps and approximately 550 from the future LRT alignment.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-4	Address: Rodeway Inn, 1401 N Hayden Island Drive
Staff: Romero, Rubin, Doschka	Location: Adjacent to entrance at Rodeway Inn
Weather: Mostly clear, no precipitation	Temperature / Wind (mph): 76◦F / 0-2 east
Instrumentation / S/N: LD720 / 0514 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 8/1/2022 – 8/2/2022	Start Time / Duration: 10:00 a.m. / 24-hour

Notes:

Sound level meter contained in Pelican case with microphone extended outside case to collect hourly noise levels. Measurement conducted from adjacent to Rodeway Inn entrance, at 1401 N Hayden Island Drive. Measured noise levels used to assess noise levels near future LRT station and alignment.

Sound Level Results

LDN:	72
Daytime Average:	67.9
Nighttime Average:	64.9
Peak Hour:	73.2
Peak Hour Time:	4:00 a.m.

Site Layout:

LT-4 located approximately 675 feet west of the southbound I-5 Interstate Bridge.

Photographs:


View southwest to tree with sound level meter and hotel entrance.


View northeast of hotel parking with Interstate Bridge beyond.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-5	Address: Holiday Inn, 909 N Hayden Island Drive
Staff: Romero, Rubin, Doschka	Location: 4th floor balcony facing I-5
Weather: Clear, no precipitation	Temperature / Wind (mph): 82◦F / 0-2 east
Instrumentation / S/N: LD720 / 0514 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 8/2/2022 – 8/3/2022	Start Time / Duration: 2:00 p.m. / 24-hour

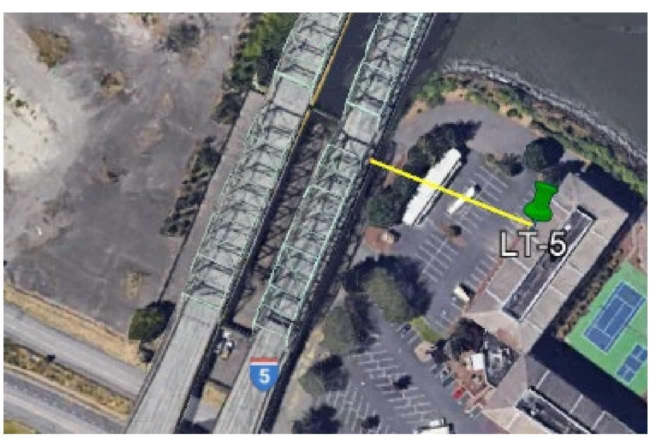
Notes:

Sound level meter contained in Pelican case with microphone extended outside case to collect hourly noise levels. Measurement conducted from 4th floor patio facing west at Holiday Inn, at 909 N Hayden Island Drive. Patios on the west side of hotel aren't in use. Measured noise levels used to assess noise levels near future LRT station and alignment.

Sound Level Results

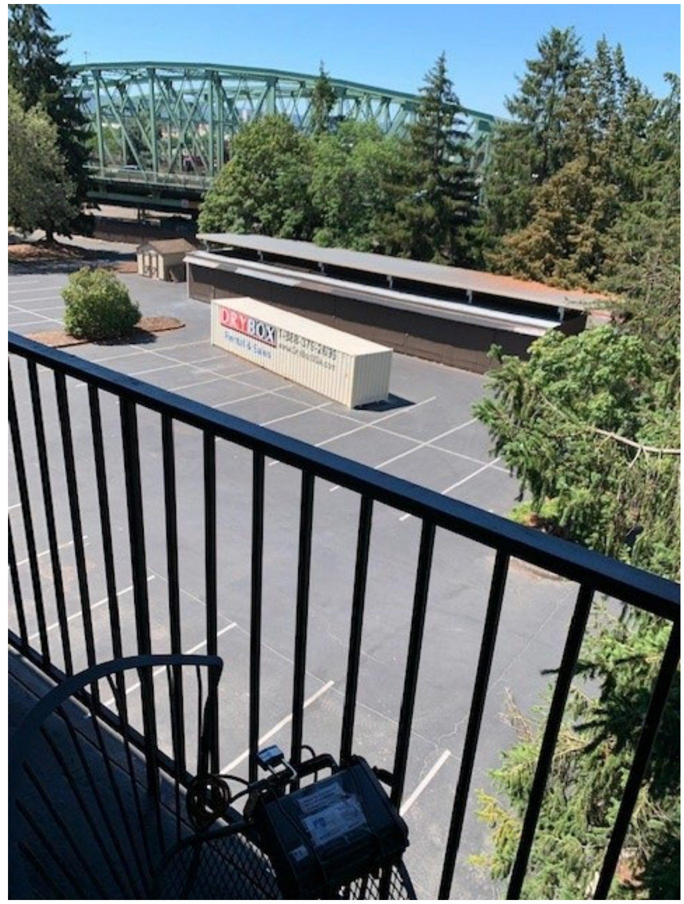
LDN:	81
Daytime Average:	75.5
Nighttime Average:	74.2
Peak Hour:	79.3
Peak Hour Time:	9:00 p.m.

Site Layout:



LT-5 located approximately 200 feet east of the northbound I-5 Interstate Bridge.

Photographs:


View southwest to Interstate Bridge with sound level meter in Pelican case on patio.


View north of hotel parking and west side balconies with Interstate Bridge to west.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-6	Address: Jantzen Beach Houseboats
Staff: Romero, Rubin, Doschka	Location: South end of 5th row (Row E) west of bridge.
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 82◦F / 0-5 east
Instrumentation / S/N: LD720 / 0514 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/21/2022 – 9/22/2022	Start Time / Duration: 2:00 p.m. / 24-hour

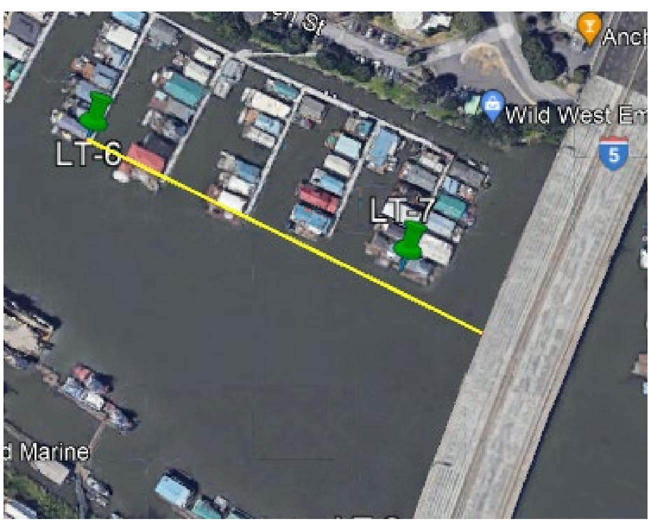
Notes:

Sound level meter contained in Pelican case with microphone extended outside case to collect hourly noise levels. Measurement conducted from south end of 5th row (Row E) at Jantzen Beach Houseboats. Measured noise levels used to assess noise levels near future LRT alignment.

Sound Level Results

LDN:	68
Daytime Average:	63.9
Nighttime Average:	60.5
Peak Hour:	67.0
Peak Hour Time:	9:00 p.m.

Site Layout:



LT-6 located approximately 730 feet west of the North Portland Harbor Bridge.

Photographs:

View southeast to North Portland Harbor Bridge with microphone extended from sound level meter in foreground.

View south of sound level meter attached to tri-pod at end of walkway. Diversified Marine Inc. in background.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-7	Address: Jantzen Beach Houseboats
Staff: Romero, Rubin, Doschka	Location: South end of 1st row (Row A) west of bridge.
Weather: Mostly cloudy, no precipitation	Temperature / Wind (mph): 50◦F / 0-3 southeast
Instrumentation / S/N: LD720 / 0161 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/27/2022 – 4/28/2022	Start Time / Duration: 12:00 p.m. / 24-hour

Notes:

Sound level meter contained in Pelican case with microphone extended outside case to collect hourly noise levels. Measurement conducted from south end of 1st row (Row A) at Jantzen Beach Houseboats. Measured noise levels used to assess noise levels near future LRT alignment.

Sound Level Results

LDN:	71
Daytime Average:	67.5
Nighttime Average:	64.4
Peak Hour:	71.1
Peak Hour Time:	7:00 a.m.

Site Layout:

LT-7 located approximately 165 feet west of the North Portland Harbor Bridge.

Photograph:

View south of Pelican case containing sound level meter at sign with North Portland Harbor Bridge to east.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-8	Address: Jantzen Bay Marina Houseboats
Staff: Romero, Rubin, Doschka	Location: South end of 1st row east of bridge.
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 50◦F / 0-3 southeast
Instrumentation / S/N: LD720 / 0514 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/28/2022 – 4/29/2022	Start Time / Duration: 11:00 a.m. / 24-hour

Notes:

Sound level meter contained in Pelican case with microphone extended outside case to collect hourly noise levels. Measurement conducted from south end of 1st row east of North Portland Harbor Bridge at Jantzen Bay Marina Houseboats. Measured noise levels used to assess noise levels near future LRT alignment.

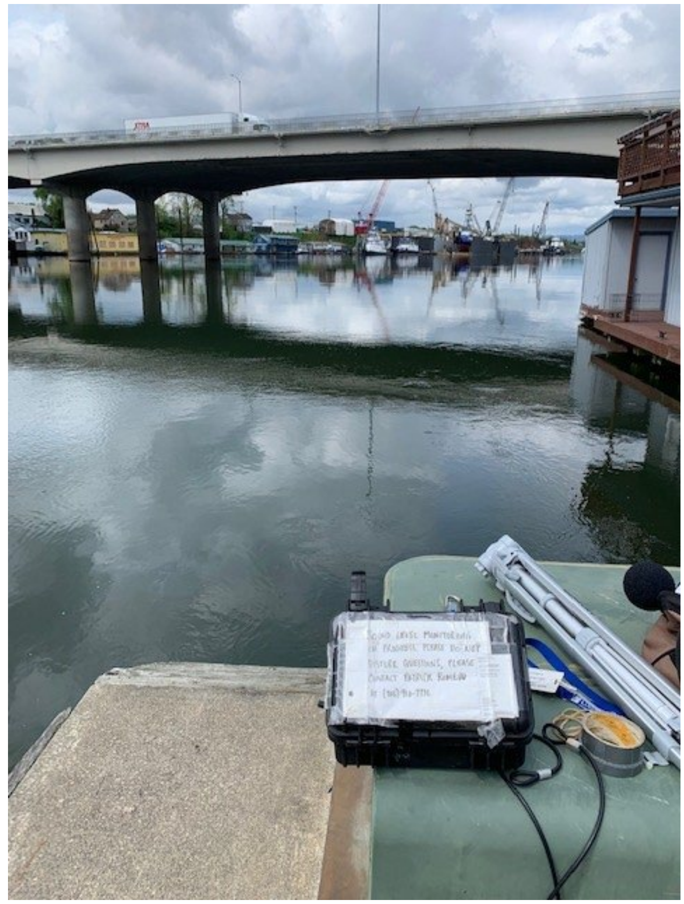
Sound Level Results

LDN:	72
Daytime Average:	67.3
Nighttime Average:	64.8
Peak Hour:	70.5
Peak Hour Time:	4:00 a.m.

Site Layout:

LT-8 located approximately 210 feet east of the North Portland Harbor Bridge.

Photograph:



View west to North Portland Harbor Bridge with Pelican case containing sound level meter located at south end of houseboats on first row of Jantzen Bay Marina Houseboats.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-9	Address: Houseboats on North Portland Harbor south shore
Staff: Romero, Rubin, Doschka	Location: Patio outside lone first row houseboat west of bridge.
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 70◦F / 0-2 south
Instrumentation / S/N: LD720 / 0514 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/22/2022 – 9/23/2022	Start Time / Duration: 12:00 p.m. / 24-hour

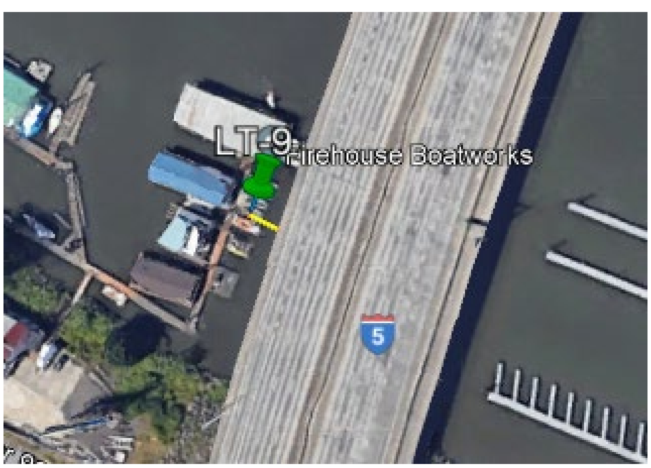
Notes:

Sound level meter contained in Pelican case with microphone extended outside case to collect hourly noise levels. Measurement conducted from patio outside lone first row houseboat west of bridge on south side of North Portland Harbor. Measured noise levels used to assess noise levels near future LRT alignment.

Sound Level Results

LDN:	74
Daytime Average:	69.2
Nighttime Average:	66.6
Peak Hour:	73.3
Peak Hour Time:	7:00 a.m.

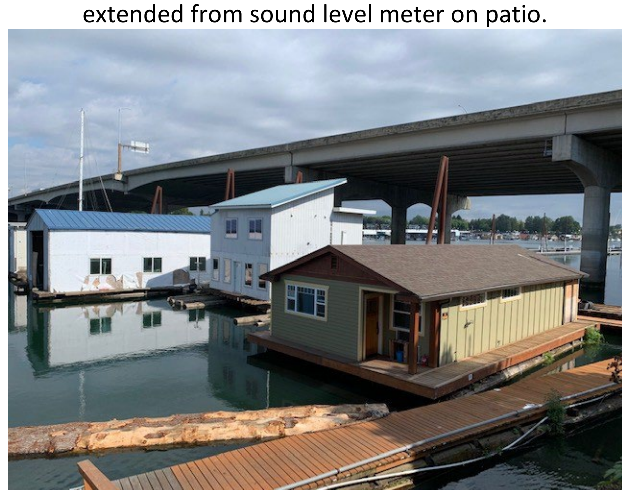
Site Layout:



LT-9 located approximately 25 feet west of the North Portland Harbor Bridge.

Photographs:

View east to North Portland Harbor Bridge with microphone extended from sound level meter on patio.



View northeast to first row of houseboats west of North Portland Harbor on south shore of Columbia River.

View northwest to additional houseboats west of North Portland Harbor on south shore of Columbia River.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-10	Address: 1250 N Anchor Way
Staff: Romero, Rubin, Doschka	Location: Residence Inn Patio/Pool
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 54◦F / 0-2 north
Instrumentation / S/N: LD720 / 0634 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/27/2022 – 4/28/2022	Start Time / Duration: 4:00 p.m. / 24-hour

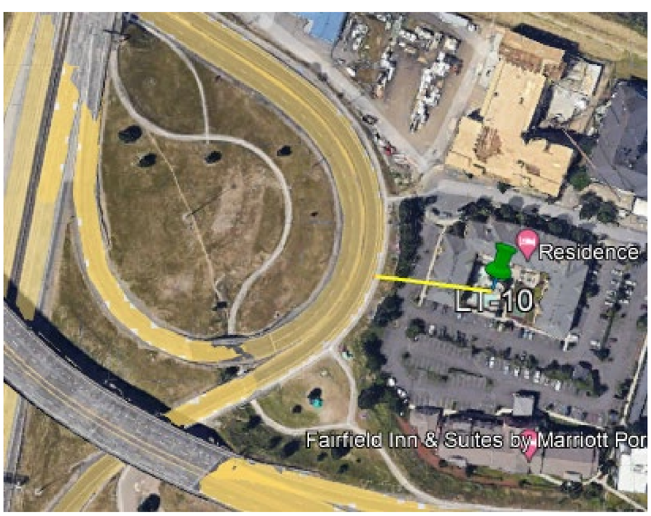
Notes:

Sound level meter contained in Pelican case with microphone extended outside case to collect hourly noise levels. Measurement conducted from Residence Inn Patio at 1250 N Anchor Way. Measured noise levels used to assess noise levels near future LRT alignment and transit station.

Sound Level Results

LDN:	66
Daytime Average:	62.3
Nighttime Average:	59.5
Peak Hour:	66
Peak Hour Time:	2:00 p.m.

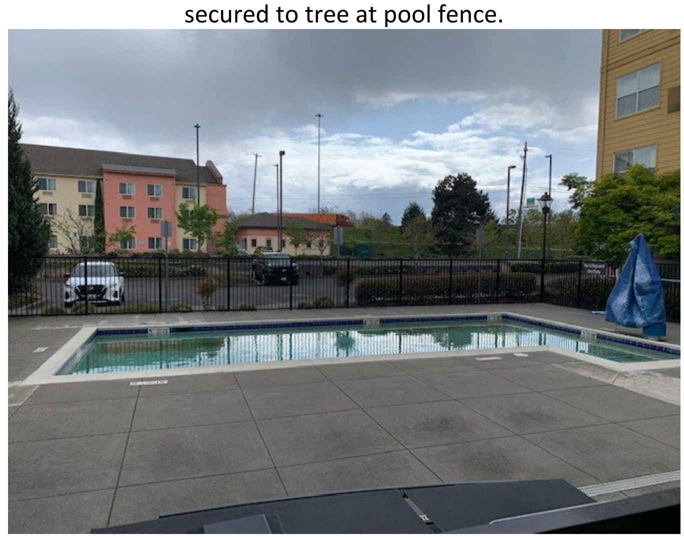
Site Layout:



LT-10 located approximately 200 feet east of the nearest I-5 ramps.

Photographs:

View south to Residence Inn Patio with sound level meter secured to tree at pool fence.



View south of pool within Residence Inn common outdoor use area south on the south side of the hotel.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-11	Address: Adjacent to 19776 SE Stark St.
Staff: Romero, Rubin, Doschka	Location: Adjacent to south of Mobile Park Plaza mobile home park
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 70◦F / 0-2 east
Instrumentation / S/N: LD720 / 0634 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/21/2022 – 9/22/2022	Start Time / Duration: 12:00 p.m. / 24-hour

Notes:

Sound level meter contained in Pelican case with microphone extended outside case to collect hourly noise levels. Measurement conducted from tree adjacent to Mobile Park Plaza at 19776 SE Stark Street. Measured noise levels used to assess noise levels near future maintenance base improvements.

Sound Level Results

LDN:	70
Daytime Average:	67.9
Nighttime Average:	62.2
Peak Hour:	71.3
Peak Hour Time:	7:00 a.m.

Site Layout:

LT-11 located approximately 400 feet north of the existing Ruby Junction Operations & Maintenance facility.

Photographs:

View south to tree where sound level meter is secured. NW Burnside is shown in the background.

View north of tree with sound level meter and Mobile Park Plaza beyond fence.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: LT-12	Address: Adjacent to Ruby Jct O&M Facility north of 1806 NW Eleven Mile Ave.
Staff: Romero, Rubin, Doschka	Location: Measurement from street tree north of 1806 NW Eleven Mile Avenue.
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 70°F / 0-2 east
Instrumentation / S/N: LD720 / 0477 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/21/2022 – 9/22/2022	Start Time / Duration: 12:00 p.m. / 24-hour

Notes:

Sound level meter contained in Pelican case with microphone extended outside case to collect hourly noise levels. Measurement conducted from tree adjacent to Ruby Junction Operations & Maintenance Facility. Measurement located north of residence at 1806 NW Eleven Mile Avenue. Measured noise levels used to assess noise levels near future maintenance base improvements.

Sound Level Results

LDN:	67
Daytime Average:	63.3
Nighttime Average:	59.4
Peak Hour:	69.2
Peak Hour Time:	2:00 p.m.

Site Layout:

LT-12 located along NW Eleven Mile Avenue with the Ruby Junction Operations & Maintenance facility located on both sides of NW Eleven Mile Avenue.

Photographs:

View northeast to tree where sound level meter is secured along NW Eleven Mile Avenue.

View south of business and residence located to south of LT-12 and tracks that run across NW Eleven Mile Ave. to the existing O&M facility.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: M4-A, M5-B, M6-C	Address: North Portland Harbor Bridge, Hayden Island
Staff: Romero, Wolff, Jaeger	Location: Center Ave-east of bridge
Weather: Clear, no precipitation	Temperature / Wind: 66◦F
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239 SVAN971 / 80354, 80356	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/7/22	Start Time / Duration: 10:29 / 20-minute

Notes:

Measurements to assess contribution from bridge structure-borne noise. Measurements conducted along sidewalk on south side of eastbound Center Avenue. Measurements were conducted were planned for longer durations; however, consistent free flow traffic is not common in this area of I-5.

Photographs:

Sample photo of setup of west measurements as photos from east measurements weren't recoverable.

Sample photos of setup of west measurements as photos from east measurements weren't recoverable.

Sound Level Results

Leq Drip Line, M4-A:	74.1
Leq 50 feet west of Drip Line, M5-B:	72.7
Leq 90 feet west of Drip Line, M6-C:	70.9

Concurrent Traffic Count (20-minute)

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	I-5 NB		I-5 SB	
Autos	1049	50	1360	50
Medium Trucks	57	50	44	50
Heavy Trucks	135	50	155	50
Motos	1	50	12	50
Buses	0	0	0	0
	I-5 NB off			
Autos	131	60		
Medium Trucks	0	0		
Heavy Trucks	0	0		
Motos	0	0		
Buses	0	0		
	Center WB		Center EB	
Autos	45	20	15	20
Medium Trucks	1	20	0	0
Heavy Trucks	0	0	0	0
Motos	0	0	0	0
Buses	0	0	0	0

Site Layout:

M4-A at drip line of Portland Harbor Bridge (southbound).
M5-B 50 located feet from drip line.
M6-C located 90 feet from drip line.
Measurement data for M1-A, M2-B, M3-C provided on separate field data sheet.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: M1-A, M2-B, M3-C	Address: North Portland Harbor Bridge, Hayden Island
Staff: Romero, Wolff, Jaeger	Location: Center Ave, west of bridge
Weather: Clear, no precipitation	Temperature / Wind: 62◦F
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239 SVAN971 / 80354, 80356	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/6/22	Start Time / Duration: 12:27 / 20-minute

Notes:

Measurements to assess contribution from bridge structure-borne noise. Measurements conducted along sidewalk on south side of eastbound Center Avenue. Measurements were conducted were planned for longer durations; however, consistent free flow traffic is not common in this area of I-5.

Photographs:

View east to M1-A at drip line of I-5 bridge deck.

View east to M3-C, M2-B, and M1-A at drip line.

Sound Level Results

Leq Drip Line, M1-A:	73.0
Leq 65 feet west of Drip Line, M2-B:	71.5
Leq 110 feet west of Drip Line, M3-C:	70.1

Concurrent Traffic Count (20-minute)

	Roadway / Direction	Speed (mph)	Roadway / Direction	Speed (mph)
	I-5 NB		I-5 SB	
Autos	1117	50	1213	50
Medium Trucks	67	50	30	50
Heavy Trucks	163	50	161	50
Motos	3	50	3	50
Buses	0	0	0	0
	I-5 NB off			
Autos	142	50		
Medium Trucks	0	0		
Heavy Trucks	0	0		
Motos	0	0		
Buses	0	0		
	Center WB		Center EB	
Autos	40	20	20	20
Medium Trucks	4	20	1	20
Heavy Trucks	0	0	1	20
Motos	0	0	0	0
Buses	0	0	0	0

Site Layout:

M1-A at drip line of Portland Harbor Bridge (southbound).
M2-B 65 located feet from drip line.
M3-C located 110 feet from drip line.
Measurement data for M4-A, M5-B, M6-C provided on separate field data sheet.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-1	Address: None.
Staff: Romero, Rubin, Doschka	Location: Burdt Bridge Creek/ Greenway Bike Trail
Weather: Clear, no precipitation	Temperature / Wind (mph): 86◦F / 0-2 south
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 8/1/2022	Start Time / Duration: 4:46 p.m. / 15-minute

Notes:

Noise measurement conducted on trail facing I-5 to the west. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west and I-5 beyond local road.

View north along trail.

Sound Level Results

Leq:	67.1
Lmax:	70.9
Lmin:	64.0
L90:	65.5
L50:	67.0
L10:	68.1
L1:	69.4

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB	742	20	39	6
mph	75	75	75	75
I-5 NB	1011	31	11	6
mph	75	75	75	75
I-5 NB Ramp	136	0	0	0
mph	70	0	0	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB	2968	80	156	24
mph	75	75	75	75
I-5 NB	4044	124	44	24
mph	75	75	75	75
I-5 NB Ramp	544	0	0	0
mph	70	0	0	0

Site Layout:

ST-1 located approximately 225 feet east of I-5.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-2	Address: 800 40th Street
Staff: Romero, Rubin, Doschka	Location: Discovery Middle School, Parking east lot
Weather: Clear, no precipitation	Temperature / Wind (mph): 69∘F / 0-1 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 8/2/2022	Start Time / Duration: 9:17 a.m. / 10-minute

Notes:

Noise measurement conducted on east side of school parking lot facing I-5 to the east. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View from school parking lot east to I-5.

View west to school entrance from parking lot.

Sound Level Results

Leq:	77.2
Lmax:	81.4
Lmin:	68.8
L90:	74.9
L50:	77.2
L10:	79.2
L1:	80.4

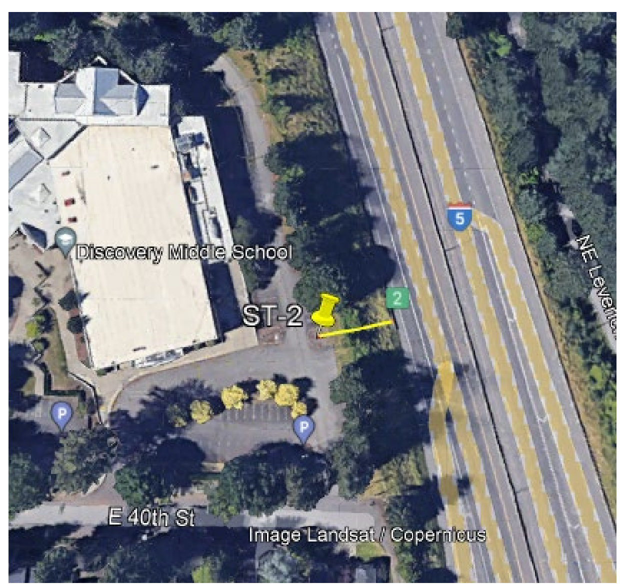
Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	367	0	57	6
mph	65	0	65	65
I-5 SB	498	26	46	0
mph	65	65	60	0
I-5 SB Off-Ramp	49	0	0	0
mph	50	0	0	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2202	0	342	36
mph	65	0	65	65
I-5 SB	2988	156	276	0
mph	65	65	60	0
I-5 SB Off-Ramp	294	0	0	0
mph	50	0	0	0

Site Layout:



ST-2 located approximately 75 feet west of I-5.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-3	Address: None
Staff: Romero, Rubin, Doschka	Location: Burdt Bridge Creek Park, picnic and disc golf
Weather: Clear, no precipitation	Temperature / Wind (mph): 85◦F / 0-1 south
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 8/1/2022	Start Time / Duration: 4:29 p.m. / 10-minute

Notes:

Noise measurement conducted at picnic area adjacent to disc golf course facing SR 500/I-5 I/C to southwest. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View to SR 500 and I-5 to southwest.

View north to picnic table and disc golf course.

Sound Level Results

Leq:	57.4
Lmax:	66.4
Lmin:	54.4
L90:	55.8
L50:	56.8
L10:	58.4
L1:	62.5

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB	484	8	29	3
Mph	65	65	65	65
I-5 NB	647	22	13	3
Mph	65	65	65	65
I-5 NB On-Ramp	87	0	0	0
mph	50	0	0	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB	2904	48	174	18
mph	65	65	65	65
I-5 NB	3882	132	78	18
mph	65	65	65	65
I-5 NB On-Ramp	522	0	0	0
mph	50	0	0	0

Site Layout:

ST-3 located approximately 290 feet north of SR 500.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-4	Address: 9721 H Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to residence
Weather: Clear, no precipitation	Temperature / Wind (mph): 70∘F / 0-3 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 8/2/2022	Start Time / Duration: 9:40 a.m. / 15-minute

Notes:

Noise measurement conducted adjacent to north of residence at 9721 H Street facing I-5 to the east. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5 and SB on-ramps.

View south to residence.

Sound Level Results

Leq:	56.1
Lmax:	63.1
Lmin:	51.4
L90:	53.8
L50:	55.7
L10:	57.8
L1:	60.9

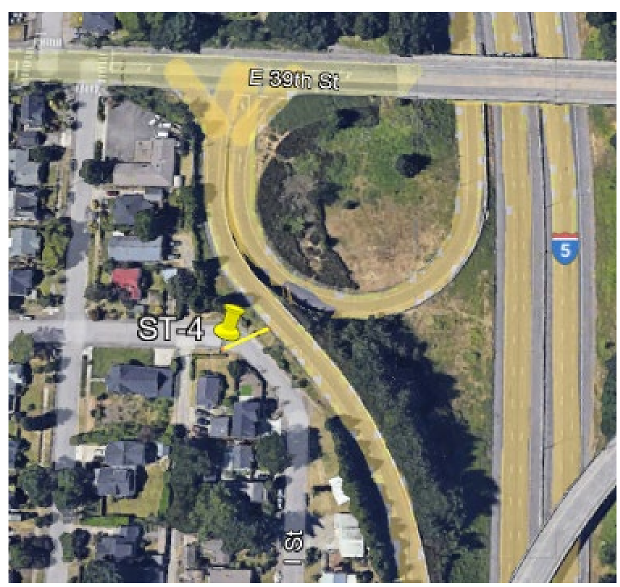
Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	587	2	68	4
mph	60	60	60	60
I-5 SB	651	22	59	4
mph	60	60	60	60
SB on-ramps	237	4	0	0
mph	30	30	0	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2348	8	272	16
mph	60	60	60	60
I-5 SB	2604	88	236	16
mph	60	60	60	60
SB on-ramps	948	16	0	0
mph	30	30	0	0

Site Layout:



ST-4 located approximately 65 feet west of I-5 on-ramp from E 39th Street.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-5	Address: 3617 K Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to residence
Weather: Clear, no precipitation	Temperature / Wind (mph): 65◦F / 0-4 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 7/1/2022	Start Time / Duration: 10:40 a.m. / 10-minute

Notes:

Noise measurement conducted adjacent to north of residence at 3617 K Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west to I-5 depressed south of SR 500.

View south to residence at 3617 K Street.

Sound Level Results

Leq:	67.1
Lmax:	69.7
Lmin:	64.1
L90:	65.7
L50:	67.0
L10:	68.2
L1:	69.4

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	476	21	46	0
mph	65	65	65	0
I-5 NB off-ramps	202	6	4	0
mph	65	65	65	0
I-5 SB	520	19	30	2
mph	65	65	65	65

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2856	126	276	0
mph	65	65	65	0
I-5 NB off-ramps	1212	36	24	0
mph	65	65	65	0
I-5 SB	3120	114	180	12
mph	65	65	65	65

Site Layout:

ST-5 located approximately 230 feet east of I-5 mainline.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-6	Address: 3601 & 3603 I Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to residence
Weather: Clear, no precipitation	Temperature / Wind (mph): 83◦F / 0-1 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 8/2/2022	Start Time / Duration: 3:02 p.m. / 15-minute

Notes:

Noise measurement conducted adjacent to south of residences at 3601 & 3603 I Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5 southbound noise wall at E 36th Street.

View north to duplex at 3601 & 3603 I Street.

Sound Level Results

Leq:	62.2
Lmax:	73.6
Lmin:	56.6
L90:	58.9
L50:	61.9
L10:	64.0
L1:	68.0

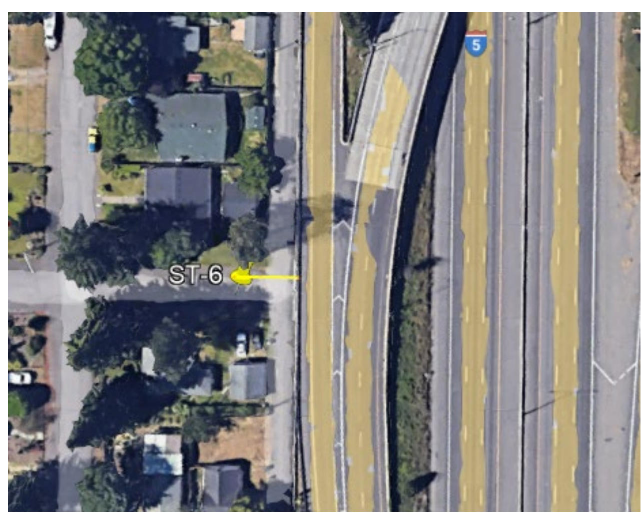
Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	1372	5	51	9
mph	65	65	65	65
I-5 SB	572	34	47	3
mph	65	65	65	60
I-5 SB ramps	288	4	1	1
mph	55	55	55	55

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	5488	20	204	36
mph	65	65	65	65
I-5 SB	2288	136	188	12
mph	65	65	65	60
I-5 SB ramps	1152	16	4	4
mph	55	55	55	55

Site Layout:



ST-6 located approximately 50 feet west of I-5 southbound ramps from E 39th St and SR 500.

Noise Measurement Data Sheet

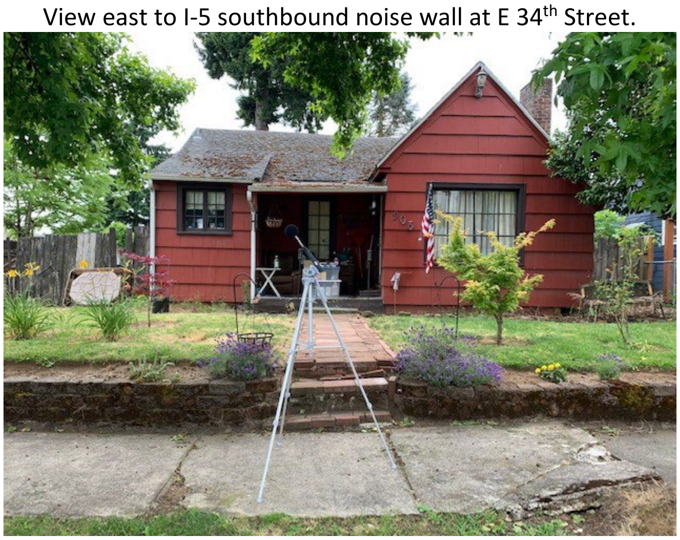
Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-7	Address: 905 E 34th Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to residence
Weather: Mostly Clear, no precipitation	Temperature / Wind (mph): 75◦F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/30/2022	Start Time / Duration: 11:22 a.m. / 15-minute

Notes:

Noise measurement conducted adjacent to north of residence at 905 E 34th Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5 southbound noise wall at E 34th Street.



View south to residence at 905 E 34th Street.

Sound Level Results

Leq:	67.2
Lmax:	71.7
Lmin:	62.2
L90:	65.2
L50:	67.1
L10:	68.6
L1:	69.9

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	955	43	86	3
mph	65	65	60	65
I-5 SB	686	8	82	3
mph	75	75	75	75
I-5 SB ramps	348	20	10	0
mph	75	75	75	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	3820	172	344	12
mph	65	65	60	65
I-5 SB	2744	32	328	12
mph	75	75	75	75
I-5 SB ramps	1392	80	40	0
mph	75	75	75	0

Site Layout:

ST-7 located approximately 100 feet west of I-5 southbound ramps from E 39th St and SR 500.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-8	Address: 3307 K Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to residence
Weather: Overcast, no precipitation	Temperature / Wind (mph): 66◦F / 0-1 north
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 7/1/2022	Start Time / Duration: 9:48 a.m. / 15-minute

Notes:

Noise measurement conducted adjacent to west of residence at 3307 K Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west to I-5 depressed in this area north of E 33rd Street.

View east to residence at 3307 K Street.

Sound Level Results

Leq:	62.5
Lmax:	66.4
Lmin:	59.1
L90:	61.2
L50:	62.4
L10:	63.7
L1:	65.1

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	633	38	84	3
mph	65	65	65	65
I-5 SB	726	15	44	0
mph	65	65	65	0
I-5 NB ramp	257	4	6	1
mph	55	55	55	55

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2532	152	336	12
mph	65	65	65	65
I-5 SB	2904	60	176	0
mph	65	65	65	0
I-5 NB ramp	1028	16	24	4
mph	55	55	55	55

Site Layout:

ST-8 located approximately 200 feet east of I-5 northbound off-ramps to E 39th St and SR 500.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-9	Address: 902 E 30th Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to residence
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 75◦F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/30/2022	Start Time / Duration: 11:45 a.m. / 10-minute

Notes:

Noise measurement conducted adjacent to south of residence at 902 E 30th Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5 depressed in this area north of E 29th Street.

View north to residence at 902 E 30th Street.

Sound Level Results

Leq:	63.2
Lmax:	70.0
Lmin:	60.0
L90:	61.6
L50:	63.2
L10:	64.4
L1:	66.7

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	656	31	4	3
mph	60	60	55	55
I-5 SB	471	21	54	1
mph	65	65	65	65
I-5 SB ramp	233	8	5	0
mph	65	65	65	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	3936	186	24	18
mph	60	60	55	55
I-5 SB	2826	126	324	6
mph	65	65	65	65
I-5 SB ramp	1398	48	30	0
mph	65	65	65	0

Site Layout:

ST-9 located approximately 130 feet west of I-5 southbound.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-10	Address: 2914 K Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to residence
Weather: Cloudy, no precipitation	Temperature / Wind (mph): 73◦F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/30/2022	Start Time / Duration: 10:42 a.m. / 10-minute

Notes:

Noise measurement conducted adjacent to south of residence at 2914 K Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west to I-5 depressed in this area north of E 29th Street.

View south to residence at 2914 K Street.

Sound Level Results

Leq:	66.1
Lmax:	71.2
Lmin:	63.6
L90:	61.0
L50:	66.0
L10:	67.8
L1:	69.3

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	575	24	49	0
mph	60	60	55	0
I-5 SB	409	9	4	1
mph	65	65	65	65
I-5 NB ramp	232	13	5	2
mph	65	65	65	65

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	3450	144	294	0
mph	60	60	55	0
I-5 SB	2454	54	24	6
mph	65	65	65	65
I-5 NB ramp	1392	78	30	12
mph	65	65	65	65

Site Layout:

ST-10 located approximately 110 feet east of I-5 northbound.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-11	Address: 2716 K Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to residence
Weather: Clear, no precipitation	Temperature / Wind (mph): 80°F / 0-4 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/30/2022	Start Time / Duration: 4:17 p.m. / 10-minute

Notes:

Noise measurement conducted adjacent to north of residence at 2716 K Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west to I-5 depressed in this area south of E 29th Street.

View south to residence at 2716 K Street.

Sound Level Results

Leq:	66.0
Lmax:	75.9
Lmin:	61.6
L90:	64.2
L50:	65.9
L10:	67.4
L1:	68.5

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	1055	26	26	5
mph	60	60	60	60
I-5 SB	676	9	38	3
mph	65	65	65	65
I-5 SB ramp	83	0	2	4
mph	55	0	55	55

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	6330	156	156	30
mph	60	60	60	60
I-5 SB	4056	54	228	18
mph	65	65	65	65
I-5 SB ramp	498	0	12	24
mph	55	0	55	55

Site Layout:

ST-11 located approximately 100 feet east of the I-5 northbound on ramp from E 4th Plain Blvd.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-12	Address: 900 E 27th Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to residence
Weather: Clear, no precipitation	Temperature / Wind (mph): 78◦F / 0-3 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/30/2022	Start Time / Duration: 2:45 p.m. / 10-minute

Notes:

Noise measurement conducted adjacent to south of residence at 900 E 27th Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to noise wall along J Street with I-5 depressed in this area north of E 4th Plain Blvd.

View north to residence at 900 E 27th Street.

Sound Level Results

Leq:	64.7
Lmax:	70.0
Lmin:	61.6
L90:	63.1
L50:	64.5
L10:	66.0
L1:	68.4

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	881	20	42	4
mph	60	60	55	60
I-5 SB	608	16	28	1
mph	55	55	55	60
I-5 SB ramp	78	1	3	1
mph	55	55	55	55

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	5286	120	252	24
mph	60	60	55	60
I-5 SB	3648	96	168	6
mph	55	55	55	60
I-5 SB ramp	468	6	18	6
mph	55	55	55	55

Site Layout:

ST-12 located approximately 70 feet west of the I-5 southbound off ramp to E 4th Plain Blvd.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-13	Address: Fort Vancouver Military Cemetery
Staff: Romero, Rubin, Doschka	Location: Benches near entrance
Weather: Overcast, no precipitation	Temperature / Wind (mph): 75∘F / 0-4 northeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/21/2022	Start Time / Duration: 4:50 p.m. / 10-minute

Notes:

Noise measurement conducted adjacent to benches at cemetery entrance north of 4th Plain Blvd. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View southwest to I-5/4th Plain Blvd interchange.

View south to 4th Plain Blvd.

Sound Level Results

Leq:	62.0
Lmax:	67.0
Lmin:	57.1
L90:	59.6
L50:	62.0
L10:	63.5
L1:	65.7

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	914	8	24	6
mph	55	55	55	55
I-5 SB	646	2	37	3
mph	60	60	60	60
4th Plain EB	163	3	0	0
mph	35	35	0	0
4th Plain WB	212	1	0	0
mph	40	40	0	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	5484	48	144	36
mph	55	55	55	55
I-5 SB	3876	12	222	18
mph	60	60	60	60
4th Plain EB	978	18	0	0
mph	35	35	0	0
4th Plain WB	1272	6	0	0
mph	40	40	0	0

Site Layout:

ST-13 located approximately 80 feet north of E 4th Plain Blvd east of I-5.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-14	Address: Arnada Park Benches
Staff: Romero, Rubin, Doschka	Location: Benches near 4th Plain Blvd.
Weather: Overcast, no precipitation	Temperature / Wind (mph): 74◦F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/21/2022	Start Time / Duration: 4:25 p.m. / 15-minute

Notes:

Noise measurement conducted adjacent to benches at north end of Arnada Park, south of 4th Plain Blvd. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View northeast to 4th Plain Blvd and I-5.

View southeast to benches and playground.

Sound Level Results

Leq:	63.0
Lmax:	72.8
Lmin:	55.8
L90:	58.6
L50:	61.6
L10:	65.3
L1:	70.5

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	1501	8	45	7
mph	60	60	60	60
I-5 SB	1052	3	46	9
mph	60	60	60	60
4th Plain EB	197	3	3	0
mph	35	35	35	0
4th Plain WB	184	2	3	0
mph	35	35	35	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	6004	32	180	28
mph	60	60	60	60
I-5 SB	4208	12	184	36
mph	60	60	60	60
4th Plain EB	788	12	12	0
mph	35	35	35	0
4th Plain WB	736	8	12	0
mph	35	35	35	0

Site Layout:

ST-14 located approximately 40 feet south of E 4th Plain Blvd, west of I-5.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-15	Address: Vancouver Barracks National Cemetery
Staff: Romero, Rubin, Doschka	Location: West side of cemetery
Weather: Clear, no precipitation	Temperature / Wind (mph): 72◦F / 0-4 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/29/2022	Start Time / Duration: 3:06 p.m. / 15-minute

Notes:

Noise measurement conducted on the west side of Vancouver Barracks National Cemetery facing I-5. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5 depressed in this area north of E 4th Plain Blvd.

View northeast to cemetery grounds.

Sound Level Results

Leq:	70.8
Lmax:	83.2
Lmin:	66.4
L90:	68.7
L50:	70.3
L10:	72.0
L1:	75.9

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	1234	20	39	9
mph	60	60	60	60
I-5 SB	888	20	65	3
mph	60	60	60	60

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	4936	80	156	36
mph	60	60	60	60
I-5 SB	3552	80	260	12
mph	60	60	60	60

Site Layout:

ST-15 located approximately 150 feet east of the I-5 northbound mainline.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-16	Address: 821 E 22nd Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to residence
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 60◦F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 5/20/2022	Start Time / Duration: 3:35 p.m. / 10-minute

Notes:

Noise measurement conducted adjacent to north of residence at 821 E 22nd Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:


View east to noise wall and I-5.


View south to residence at 821 E 22nd Street.

Sound Level Results

Leq:	66.9
Lmax:	70.5
Lmin:	63.2
L90:	65.5
L50:	66.7
L10:	68.0
L1:	69.3

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB off to 4th Plain	95	0	3	0
mph	35	0	35	0
I-5 NB	915	4	23	7
mph	65	65	55	65
I-5 SB	671	21	27	2
mph	65	65	65	65
I-5 SB on from 4th Plain	63	0	3	0
mph	45	0	45	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB off to 4th Plain	570	0	18	0
mph	35	0	35	0
I-5 NB	5490	24	138	42
mph	65	65	55	65
I-5 SB	4026	126	162	12
mph	65	65	65	65
I-5 SB on from 4th Plain	378	0	18	0
mph	45	0	45	0

Site Layout:

ST-16 located approximately 85 feet west of I-5 southbound on-ramp from 4th Plain Blvd.

Noise Measurement Data Sheet

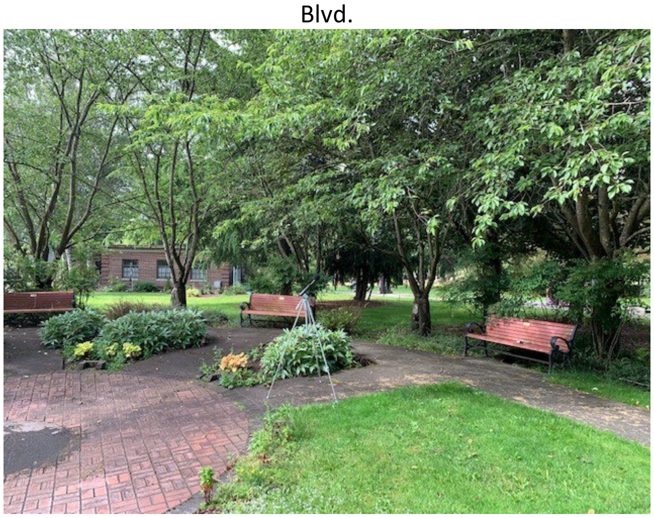
Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-17	Address: Veterans Affairs Medical Ctr
Staff: Romero, Rubin, Doschka	Location: Veterans Garden/Museum
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 64◦F / 0-3 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/29/2022	Start Time / Duration: 9:44 a.m. / 15-minute

Notes:

Noise measurement conducted at VA garden and museum grounds facing I-5 to the west. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west to I-5 depressed in this area south of E 4th Plain Blvd.



View south to garden and museum grounds.

Sound Level Results

Leq:	59.1
Lmax:	66.5
Lmin:	55.6
L90:	57.3
L50:	58.9
L10:	60.4
L1:	61.9

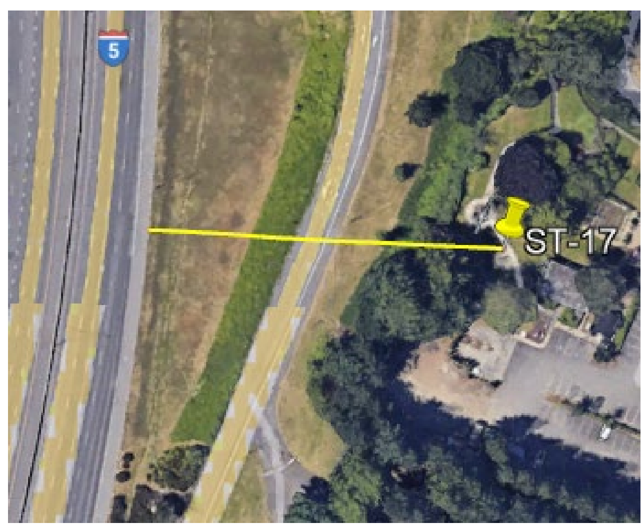
Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	702	28	96	3
mph	60	60	55	60
I-5 SB	980	26	61	4
mph	65	65	60	65

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2808	112	384	12
mph	60	60	55	60
I-5 SB	3920	104	244	16
mph	65	65	60	65

Site Layout:



ST-17 located approximately 350 feet east of the I-5 northbound mainline.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-18	Address: Athletic field north of E McLoughlin Blvd.
Staff: Romero, Rubin, Doschka	Location: Baseball Field
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 65°F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/29/2022	Start Time / Duration: 10:15 a.m. / 15-minute

Notes:

Noise measurement conducted at baseball field west of Clark College Annex and north of E McLoughlin Blvd. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west to I-5.

View south to athletic field and walking path.

Sound Level Results

Leq:	60.9
Lmax:	66.6
Lmin:	57.4
L90:	59.2
L50:	60.5
L10:	62.2
L1:	64.8

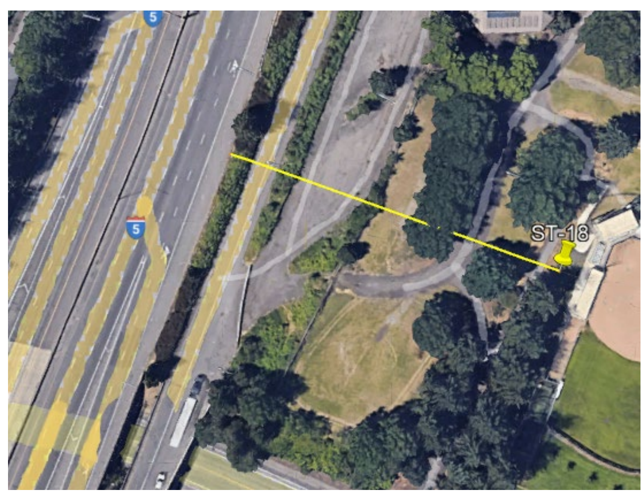
Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	725	27	78	0
mph	60	60	60	0
I-5 SB	953	32	79	4
mph	65	65	60	65

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2900	108	312	0
mph	60	60	60	0
I-5 SB	3812	128	316	16
mph	65	65	60	65

Site Layout:



ST-18 located approximately 360 feet east of the I-5 northbound mainline and north of E McLoughlin Blvd.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-19	Address: 1800 W Reserve Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to apartments
Weather: Clear, no precipitation	Temperature / Wind (mph): 67◦F / 0-4 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/29/2022	Start Time / Duration: 1:56 p.m. / 15-minute

Notes:

Noise measurement conducted adjacent to apartments at 1800 W Reserve Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:


View east to I-5.


View north to apartments at 1800 W Reserve Street.

Sound Level Results

Leq:	69.9
Lmax:	75.8
Lmin:	64.7
L90:	67.2
L50:	69.4
L10:	71.9
L1:	74.3

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	959	31	66	7
mph	60	60	55	60
I-5 SB	912	21	105	3
mph	60	60	55	60

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	3836	124	264	28
mph	60	60	55	60
I-5 SB	3648	84	420	12
mph	60	60	55	60

Site Layout:

ST-19 located approximately 80 feet west of the I-5, north of E McLoughlin Blvd.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-20	Address: 608 15th Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to residence
Weather: Clear, no precipitation	Temperature / Wind (mph): 65°F / 0-4 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/29/2022	Start Time / Duration: 12:48 p.m. / 15-minute

Notes:

Noise measurement conducted adjacent to apartments at 1800 W Reserve Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5.

View north to residence at 608 15th Street.

Sound Level Results

Leq:	67.0
Lmax:	73.0
Lmin:	62.9
L90:	65.3
L50:	66.8
L10:	68.4
L1:	70.5

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	905	27	78	4
mph	60	60	55	60
I-5 SB	969	35	114	4
mph	55	55	50	55
I-5 NB on	104	2	6	0
mph	45	45	40	0
I-5 SB off	76	2	5	0
mph	45	45	40	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	3620	108	312	16
mph	60	60	55	60
I-5 SB	3876	140	456	16
mph	55	55	50	55
I-5 NB on	414	6	24	0
mph	45	45	40	0
I-5 SB off	303	6	18	0
mph	45	45	40	0

Site Layout:

ST-20 located approximately 80 feet west of the I-5 southbound off-ramp to E Mill Plain Blvd.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-21	Address: Marshall Park
Staff: Romero, Rubin, Doschka	Location: Center of Horse-Shoe Pits
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 63◦F / 0-4 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 6/29/2022	Start Time / Duration: 10:45 a.m. / 10-minute

Notes:

Noise measurement conducted at center of westernmost horse-shoe pits east of I-5. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west to I-5 NB off-ramp to E 4th Plain Blvd.

View south to horse-shoe pits at Marshall Park.

Sound Level Results

Leq:	68.0
Lmax:	76.0
Lmin:	61.0
L90:	64.4
L50:	67.8
L10:	70.8
L1:	71.9

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	473	26	48	5
mph	60	60	55	60
I-5 SB	649	19	48	3
mph	65	65	60	65
I-5 NB off ramp	51	1	2	0
mph	45	45	45	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2838	156	288	30
mph	65	60	60	65
I-5 SB	3894	114	288	18
mph	65	65	60	65
I-5 NB off ramp	304	3	14	0
mph	45	45	45	0

Site Layout:

ST-21 located approximately 80 feet west of the I-5 southbound off-ramp to E Mill Plain Blvd.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-22	Address: E 15th Street/ E Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to Midtown Apts.
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 73◦F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/21/2022	Start Time / Duration: 3:24 p.m. / 15-minute

Notes:

Noise measurement conducted at corner of E 15th Street and E Street, adjacent to the Milltown Apartments. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View south to E 15th Street with arterial in background.

View east along E 15th Street towards I-5.

Sound Level Results

Leq:	64.6
Lmax:	84.0
Lmin:	57.4
L90:	60.2
L50:	62.1
L10:	66.3
L1:	71.8

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	1138	16	38	5
mph	60	60	60	60
I-5 SB	892	2	71	4
mph	55	55	55	55
Mill Plain EB	187	6	0	0
mph	35	35	0	0
E 15th Street WB	232	6	12	0
mph	35	35	35	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	4552	64	152	20
mph	60	60	60	60
I-5 SB	3568	8	284	16
mph	55	55	55	55
Mill Plain EB	748	24	0	0
mph	35	35	0	0
E 15th Street WB	928	24	48	0
mph	35	35	35	0

Site Layout:

ST-22 located approximately 80 feet west of the I-5 southbound off-ramp to E Mill Plain Blvd.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-23	Address: E 15th Street/ E Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to Midtown Apts.
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 72◦F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/21/2022	Start Time / Duration: 2:58 p.m. / 15-minute

Notes:

Noise measurement conducted at benches located on the south side of Marshall Park near Mill Plain Blvd. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View south to E Mill Plain Blvd.

View west along walking path with I-5 in background.

Sound Level Results

Leq:	62.8
Lmax:	77.1
Lmin:	58.8
L90:	61.1
L50:	62.1
L10:	63.8
L1:	67.6

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	1014	15	33	6
mph	60	60	60	60
I-5 SB	731	4	61	5
mph	55	55	55	55
Mill Plain EB	110	3	0	0
mph	30	30	0	0
Mill Plain WB	177	6	1	0
mph	30	30	30	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	4056	60	132	24
mph	60	60	60	60
I-5 SB	2924	16	244	20
mph	55	55	55	55
Mill Plain EB	440	12	0	0
mph	30	30	0	0
Mill Plain WB	708	24	4	0
mph	30	30	30	0

Site Layout:

ST-23 located at benches located on the south side of Marshall Park approximately 165 feet north of E Mill Plain Blvd.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-24	Address: 500 E 13th Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to Hudson Apts.
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 60∘F / 0-4 south
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 5/20/2022	Start Time / Duration: 2:40 p.m. / 10-minute

Notes:

Noise measurement conducted adjacent to east of the patios at the Hudson Apartments facing I-5. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5.

View west to patios at the Hudson Apartments.

Sound Level Results

Leq:	66.5
Lmax:	81.4
Lmin:	62.2
L90:	65.2
L50:	64.8
L10:	69.8
L1:	77.8

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB On-Ramp	131	0	13	0
mph	45	0	45	0
I-5 SB	548	0	49	0
mph	65	0	65	0
I-5 NB	661	7	19	1
mph	60	60	60	60
NB Off-Ramp to 4th	55	0	4	0
mph	55	0	55	0
NB Off-Ramp to MP	88	0	3	0
mph	55	0	55	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB On-Ramp	524	0	52	0
mph	45	0	45	0
I-5 SB	3192	0	196	0
mph	65	0	65	0
I-5 NB	2644	28	76	4
mph	60	60	60	60
NB Off-Ramp to 4th	220	0	16	0
mph	55	0	55	0
NB Off-Ramp to MP	352	0	12	0
mph	55	0	55	0

Site Layout:

ST-24 located approximately 265 feet west of the I-5 southbound mainline.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-25	Address: 401 E 13th Street
Staff: Romero, Rubin, Doschka	Location: Adjacent to hotel pool
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 59◦F / 0-2 south
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 5/20/2022	Start Time / Duration: 2:15 p.m. / 15-minute

Notes:

Noise measurement conducted adjacent to south of pool at Comfort Inn. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5.

View north to hotel pool beyond fence.

Sound Level Results

Leq:	63.7
Lmax:	66.8
Lmin:	61.3
L90:	62.6
L50:	63.7
L10:	65.0
L1:	65.7

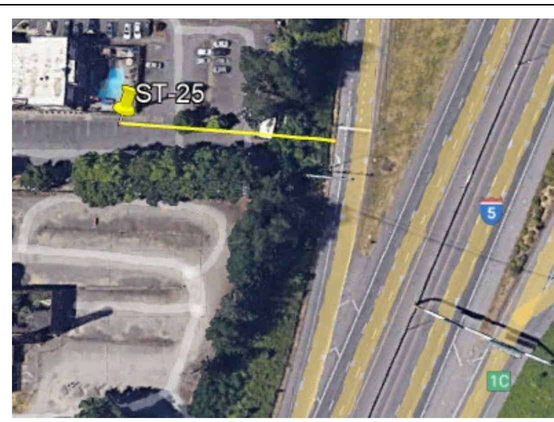
Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB On-Ramp	209	0	18	0
mph	45	0	45	0
I-5 SB	719	0	58	0
mph	60	0	60	0
I-5 NB	974	11	37	7
mph	60	60	60	60
NB Off-Ramp to 4th	122	0	6	0
mph	45	0	45	0
NB Off-Ramp to MP	95	0	11	0
mph	35	0	35	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB On-Ramp	836	0	72	0
mph	45	0	45	0
I-5 SB	2876	0	232	0
mph	60	0	60	0
I-5 NB	3896	44	148	28
mph	60	60	60	60
NB Off-Ramp to 4th	488	0	24	0
mph	45	0	45	0
NB Off-Ramp to MP	380	0	44	0
mph	35	0	35	0

Site Layout:



ST-25 located approximately 200 feet west of the I-5 southbound on-ramp from E Mill Plain Blvd.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-26	Address: 650 Officers Row
Staff: Romero, Rubin, Doschka	Location: Fort Vancouver
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 54°F / 0-4 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 5/19/2022	Start Time / Duration: 3:45 p.m. / 15-minute

Notes:

Noise measurement conducted in front yard of office located at 650 Officers Row at Fort Vancouver. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west to I-5.

View east to Office 650 in Fort Vancouver.

Sound Level Results

Leq:	68.4
Lmax:	73.5
Lmin:	66.1
L90:	67.1
L50:	68.5
L10:	69.5
L1:	70.5

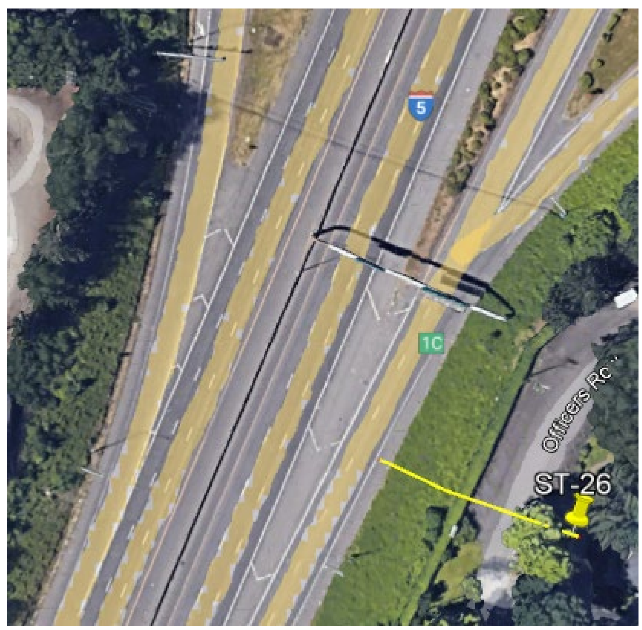
Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	1247	12	62	2
mph	60	60	55	60
I-5 SB	887	23	62	2
mph	60	60	60	60

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	4988	48	248	8
mph	60	60	55	60
I-5 SB	3548	92	248	8
mph	60	60	60	60

Site Layout:



ST-26 located approximately 150 feet east of the I-5 northbound off-ramp to E Mill Plain Blvd.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-27	Address: 901 C Street
Staff: Romero, Rubin, Doschka	Location: Vancouver Community Library, parking lot to east
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 72◦F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/21/2022	Start Time / Duration: 2:39 p.m. / 10-minute

Notes:

Noise measurement conducted at east side of parking lot at Vancouver Community Library. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View south to E Mill Plain Blvd.

View west along walking path with I-5 in background.

Sound Level Results

Leq:	69.5
Lmax:	71.6
Lmin:	65.1
L90:	67.3
L50:	68.6
L10:	70.0
L1:	70.7

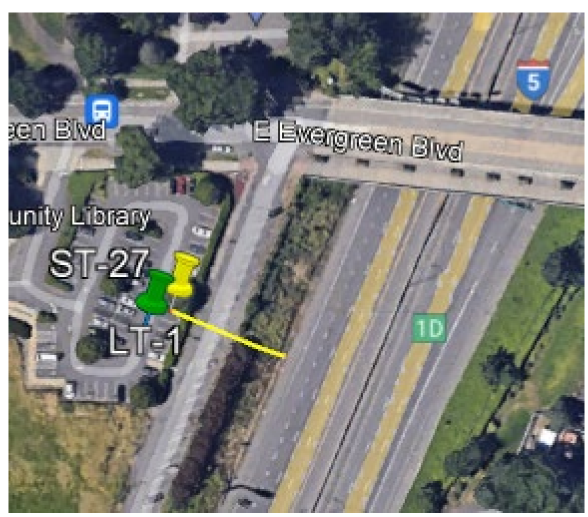
Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	838	21	41	11
mph	65	65	65	65
I-5 SB	633	4	53	1
mph	65	65	65	65
Evergreen EB	20	1	0	0
mph	20	20	0	0
Evergreen WB	20	0	0	0
mph	20	0	0	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	5028	126	246	66
mph	65	65	65	65
I-5 SB	3798	24	318	6
mph	65	65	65	65
Evergreen EB	120	6	0	0
mph	20	20	0	0
Evergreen WB	120	0	0	0
mph	20	0	0	0

Site Layout:



ST-27 located at east side of Vancouver Community Library parking lot, approximately 100 feet west of I-5. Long-Term (LT)-1 measurement described separately.

Noise Measurement Data Sheet

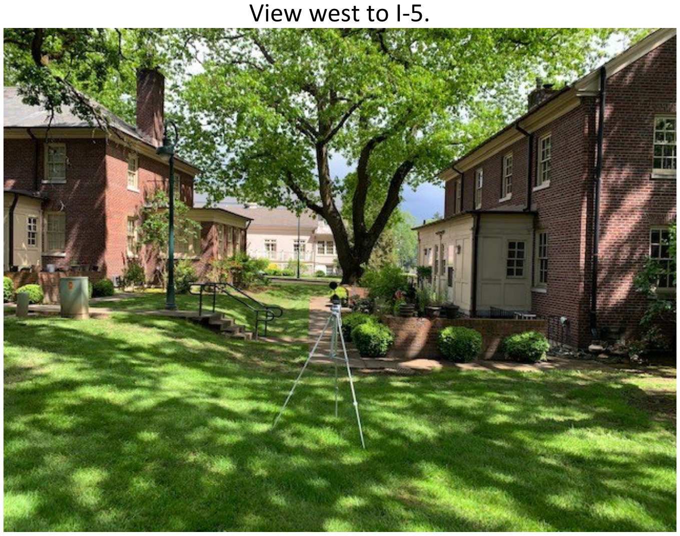
Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-28	Address: Barnes Street, Fort Vancouver
Staff: Romero, Rubin, Doschka	Location: Fort Vancouver
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 53°F / 0-4 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 5/19/2022	Start Time / Duration: 2:35 p.m. / 10-minute

Notes:

Noise measurement facing I-5, conducted in front of buildings located along Barnes Street in Fort Vancouver. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west to I-5.



View east to buildings along Barnes Street, Fort Vancouver.

Sound Level Results

Leq:	69.3
Lmax:	73.8
Lmin:	65.9
L90:	67.8
L50:	69.3
L10:	70.6
L1:	71.7

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	737	9	52	0
mph	55	60	55	0
I-5 SB	576	19	33	0
mph	55	60	55	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	4422	54	312	0
mph	55	60	55	0
I-5 SB	3456	114	198	0
mph	55	60	55	0

Site Layout:

ST-28 located approximately 125 feet east of the I-5 northbound on-ramp from SR 14.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-29	Address: 300 Block E 7th Street
Staff: Romero, Rubin, Doschka	Location: Across E 7th Street from the Normandy Apartments
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 56◦F / 0-3 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 5/19/2022	Start Time / Duration: 4:34 p.m. / 10-minute

Notes:

Noise measurement conducted across E 7th Street from the Normandy Apartments. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5.

View north to Normandy Apartments.

Sound Level Results

Leq:	73.6
Lmax:	76.7
Lmin:	70.2
L90:	72.1
L50:	73.5
L10:	74.8
L1:	75.8

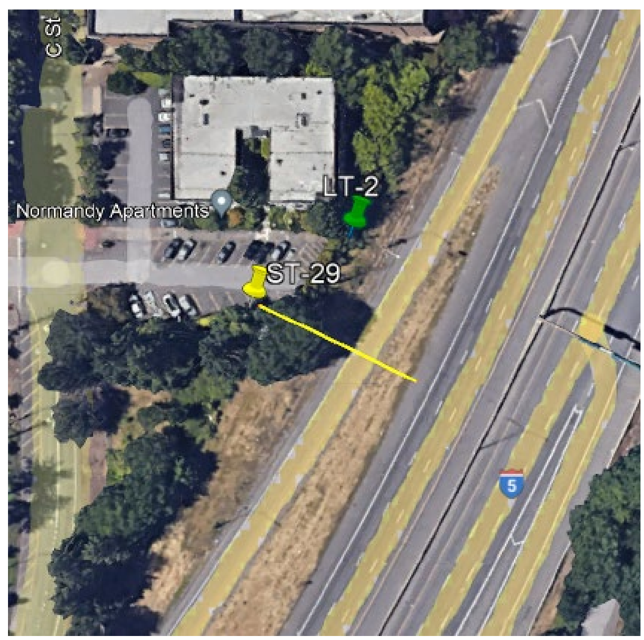
Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	1088	2	33	0
mph	50	50	50	0
I-5 SB	815	17	59	0
mph	60	60	60	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	6528	12	198	0
mph	50	50	50	0
I-5 SB	4890	102	354	0
mph	60	60	60	0

Site Layout:



ST-29 located approximately 120 feet west of the I-5 mainline. LT-2 measurement described separately.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-30	Address: W 3rd St/ Washington St
Staff: Romero, Rubin, Doschka	Location: Parking lot at W 3rd St/ Washington St
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 54°F / 0-3 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 5/20/2022	Start Time / Duration: 10:20 a.m. / 10-minute

Notes:

Noise measurement conducted adjacent to parking lot east of W 3rd Street and Washington Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5.

View southwest to parking at Hurley Building at 275 W 3rd St.

Sound Level Results

Leq:	72.3
Lmax:	77.4
Lmin:	66.6
L90:	70.3
L50:	72.0
L10:	73.8
L1:	75.6

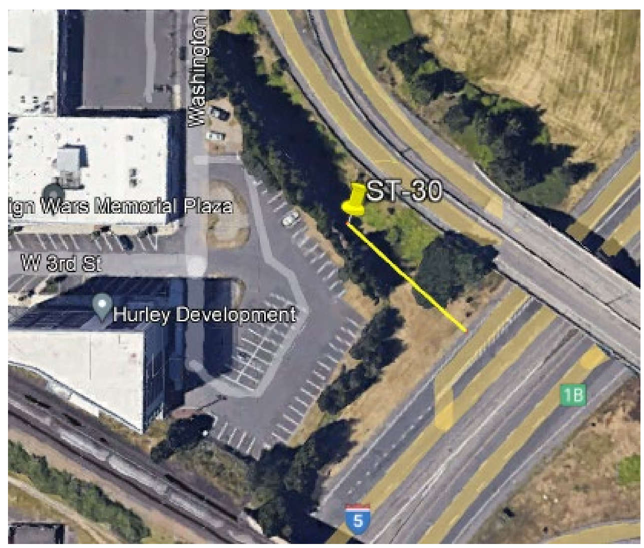
Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	474	17	72	1
mph	60	60	60	60
I-5 SB	668	22	58	2
mph	60	60	60	60

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2844	102	432	6
mph	60	60	60	60
I-5 SB	4008	132	348	12
mph	60	60	60	60

Site Layout:



ST-30 located approximately 170 feet northwest of the I-5 mainline.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-31	Address: Fort Vancouver
Staff: Romero, Rubin, Doschka	Location: Historic Cabins
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 55∘F / 0-6 northeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 5/20/2022	Start Time / Duration: 11:08 a.m. / 15-minute

Notes:

Noise measurement conducted on path south of historic cabins at Fort Vancouver. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View south to SR 14 westbound ramps.

View north to historic cabins at Fort Vancouver.

Sound Level Results

Leq:	62.5
Lmax:	67.6
Lmin:	59.2
L90:	60.8
L50:	62.5
L10:	64.8
L1:	66.1

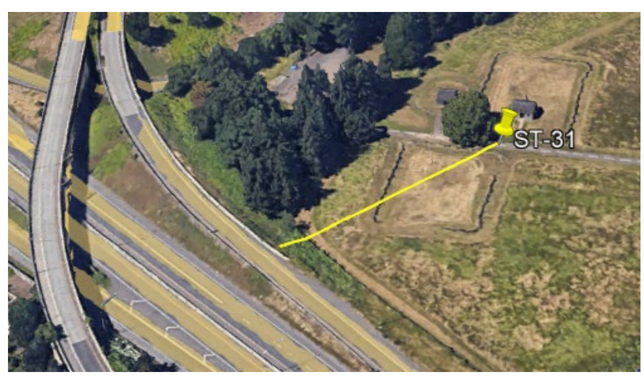
Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
SR 14 WB	341	5	12	0
mph	50	50	50	0
SR 14 EB	305	17	6	0
mph	50	50	50	0
I-5 SB Off to SR 14	168	2	5	0
mph	45	45	45	0
SR 14 WB to I-5 NB	68	8	5	0
mph	45	45	45	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
SR 14 WB	1364	20	48	0
mph	50	50	50	0
SR 14 EB	1220	68	24	0
mph	50	50	50	0
I-5 SB Off to SR 14	672	8	20	0
mph	45	45	45	0
SR 14 WB to I-5 NB	272	32	20	0
mph	45	45	45	0

Site Layout:



ST-31 located approximately 260 feet northeast of the SR 14 WB off-ramp to I-5 northbound.

Noise Measurement Data Sheet

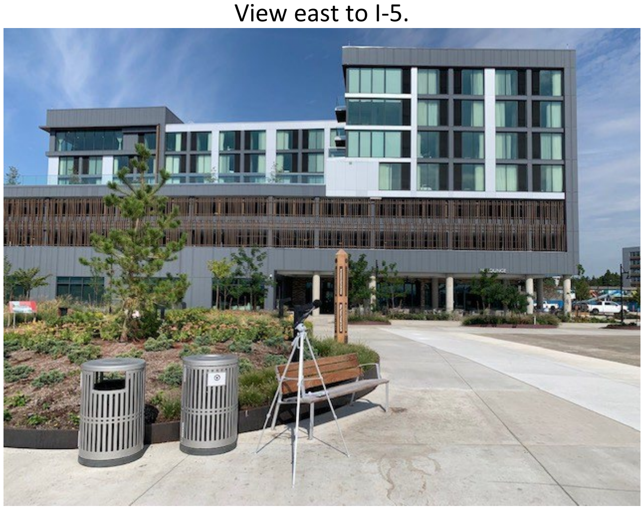
Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-32	Address: South of 100 Block of Columbia Street
Staff: Romero, Rubin, Doschka	Location: Vancouver Waterfront Trail
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 73◦F / 0-4 northwest
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/21/2022	Start Time / Duration: 2:00 p.m. / 15-minute

Notes:

Noise measurement conducted south of Vancouver Landing Amphitheater at 110 Columbia Street. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5.



View north to recent development at 100 block of Columbia St.

Sound Level Results

Leq:	64.6
Lmax:	68.5
Lmin:	62.2
L90:	63.2
L50:	64.3
L10:	66.0
L1:	68.0

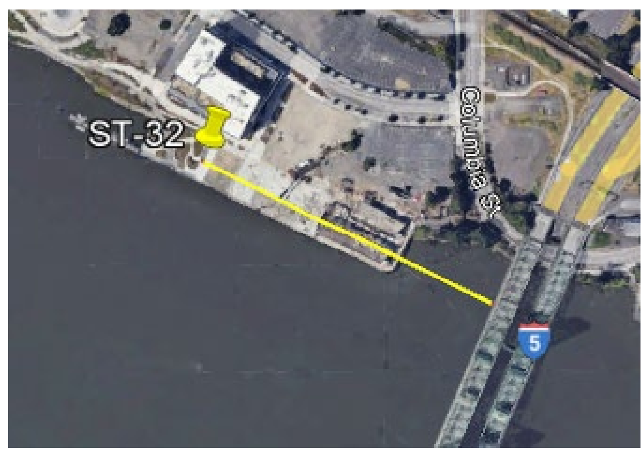
Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	808	12	85	7
mph	60	60	60	60
I-5 SB	825	16	73	2
mph	60	60	60	60

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	3232	48	340	28
mph	60	60	60	60
I-5 SB	3300	64	292	8
mph	60	60	60	60

Site Layout:



ST-32 located approximately 750 feet northwest of the I-5 southbound bridge over the Columbia River.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-33	Address: Park south of SR 14
Staff: Romero, Rubin, Doschka	Location: Benches at Old Apple Tree Park
Weather: Clear, no precipitation	Temperature / Wind (mph): 85∘F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 8/2/2022	Start Time / Duration: 5:14 p.m. / 10-minute

Notes:

Noise measurement conducted at benches at Old Apple Tree Park approximately 75 feet from SR14 and 600 feet from I-5. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View northwest to SR 14 westbound ramps.

View north to historic cabins at Fort Vancouver.

Sound Level Results

Leq:	67.7	L50:	67.4
Lmax:	76.3	L10:	69.4
Lmin:	61.9	L1:	71.6
L90:	65.2		

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB to SR 14 EB	213	0	7	1
mph	55	0	55	55
I-5 NB to SR 14 EB	118	0	1	4
mph	60	0	60	60
SR 14 EB from WA St	117	0	1	0
mph	60	0	60	0
SR 14 WB to I-5 SB	168	0	7	0
mph	60	0	60	0
SR 14 WB to DT Vanc	69	0	2	0
mph	60	0	60	0
SR 14 WB to I-5 NB	263	0	5	1
mph	55	0	55	55

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB to SR 14 EB	1278	0	42	6
mph	55	0	55	55
I-5 NB to SR 14 EB	708	0	6	24
mph	60	0	60	60
SR 14 EB from WA St	702	0	6	0
mph	60	0	60	0
SR 14 WB to I-5 SB	1008	0	42	0
mph	60	0	60	0
SR 14 WB to DT Vanc	414	0	12	0
mph	60	0	60	0
SR 14 WB to I-5 NB	1578	0	30	6
mph	55	0	55	55

Site Layout:

ST-33 located approximately 75 feet southwest of the I-5 southbound off-ramp to eastbound SR 14.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-34	Address: Vancouver Land Bridge Trail
Staff: Romero, Rubin, Doschka	Location: South side of overcrossing
Weather: Cloudy, no precipitation	Temperature / Wind (mph): 62◦F / 0-5 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 5/20/2022	Start Time / Duration: 11:27 a.m. / 10-minute

Notes:

Noise measurement conducted on the Vancouver Land Bridge overcrossing above SR 14. Noise measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View northwest to SR 14 from Vancouver Land Bridge.

View southeast from Vancouver Land Bridge Bike/PED Trail.

Sound Level Results

Leq:	75.0	L50:	74.8
Lmax:	79.7	L10:	77.1
Lmin:	67.0	L1:	78.3
L90:	70.8		

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB to SR 14 EB	369	0	8	0
mph	45	0	45	0
I-5 NB to SR 14 EB	164	0	6	0
mph	45	0	45	0
SR 14 EB from WA St	49	0	2	0
mph	45	0	45	0
SR 14 WB to I-5 SB	123	0	10	0
mph	45	0	45	0
SR 14 WB to DT Vanc	48	0	0	0
mph	45	0	0	0
SR 14 WB to I-5 NB	129	0	12	0
mph	50	0	50	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 SB to SR 14 EB	2214	0	48	0
mph	45	0	45	0
I-5 NB to SR 14 EB	984	0	36	0
mph	45	0	45	0
SR 14 EB from WA St	294	0	12	0
mph	45	0	45	0
SR 14 WB to I-5 SB	738	0	60	0
mph	45	0	45	0
SR 14 WB to DT Vanc	288	0	0	0
mph	45	0	0	0
SR 14 WB to I-5 NB	774	0	72	0
mph	50	0	50	0

Site Layout:

ST-34 located on the Vancouver Land Bridge above SR 14.

Noise Measurement Data Sheet

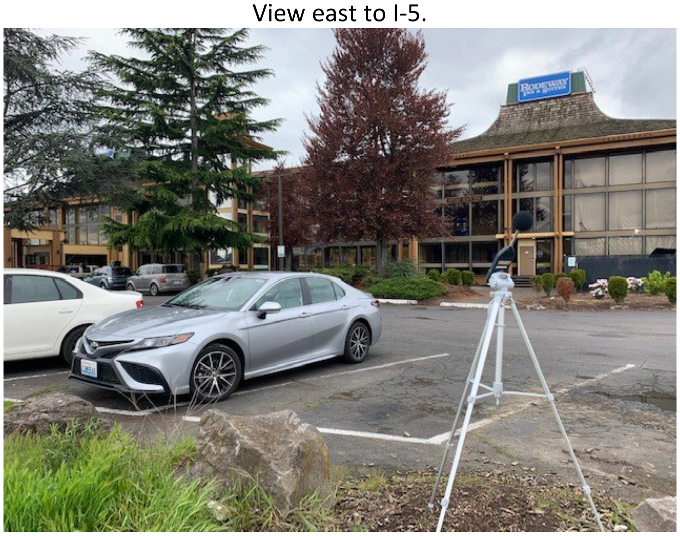
Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-35	Address: 1401 N Hayden Island Dr.
Staff: Romero, Rubin, Doschka	Location: Adjacent to Rodeway Inn
Weather: Overcast, no precipitation	Temperature / Wind (mph): 55◦F / 0-2 northwest
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/29/2022	Start Time / Duration: 10:16 a.m. / 15-minute

Notes:

Noise measurement facing I-5 at eastern frontage of Rodeway Inn at 1401 N Hayden Island Drive. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View east to I-5.



View southwest to parking and entrance at Rodeway Inn.

Sound Level Results

Leq:	67.5
Lmax:	74.3
Lmin:	65.5
L90:	66.3
L50:	67.2
L10:	68.6
L1:	69.9

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	768	41	103	1
mph	65	65	60	65
I-5 SB	982	12	62	2
mph	70	70	70	70

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	3072	164	412	4
mph	65	65	60	65
I-5 SB	3928	48	248	8
mph	70	70	70	70

Site Layout:

ST-35 located approximately 615 feet northwest of the I-5 southbound bridge over the Columbia River. Long-Term (LT)-4 measurement is described separately.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-36	Address: 909 N Hayden Island Dr.
Staff: Romero, Rubin, Doschka	Location: Tennis courts
Weather: Clear, no precipitation	Temperature / Wind (mph): 63◦F / 0-1 west
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/29/2022	Start Time / Duration: 2:35 p.m. / 10-minute

Notes:

Noise measurement facing I-5 at Holiday Inn tennis courts. Units facing tennis courts have balconies that are used by guests. Balconies facing I-5 aren't in use. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View northwest to I-5.

View south to tennis courts at Holiday Inn.

Sound Level Results

Leq:	57.9
Lmax:	79.0
Lmin:	53.2
L90:	54.8
L50:	56.0
L10:	59.3
L1:	66.7

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	654	15	39	1
mph	60	60	60	60
I-5 SB	582	7	40	2
mph	50	50	50	50

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	3924	90	234	6
mph	60	60	60	60
I-5 SB	3492	42	240	12
mph	50	50	50	50

Site Layout:

ST-36 located approximately 370 feet southeast of the I-5 northbound bridge over the Columbia River. LT-5 measurement is described separately.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-37	Address: 12226 N Jantzen Drive
Staff: Romero, Rubin, Doschka	Location: Adjacent to hotel frontage
Weather: Cloudy, no precipitation	Temperature / Wind (mph): 60∘F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/22/2022	Start Time / Duration: 10:02 a.m. / 10-minute

Notes:

Noise measurement conducted at frontage of Oxford Suites Hotel at 12226 N Jantzen Drive. Noise measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View northwest to N Jantzen Dr with I-5 in the distance.


View north along N Jantzen Dr.

Sound Level Results

Leq:	64.1	L50:	62.2
Lmax:	74.2	L10:	67.0
Lmin:	57.3	L1:	71.8
L90:	59.5		

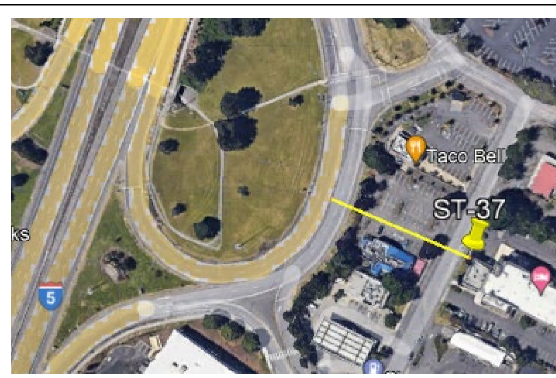
Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	472	10	58	0
mph	65	65	65	0
I-5 SB	479	1	60	4
mph	65	65	65	65
N Hayden Island Dr EB	20	0	0	0
mph	30	0	0	0
N Hayden Island Dr WB	10	0	0	0
mph	30	0	0	0
N Jantzen Dr NB	21	0	0	0
mph	30	0	0	0
N Jantzen Dr SB	9	0	0	0
mph	30	0	0	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2832	60	348	0
mph	65	65	65	0
I-5 SB	2874	6	360	24
mph	65	65	65	65
N Hayden Island Dr EB	120	0	0	0
mph	30	0	0	0
N Hayden Island Dr WB	60	0	0	0
mph	30	0	0	0
N Jantzen Dr NB	126	0	0	0
mph	30	0	0	0
N Jantzen Dr SB	54	0	0	0
mph	30	0	0	0

Site Layout:



ST-37 located approximately 260 feet from the SB I-5 ramp from N Hayden Island Drive.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-38	Address: Adjacent to 11922 N Jantzen Beach Avenue
Staff: Romero, Rubin, Doschka	Location: Adjacent Jantzen Beach Village Condominiums
Weather: Cloudy, no precipitation	Temperature / Wind (mph): 60◦F / 0-2 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/22/2022	Start Time / Duration: 10:37 a.m. / 15-minute

Notes:

Noise measurement conducted at frontage of Jantzen Beach Village Condominiums. Noise measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:


View southeast to N Jantzen Beach Ave and N Tomahawk Island Dr.


View northwest to Jantzen Beach Village Condominiums.

Sound Level Results

Leq:	58.8	L50:	56.3
Lmax:	72.8	L10:	62.0
Lmin:	53.3	L1:	65.8
L90:	54.5		

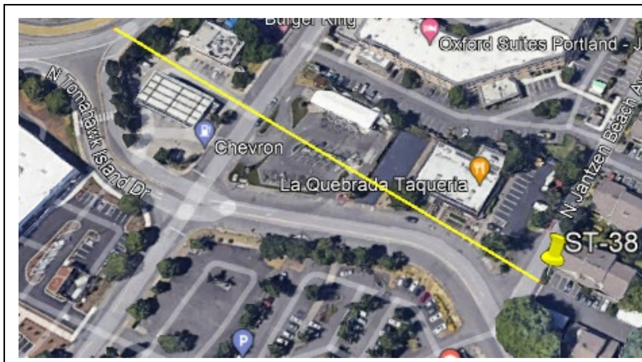
Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	736	16	56	2
mph	65	65	65	65
I-5 SB	732	24	88	1
mph	65	65	65	65
SB/EB N Tomahawk Is. Dr	24	2	0	0
mph	25	25	0	0
NB/WB Tomahawk Is. Dr	34	2	0	0
mph	25	25	0	0
NB JantzenBeach/Hayden	16	0	0	0
mph	20	0	0	0
SB JantzenBeach/Hayden	11	0	0	0
mph	20	0	0	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2944	64	224	8
mph	65	65	65	65
I-5 SB	2928	96	352	4
mph	65	65	65	65
SB/EB N Tomahawk Is. Dr	96	8	0	0
mph	25	25	0	0
NB/WB Tomahawk Is. Dr	136	8	0	0
mph	25	25	0	0
NB JantzenBeach/Hayden	64	0	0	0
mph	20	0	0	0
SB JantzenBeach/Hayden	44	0	0	0
mph	20	0	0	0

Site Layout:



ST-38 located approximately 60 feet from N Tomahawk Island Dr. and 725 feet to the nearest I-5 ramp.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-39	Address: Jantzen Beach Houseboats
Staff: Romero, Rubin, Doschka	Location: First row west of I-5, Row A
Weather: Mostly clear, no precipitation	Temperature / Wind (mph): 50◦F / 0-4 northwest
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/27/2022	Start Time / Duration: 11:24 a.m. / 15-minute

Notes:

Noise measurement facing I-5 first row (Row A) of Jantzen Beach Houseboats west of the North Portland Harbor Bridge. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View southeast to I-5.

View west to adjacent houseboats and Columbia River.

Sound Level Results

Leq:	68.8
Lmax:	73.3
Lmin:	64.6
L90:	66.5
L50:	68.5
L10:	70.6
L1:	71.9

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	836	30	105	0
mph	60	55	55	0
I-5 SB	765	9	88	2
mph	65	60	60	65

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	3344	120	420	0
mph	60	55	55	0
I-5 SB	3060	36	352	8
mph	65	60	60	65

Site Layout:

ST-39 located approximately 150 feet west of the North Portland Harbor Bridge.

Noise Measurement Data Sheet

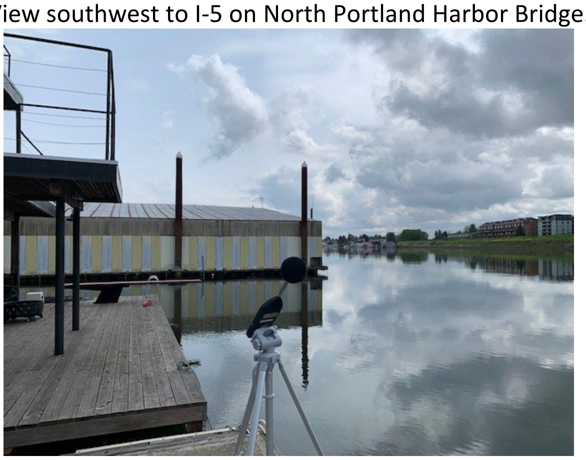
Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-40	Address: Jantzen Bay Marina Houseboats
Staff: Romero, Rubin, Doschka	Location: First row east of I-5
Weather: Overcast, no precipitation	Temperature / Wind (mph): 51◦F / 0-3 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/28/2022	Start Time / Duration: 12:03 p.m. / 15-minute

Notes:

Noise measurement facing I-5 first row of Jantzen Bay Marina Houseboats east of the North Portland Harbor Bridge. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:


View southwest to I-5 on North Portland Harbor Bridge.


View southeast to adjacent houseboats and Columbia River.

Sound Level Results

Leq:	66.2
Lmax:	72.7
Lmin:	63.1
L90:	64.5
L50:	66.0
L10:	67.6
L1:	71.0

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	818	35	82	1
mph	60	55	55	60
I-5 SB	903	10	103	0
mph	60	55	55	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	3272	140	328	4
mph	60	55	55	60
I-5 SB	3612	40	412	0
mph	60	55	55	0

Site Layout:

ST-40 located approximately 220 feet east of the North Portland Harbor Bridge.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-41	Address: Frontage along N Marine Dr
Staff: Romero, Rubin, Doschka	Location: East end of N Marine Dr
Weather: Overcast, no precipitation	Temperature / Wind (mph): 54◦F / 0-3 east
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/29/2022	Start Time / Duration: 8:59 a.m. / 15-minute

Notes:

Noise measurement facing I-5 from frontage along N Marine Drive west of I-5 and south of North Portland Harbor. Residence at 1601 N Marine Dr and 5 houseboats in area. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses. I-5 NB on-ramp and I-5 SB off-ramp included low volumes at low speeds and we not included in traffic counts.

Photographs:

View east to I-5 on North Portland Harbor Bridge.

View west to nearby businesses and one residence at 1601 N Marine Drive.

Sound Level Results

Leq:	69.8
Lmax:	78.1
Lmin:	64.9
L90:	67.2
L50:	69.0
L10:	70.1
L1:	71.4

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	643	33	112	0
mph	70	65	60	0
I-5 SB	789	13	67	0
mph	65	60	60	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2572	132	448	0
mph	70	65	60	0
I-5 SB	3156	52	268	0
mph	65	60	60	0

Site Layout:

ST-41 located along N Marine Dr. approximately 115 feet west of the North Portland Harbor Bridge.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-42	Address: Frontage along N Pier St
Staff: Romero, Rubin, Doschka	Location: North of 1425 N Pier St
Weather: Overcast, no precipitation	Temperature / Wind (mph): 54◦F / 0-3 east
Instrumentation / S/N: LDLxT1 / 3981 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/29/2022	Start Time / Duration: 8:59 a.m. / 15-minute

Notes:

Noise measurement facing I-5 from bluff south of Columbia River along N Pier 99 St east of I-5 near business at 1425 N Pier St. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

Site photos taken during measurement were not recoverable. Photos provided below are from previous measurement at ST-42 when traffic congestion prevented accurate measurement.

View west to I-5 on North Portland Harbor Bridge.

View east to development south of the Columbia River.

Sound Level Results

Leq:	68.0
Lmax:	70.6
Lmin:	64.8
L90:	66.1
L50:	67.5
L10:	69.7
L1:	70.4

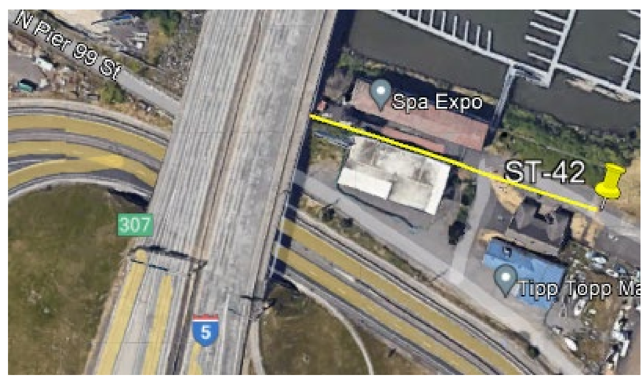
Concurrent Traffic Count (15-minute) – same as ST-41

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	643	33	112	0
mph	70	65	60	0
I-5 SB	789	13	67	0
mph	65	60	60	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2572	132	448	0
mph	70	65	60	0
I-5 SB	3156	52	268	0
mph	65	60	60	0

Site Layout:



ST-42 located along frontage of N Pier St. approximately 360 feet east of the North Portland Harbor Bridge.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-43	Address: Adjacent to 1000 N Anchor Way
Staff: Romero, Rubin, Doschka	Location: Newport Apartments
Weather: Cloudy, no precipitation	Temperature / Wind (mph): 60◦F / 0-2 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 9/23/2022	Start Time / Duration: 9:16 a.m. / 15-minute

Notes:

Noise measurement conducted at entrance of Newport Apartments on N Marine Drive. Apartments include private balconies on 2nd, 3rd, and 4th floors. at all five buildings in apartment complex. Noise measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View southeast to N Marine Dr with MLK in background.

View north to entrance at Newport Apartments.

Sound Level Results

Leq:	69.6	L50:	66.2
Lmax:	89.6	L10:	71.2
Lmin:	57.3	L1:	77.4
L90:	61.9		

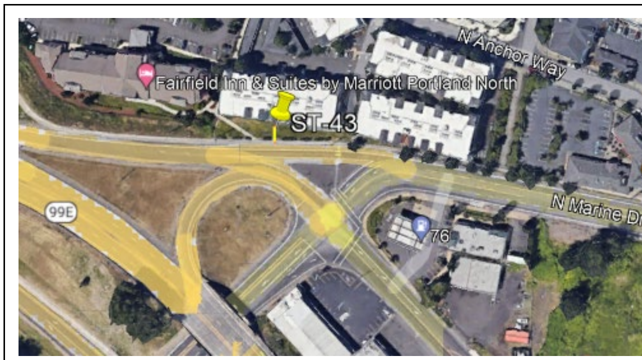
Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	638	7	77	1
mph	60	60	60	60
I-5 SB	771	12	70	1
mph	60	60	60	60
N Marine Dr WB to MLK	99	9	18	0
mph	45	35	30	0
WB Union Court	20	1	2	0
mph	20	20	20	0
MLK EB	95	6	19	0
mph	45	35	35	0
MLK WB	70	5	15	0
mph	45	40	40	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2552	28	308	4
mph	60	60	60	60
I-5 SB	3084	48	280	4
mph	60	60	60	60
N Marine Dr WB to MLK	396	36	72	0
mph	45	35	30	0
WB Union Court	80	4	8	0
mph	20	20	20	0
MLK EB	380	24	76	0
mph	45	35	35	0
MLK WB	280	20	60	0
mph	45	40	40	0

Site Layout:



ST-43 located approximately 25 feet north of N Marine Dr and 580 feet to the nearest I-5 ramp.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-44	Address: DeMarini Baseball Field
Staff: Romero, Rubin, Doschka	Location: Delta Park
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 50∘F / 0-6 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/27/2022	Start Time / Duration: 1:17 p.m. / 10-minute

Notes:

Noise measurement conducted at DeMarini baseball field at northwest end of Delta Park. Noise measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west to I-5.

View east to athletic fields at Delta Park.

Sound Level Results

Leq:	63.8	L50:	63.4
Lmax:	72.1	L10:	65.4
Lmin:	60.4	L1:	68.8
L90:	62.1		

Concurrent Traffic Count (10-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	495	5	58	0
mph	60	55	55	0
I-5 SB	357	19	35	0
mph	60	55	55	0
MLK EB	104	8	12	0
mph	55	55	55	0
MLK WB	120	6	6	0
mph	55	55	55	0
I-5 NB off to MLK	30	2	5	0
mph	45	35	35	0
I-5 NB Off to Union	15	1	1	0
mph	35	35	35	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2970	30	348	0
mph	60	55	55	0
I-5 SB	2142	114	210	0
mph	60	55	55	0
MLK EB	624	48	72	0
mph	55	55	55	0
MLK WB	720	36	36	0
mph	55	55	55	0
I-5 NB off to MLK	180	12	30	0
mph	45	35	35	0
I-5 NB Off to Union	90	2	6	0
mph	35	35	35	0

Site Layout:

ST-44 located approximately 380 feet east of I-5 northbound ramps to MLK.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-45	Address: Delta Park Baseball Field #7
Staff: Romero, Rubin, Doschka	Location: Delta Park
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 49◦F / 0-2 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/28/2022	Start Time / Duration: 9:20 a.m. / 15-minute

Notes:

Noise measurement conducted at Delta Park Baseball Field #7 located at northeast end of Delta Park. Noise measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:


View west to I-5.


View east to athletic fields at Delta Park.

Sound Level Results

Leq:	61.0	L50:	60.5
Lmax:	70.3	L10:	62.8
Lmin:	55.4	L1:	66.9
L90:	58.1		

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	528	9	77	0
mph	60	55	55	0
I-5 SB	561	20	64	0
mph	60	55	55	0
EB MLK	102	4	9	0
mph	55	55	55	0
WB MLK	179	7	8	0
mph	55	55	55	0
SB Union Court	101	2	4	0
mph	35	35	35	0
WB Union Court	30	2	2	0
mph	35	35	35	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2112	36	308	0
mph	60	55	55	0
I-5 SB	2244	80	256	0
mph	60	55	55	0
EB MLK	406	16	38	0
mph	55	55	55	0
WB MLK	716	28	30	0
mph	55	55	55	0
SB Union Court	405	8	16	0
mph	35	35	35	0
WB Union Court	120	6	9	0
mph	35	35	35	0

Site Layout:

ST-45 located approximately 535 feet southwest of NE Martin Luther King Way and over 2,000 feet east of I-5.

Noise Measurement Data Sheet

Project Name: Interstate Bridge Replacement	Project Number: 30900427.000
Bridge Noise Measurements: ST-46	Address: Delta Park Field #4
Staff: Romero, Rubin, Doschka	Location: Southwest corner of Delta Park
Weather: Partly cloudy, no precipitation	Temperature / Wind (mph): 51◦F / 0-2 southeast
Instrumentation / S/N: LD820 / 1194 LDCAL200 / 2239	Calibration Pre-Check: 114.0 Post-Check: 114.0
Date: 4/27/2022	Start Time / Duration: 12:36 p.m. / 15-minute

Notes:

Noise measurement facing I-5 from southwest corner of Delta Park Field #4 located near N Denver Ave. Measurement conducted for noise model validation only. Validated noise model will include noise receivers at noise-sensitive land uses.

Photographs:

View west to I-5 on- and off-ramps north of Victory Blvd.

View south to I-5 mainline passing over Victory Blvd.

Sound Level Results

Leq:	68.0
Lmax:	81.7
Lmin:	62.6
L90:	65.7
L50:	67.7
L10:	69.7
L1:	72.9

Concurrent Traffic Count (15-minute)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	658	12	77	0
mph	60	55	55	0
I-5 SB	487	32	95	0
mph	60	55	55	0
NB Victory On	73	4	7	0
mph	50	45	45	0
I-5 NB Off to Union	95	5	10	0
mph	55	50	50	0

Modeled Traffic (1-hour)

Roadway	Auto	Medium Trucks	Heavy Trucks	Moto
I-5 NB	2632	48	308	0
mph	60	55	55	0
I-5 SB	1948	128	380	0
mph	60	55	55	0
NB Victory On	292	16	28	0
mph	50	45	45	0
I-5 NB Off to Union	381	20	39	0
mph	55	50	50	0

Site Layout:

ST-46 located approximately 250 feet east of the I-5 northbound on-ramp from N Victory Blvd/ N Whitaker Rd.

Appendix E

LONG-TERM MEASUREMENT DATA

The following information measurement data were collected in 2022 in support of the IBR Program transit noise assessment and to support future project construction.

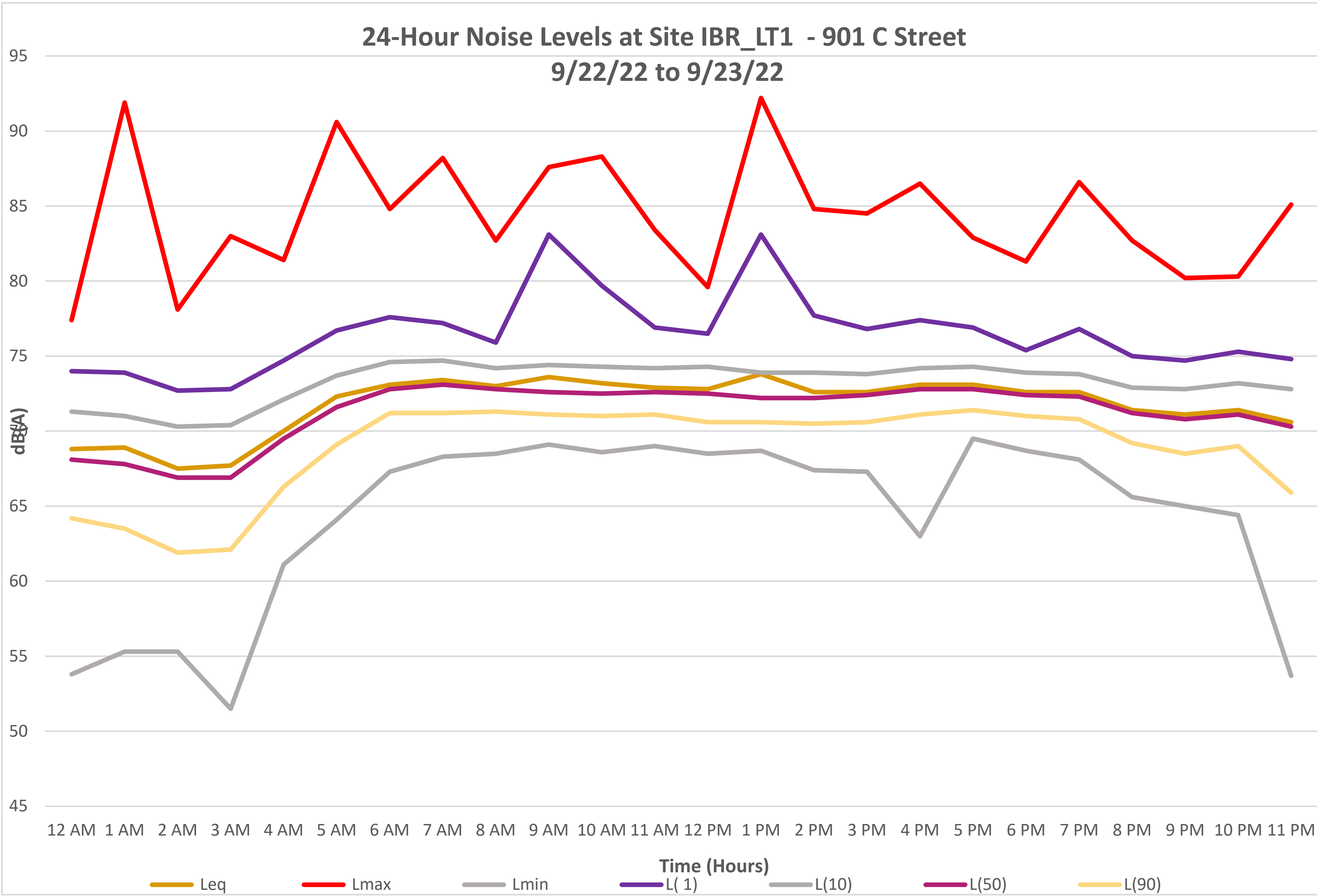
Long-Term Measurement Site LT-1: Vancouver Community Library

Ambient Noise Monitoring Data collected on September 22, 2022, to September 23, 2022, from east side of library parking lot.

Site LT1: Vancouver Community Library, 901 C Street

(white)	**Daytime Hours (7:00AM to 5:00PM)**
(light grey)	**Evening Hours (5:00PM to 10:00PM)**
(dark grey)	**Nighttime Hours (10:00PM to 7:00AM)**

Site	Location	Number	Date	Start Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	0:00:00	3600	68.8	77.4	53.8	92.9	74	71.3	68.1	64.2
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	1:00:00	3600	68.9	91.9	55.3	105.7	73.9	71	67.8	63.5
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	2:00:00	3600	67.5	78.1	55.3	93	72.7	70.3	66.9	61.9
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	3:00:00	3600	67.7	83	51.5	99.1	72.8	70.4	66.9	62.1
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	4:00:00	3600	70	81.4	61.1	102.3	74.7	72.1	69.5	66.3
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	5:00:00	3600	72.3	90.6	64.1	108.3	76.7	73.7	71.6	69.1
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	6:00:00	3600	73.1	84.8	67.3	97.1	77.6	74.6	72.8	71.2
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	7:00:00	3600	73.4	88.2	68.3	110.5	77.2	74.7	73.1	71.2
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	8:00:00	3600	73	82.7	68.5	104.5	75.9	74.2	72.8	71.3
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	9:00:00	3600	73.6	87.6	69.1	103.5	83.1	74.4	72.6	71.1
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	10:00:00	3600	73.2	88.3	68.6	104.5	79.7	74.3	72.5	71
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	11:00:00	3600	72.9	83.4	69	99.7	76.9	74.2	72.6	71.1
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	12:00:00	3600	72.8	79.6	68.5	97.4	76.5	74.3	72.5	70.6
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	13:00:00	3600	73.8	92.2	68.7	111.4	83.1	73.9	72.2	70.6
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	14:00:00	3600	72.6	84.8	67.4	112.8	77.7	73.9	72.2	70.5
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	23 Sep 22	15:00:00	3600	72.6	84.5	67.3	102.9	76.8	73.8	72.4	70.6
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	22 Sep 22	16:00:00	3600	73.1	86.5	63	117.1	77.4	74.2	72.8	71.1
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	22 Sep 22	17:00:00	3600	73.1	82.9	69.5	100.2	76.9	74.3	72.8	71.4
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	22 Sep 22	18:00:00	3600	72.6	81.3	68.7	100.2	75.4	73.9	72.4	71
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	22 Sep 22	19:00:00	3600	72.6	86.6	68.1	102.9	76.8	73.8	72.3	70.8
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	22 Sep 22	20:00:00	3600	71.4	82.7	65.6	103.3	75	72.9	71.2	69.2
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	22 Sep 22	21:00:00	3600	71.1	80.2	65	96	74.7	72.8	70.8	68.5
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	22 Sep 22	22:00:00	3600	71.4	80.3	64.4	95.1	75.3	73.2	71.1	69
IBR_LT1	Vanc Community Library, 901 C St - Adj to N of Proposed LRT Station	LT1	22 Sep 22	23:00:00	3600	70.6	85.1	53.7	99.2	74.8	72.8	70.3	65.9


24-Hour Noise Levels at Site IBR_LT1 - 901 C Street
9/22/22 to 9/23/22
95
90
85
80
75
70
65
60
55
50
45
dB(A)
12 AM 1 AM 2 AM 3 AM 4 AM 5 AM 6 AM 7 AM 8 AM 9 AM 10 AM 11 AM 12 PM 1 PM 2 PM 3 PM 4 PM 5 PM 6 PM 7 PM 8 PM 9 PM 10 PM 11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

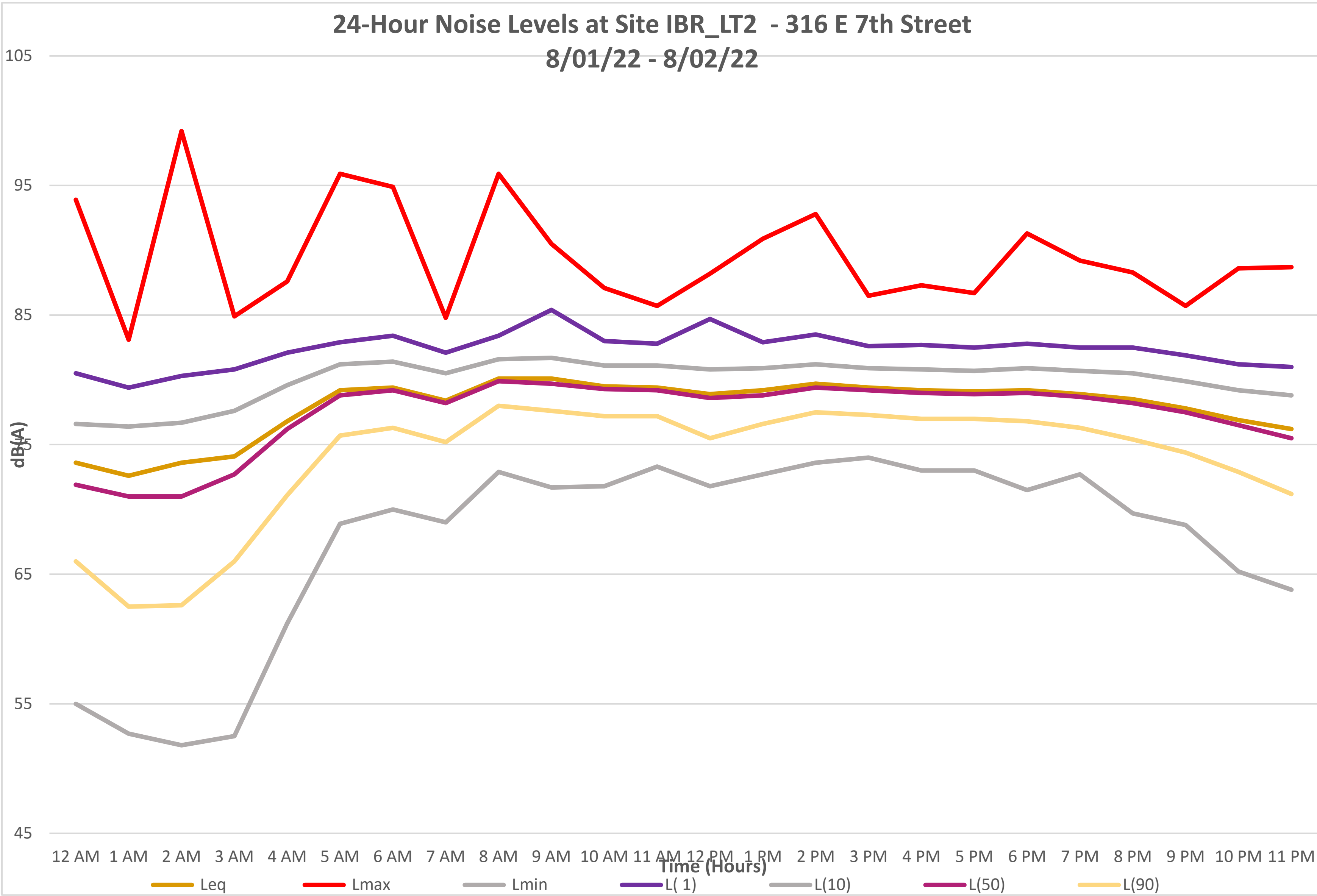
Long-Term Measurement Site LT-2: Normandy Apartments

Ambient Noise Monitoring Data collected on August 1, 2022, to August 2, 2022, from east property line adjacent to I-5 right-of-way.

Site LT2: Normandy Apartments, 316 E 7th Street

(white)	**Daytime Hours (7:00AM to 5:00PM)**
(light gray)	**Evening Hours (5:00PM to 10:00PM)**
(dark gray)	**Nighttime Hours (10:00PM to 7:00AM)**

Site	Location	Number	Date	Start Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	0:00:00	3600	73.6	93.9	55	116.1	80.5	76.6	71.9	66
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	1:00:00	3600	72.6	83.1	52.7	99	79.4	76.4	71	62.5
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	2:00:00	3600	73.6	99.2	51.8	108.9	80.3	76.7	71	62.6
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	3:00:00	3600	74.1	84.9	52.5	97.9	80.8	77.6	72.7	66
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	4:00:00	3600	76.8	87.6	61.2	103.9	82.1	79.6	76.2	71.1
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	5:00:00	3600	79.2	95.9	68.9	113.6	82.9	81.2	78.8	75.7
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	6:00:00	3600	79.4	94.9	70	112.8	83.4	81.4	79.2	76.3
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	7:00:00	3600	78.4	84.8	69	104.5	82.1	80.5	78.2	75.2
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	8:00:00	3600	80.1	95.9	72.9	112.9	83.4	81.6	79.9	78
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	9:00:00	3600	80.1	90.5	71.7	112.2	85.4	81.7	79.7	77.6
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	10:00:00	3600	79.5	87.1	71.8	103.1	83	81.1	79.3	77.2
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	11:00:00	3600	79.4	85.7	73.3	101.8	82.8	81.1	79.2	77.2
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	12:00:00	3600	78.9	88.2	71.8	102.1	84.7	80.8	78.6	75.5
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	02 Aug 22	12:00:00	3600	79.2	90.9	72.7	111	82.9	80.9	78.8	76.6
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	13:00:00	3600	79.7	92.8	73.6	118.5	83.5	81.2	79.4	77.5
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	14:00:00	3600	79.4	86.5	74	103.2	82.6	80.9	79.2	77.3
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	15:00:00	3600	79.2	87.3	73	104.2	82.7	80.8	79	77
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	16:00:00	3600	79.1	86.7	73	101.5	82.5	80.7	78.9	77
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	17:00:00	3600	79.2	91.3	71.5	112	82.8	80.9	79	76.8
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	18:00:00	3600	78.9	89.2	72.7	102.3	82.5	80.7	78.7	76.3
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	19:00:00	3600	78.5	88.3	69.7	103	82.5	80.5	78.2	75.4
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	20:00:00	3600	77.8	85.7	68.8	100.5	81.9	79.9	77.5	74.4
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	21:00:00	3600	76.9	88.6	65.2	104.5	81.2	79.2	76.5	72.9
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	22:00:00	3600	76.2	88.7	63.8	105.1	81	78.8	75.5	71.2
IBR_LT2	316 E 7th St - Normandy Apts at ROW	LT2	01 Aug 22	23:00:00	3600	74.5	82.4	55.7	98.4	80	77.6	73.7	67.5


24-Hour Noise Levels at Site IBR_LT2 - 316 E 7th Street
8/01/22 - 8/02/22
105
95
85
75
65
55
45
dB(A)
12 AM
1 AM
2 AM
3 AM
4 AM
5 AM
6 AM
7 AM
8 AM
9 AM
10 AM
11 AM
12 PM
1 PM
2 PM
3 PM
4 PM
5 PM
6 PM
7 PM
8 PM
9 PM
10 PM
11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

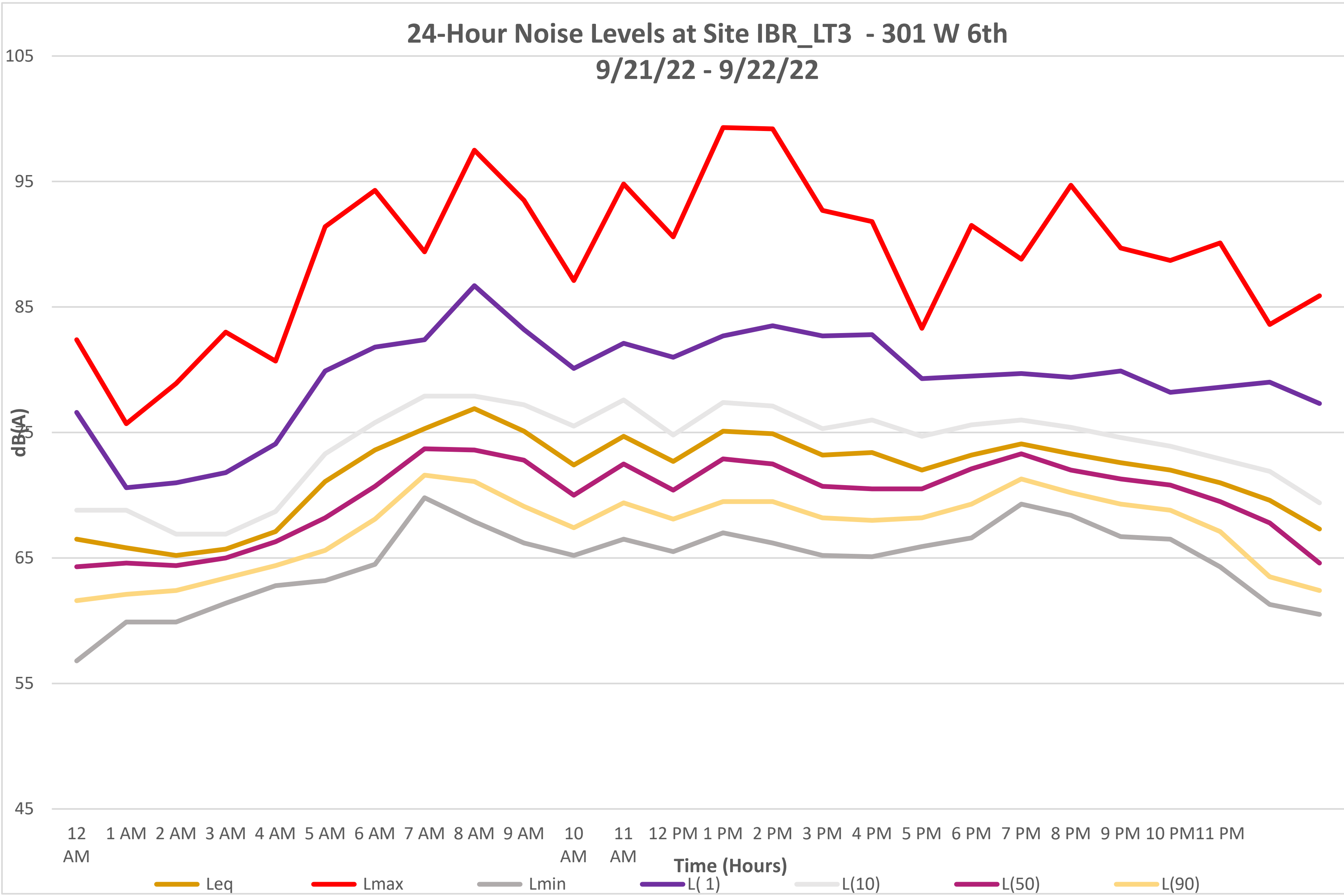
Long-Term Measurement Site LT-3: Columbia Street and W 4th Street

Ambient Noise Monitoring Data collected on September 21, 2022, to September 22, 2022, from public right-of-way.

Site LT3: Columbia Street and West 4th Street

Legend
Daytime Hours (7:00AM to 5:00PM)
Evening Hours (5:00PM to 10:00PM)
Nighttime Hours (10:00PM to 7:00AM)

Site	Location	Number	Date	Start Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	0:00:00	3600	66.5	82.4	56.8	95.7	76.6	68.8	64.3	61.6
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	1:00:00	3600	65.8	75.7	59.9	96	70.6	68.8	64.6	62.1
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	2:00:00	3600	65.2	78.9	59.9	94.1	71	66.9	64.4	62.4
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	3:00:00	3600	65.7	83	61.4	98.3	71.8	66.9	65	63.4
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	4:00:00	3600	67.1	80.7	62.8	96.6	74.1	68.7	66.3	64.4
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	5:00:00	3600	71.1	91.4	63.2	104.1	79.9	73.3	68.2	65.6
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	6:00:00	3600	73.6	94.3	64.5	107.7	81.8	75.8	70.7	68.1
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	7:00:00	3600	75.3	89.4	69.8	106.2	82.4	77.9	73.7	71.6
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	8:00:00	3600	76.9	97.5	67.9	114.3	86.7	77.9	73.6	71.1
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	9:00:00	3600	75.1	93.5	66.2	108.8	83.2	77.2	72.8	69.1
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	10:00:00	3600	72.4	87.1	65.2	106.6	80.1	75.5	70	67.4
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	10:00:00	3600	74.7	94.8	66.5	118.5	82.1	77.6	72.5	69.4
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	11:00:00	3600	72.7	90.6	65.5	105	81	74.8	70.4	68.1
IBR_LT3	Columbia Street and West 4th Street	LT3	22 Sep 22	11:00:00	3600	75.1	99.3	67	113.2	82.7	77.4	72.9	69.5
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	12:00:00	3600	74.9	99.2	66.2	114.3	83.5	77.1	72.5	69.5
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	13:00:00	3600	73.2	92.7	65.2	109.7	82.7	75.3	70.7	68.2
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	14:00:00	3600	73.4	91.8	65.1	107.7	82.8	76	70.5	68
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	15:00:00	3600	72	83.3	65.9	99.9	79.3	74.7	70.5	68.2
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	16:00:00	3600	73.2	91.5	66.6	109.4	79.5	75.6	72.1	69.3
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	17:00:00	3600	74.1	88.8	69.3	104.8	79.7	76	73.3	71.3
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	18:00:00	3600	73.3	94.7	68.4	125.3	79.4	75.4	72	70.2
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	19:00:00	3600	72.6	89.7	66.7	103.4	79.9	74.6	71.3	69.3
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	20:00:00	3600	72	88.7	66.5	108.4	78.2	73.9	70.8	68.8
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	21:00:00	3600	71	90.1	64.3	101.6	78.6	72.9	69.5	67.1
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	22:00:00	3600	69.6	83.6	61.3	98.8	79	71.9	67.8	63.5
IBR_LT3	Columbia Street and West 4th Street	LT3	21 Sep 22	23:00:00	3600	67.3	85.9	60.5	99.8	77.3	69.4	64.6	62.4


24-Hour Noise Levels at Site IBR_LT3 - 301 W 6th
9/21/22 - 9/22/22
105
95
85
75
65
55
45
dB(A)
12 AM
1 AM
2 AM
3 AM
4 AM
5 AM
6 AM
7 AM
8 AM
9 AM
10 AM
11 AM
12 PM
1 PM
2 PM
3 PM
4 PM
5 PM
6 PM
7 PM
8 PM
9 PM
10 PM
11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

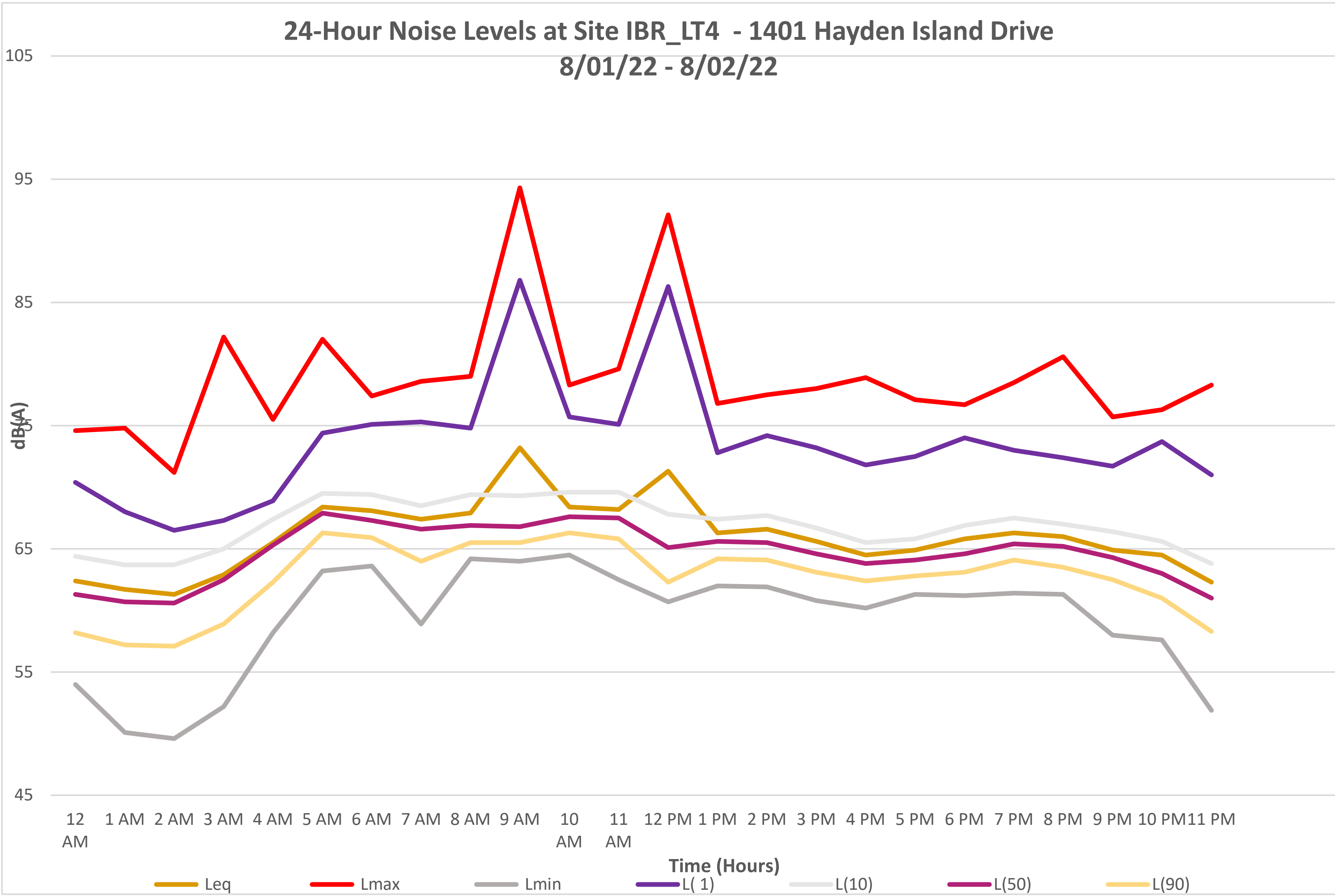
Long-Term Measurement Site LT4: Roadway Inn

Ambient Noise Monitoring Data collected on August 1, 2022, to August 2, 2022, adjacent to east entrance.

Site LT4: Rodeway Inn, 1401 N Hayden Island Drive

Daytime Hours (7:00AM to 5:00PM)
Evening Hours (5:00PM to 10:00PM)
Nighttime Hours (10:00PM to 7:00AM)

Site	Location	Number	Date	Start Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	02 Aug 22	0:00:00	3600	62.4	74.6	54	89.1	70.4	64.4	61.3	58.2
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	02 Aug 22	1:00:00	3600	61.7	74.8	50.1	88.1	68	63.7	60.7	57.2
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	02 Aug 22	2:00:00	3600	61.3	71.2	49.6	90.3	66.5	63.7	60.6	57.1
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	02 Aug 22	3:00:00	3600	62.9	82.2	52.2	109.2	67.3	65	62.5	58.9
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	02 Aug 22	4:00:00	3600	65.5	75.5	58.2	91.3	68.9	67.4	65.3	62.3
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	02 Aug 22	5:00:00	3600	68.4	82	63.2	93.2	74.4	69.5	67.9	66.3
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	02 Aug 22	6:00:00	3600	68.1	77.4	63.6	91.8	75.1	69.4	67.3	65.9
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	02 Aug 22	7:00:00	3600	67.4	78.6	58.9	90.4	75.3	68.5	66.6	64
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	02 Aug 22	8:00:00	3600	67.9	79	64.2	93.2	74.8	69.4	66.9	65.5
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	02 Aug 22	9:00:00	3600	73.2	94.3	64	110.7	86.8	69.3	66.8	65.5
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	10:00:00	3600	68.4	78.3	64.5	91	75.7	69.6	67.6	66.3
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	11:00:00	3600	68.2	79.6	62.5	96.8	75.1	69.6	67.5	65.8
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	12:00:00	3600	71.3	92.1	60.7	107.5	86.3	67.8	65.1	62.3
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	13:00:00	3600	66.3	76.8	62	91.4	72.8	67.4	65.6	64.2
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	14:00:00	3600	66.6	77.5	61.9	91.7	74.2	67.7	65.5	64.1
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	15:00:00	3600	65.6	78	60.8	92.2	73.2	66.7	64.6	63.1
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	16:00:00	3600	64.5	78.9	60.2	99.4	71.8	65.5	63.8	62.4
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	17:00:00	3600	64.9	77.1	61.3	90.7	72.5	65.8	64.1	62.8
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	18:00:00	3600	65.8	76.7	61.2	90.2	74	66.9	64.6	63.1
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	19:00:00	3600	66.3	78.5	61.4	93.6	73	67.5	65.4	64.1
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	20:00:00	3600	66	80.6	61.3	92.7	72.4	67	65.2	63.5
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	21:00:00	3600	64.9	75.7	58	88.5	71.7	66.4	64.3	62.5
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	22:00:00	3600	64.5	76.3	57.6	91.7	73.7	65.6	63	61
IBR_LT4	Rodeway Inn 1401 N Hayden Island Dr - east entrance	LT4	01 Aug 22	23:00:00	3600	62.3	78.3	51.9	89.9	71	63.8	61	58.3



24-Hour Noise Levels at Site IBR_LT4 - 1401 Hayden Island Drive
8/01/22 - 8/02/22
dB(A)
105
95
85
75
65
55
45
12 AM
1 AM
2 AM
3 AM
4 AM
5 AM
6 AM
7 AM
8 AM
9 AM
10 AM
11 AM
12 PM
1 PM
2 PM
3 PM
4 PM
5 PM
6 PM
7 PM
8 PM
9 PM
10 PM
11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

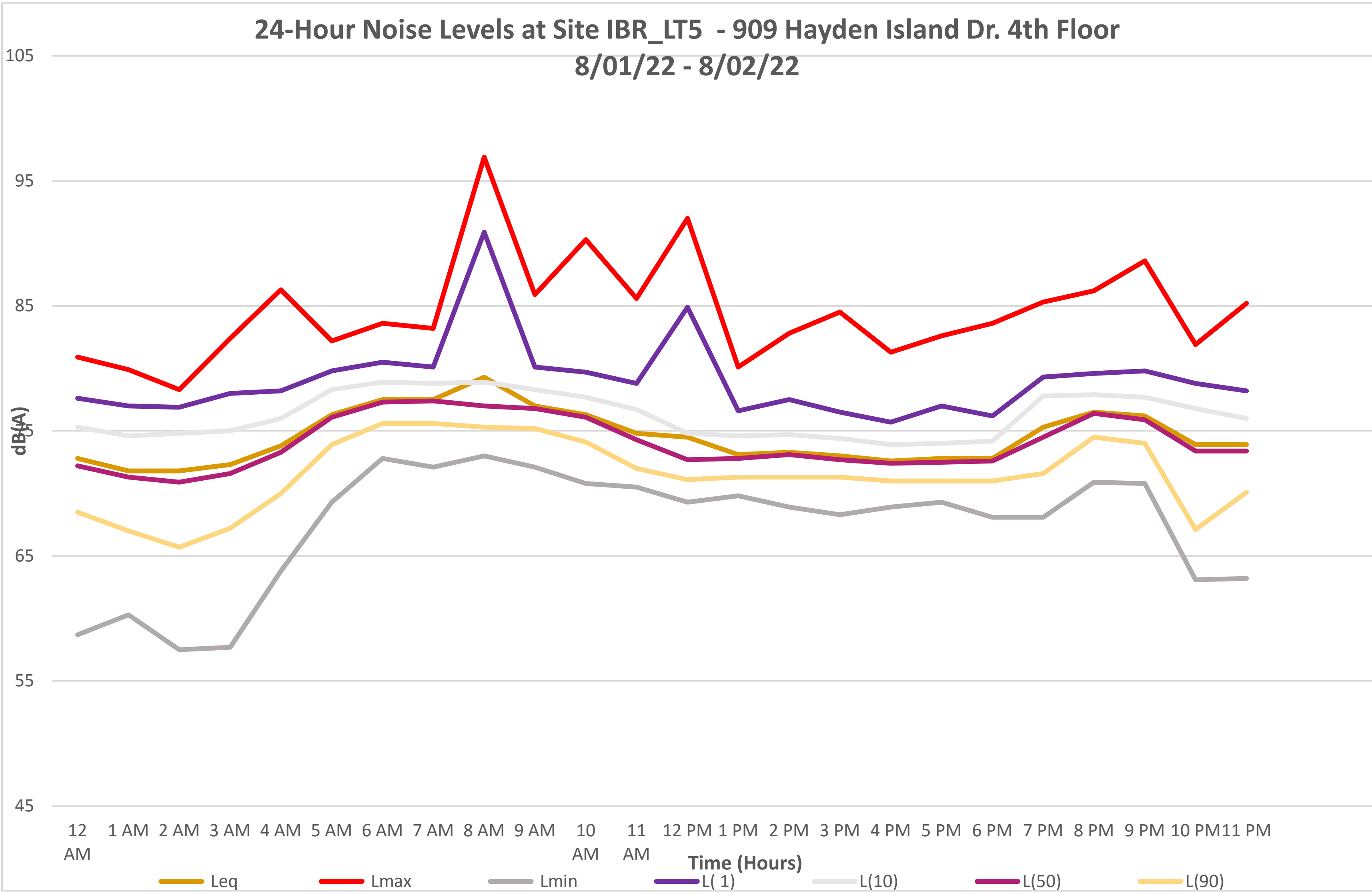
Long-Term Measurement Site LT5: Holiday Inn

Ambient Noise Monitoring Data collected on August 2, 2022, to August 3, 2022, from 4th floor balcony on west side of hotel.

Site LT5: Holiday Inn, 909 N Hayden Island Drive

Legend	
(white)	**Daytime Hours (7:00AM to 5:00PM)**
(light grey)	**Evening Hours (5:00PM to 10:00PM)**
(dark grey)	**Nighttime Hours (10:00PM to 7:00AM)**

Site	Location	Number	Date	Start Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	0:00:00	3600	72.8	80.9	58.7	93.8	77.6	75.3	72.2	68.5
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	1:00:00	3600	71.8	79.9	60.3	95.4	77	74.6	71.3	67
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	2:00:00	3600	71.8	78.3	57.5	91.6	76.9	74.8	70.9	65.7
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	3:00:00	3600	72.3	82.4	57.7	95.8	78	75	71.6	67.2
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	4:00:00	3600	73.8	86.3	63.8	99.6	78.2	76	73.3	70
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	5:00:00	3600	76.3	82.2	69.3	98.8	79.8	78.3	76.1	73.9
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	6:00:00	3600	77.5	83.6	72.8	95.3	80.5	78.9	77.3	75.6
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	7:00:00	3600	77.5	83.2	72.1	97	80.1	78.8	77.4	75.6
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	8:00:00	3600	79.3	96.9	73	111.3	90.9	78.9	77	75.3
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	9:00:00	3600	77	85.9	72.1	99.2	80.1	78.3	76.8	75.2
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	10:00:00	3600	76.3	90.3	70.8	108.2	79.7	77.7	76.1	74.1
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	11:00:00	3600	74.8	85.6	70.5	104.6	78.8	76.7	74.3	72
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	12:00:00	3600	74.5	92	69.3	105.3	84.9	74.8	72.7	71.1
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	03 Aug 22	13:00:00	3600	73.1	80.1	69.8	96.4	76.6	74.6	72.8	71.3
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	02 Aug 22	14:00:00	3600	73.3	82.8	68.9	97.1	77.5	74.7	73.1	71.3
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	02 Aug 22	15:00:00	3600	73	84.5	68.3	102	76.5	74.4	72.7	71.3
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	02 Aug 22	16:00:00	3600	72.6	81.3	68.9	93.9	75.7	73.9	72.4	71
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	02 Aug 22	17:00:00	3600	72.8	82.6	69.3	95.2	77	74	72.5	71
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	02 Aug 22	18:00:00	3600	72.8	83.6	68.1	99.9	76.2	74.2	72.6	71
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	02 Aug 22	19:00:00	3600	75.3	85.3	68.1	98.1	79.3	77.8	74.5	71.6
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	02 Aug 22	20:00:00	3600	76.5	86.2	70.9	99.2	79.6	77.9	76.4	74.5
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	02 Aug 22	21:00:00	3600	76.2	88.6	70.8	105.2	79.8	77.7	75.9	74
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	02 Aug 22	22:00:00	3600	73.9	81.9	63.1	97.7	78.8	76.8	73.4	67.1
IBR_LT5	Holiday Inn 909 N Hayden Island Dr, 4th FL balcony	LT5	02 Aug 22	23:00:00	3600	73.9	85.2	63.2	98.8	78.2	76	73.4	70.1


24-Hour Noise Levels at Site IBR_LT5 - 909 Hayden Island Dr. 4th Floor
8/01/22 - 8/02/22
105
95
85
65
55
45
dB(A)
12 AM
1 AM
2 AM
3 AM
4 AM
5 AM
6 AM
7 AM
8 AM
9 AM
10 AM
11 AM
12 PM
1 PM
2 PM
3 PM
4 PM
5 PM
6 PM
7 PM
8 PM
9 PM
10 PM
11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

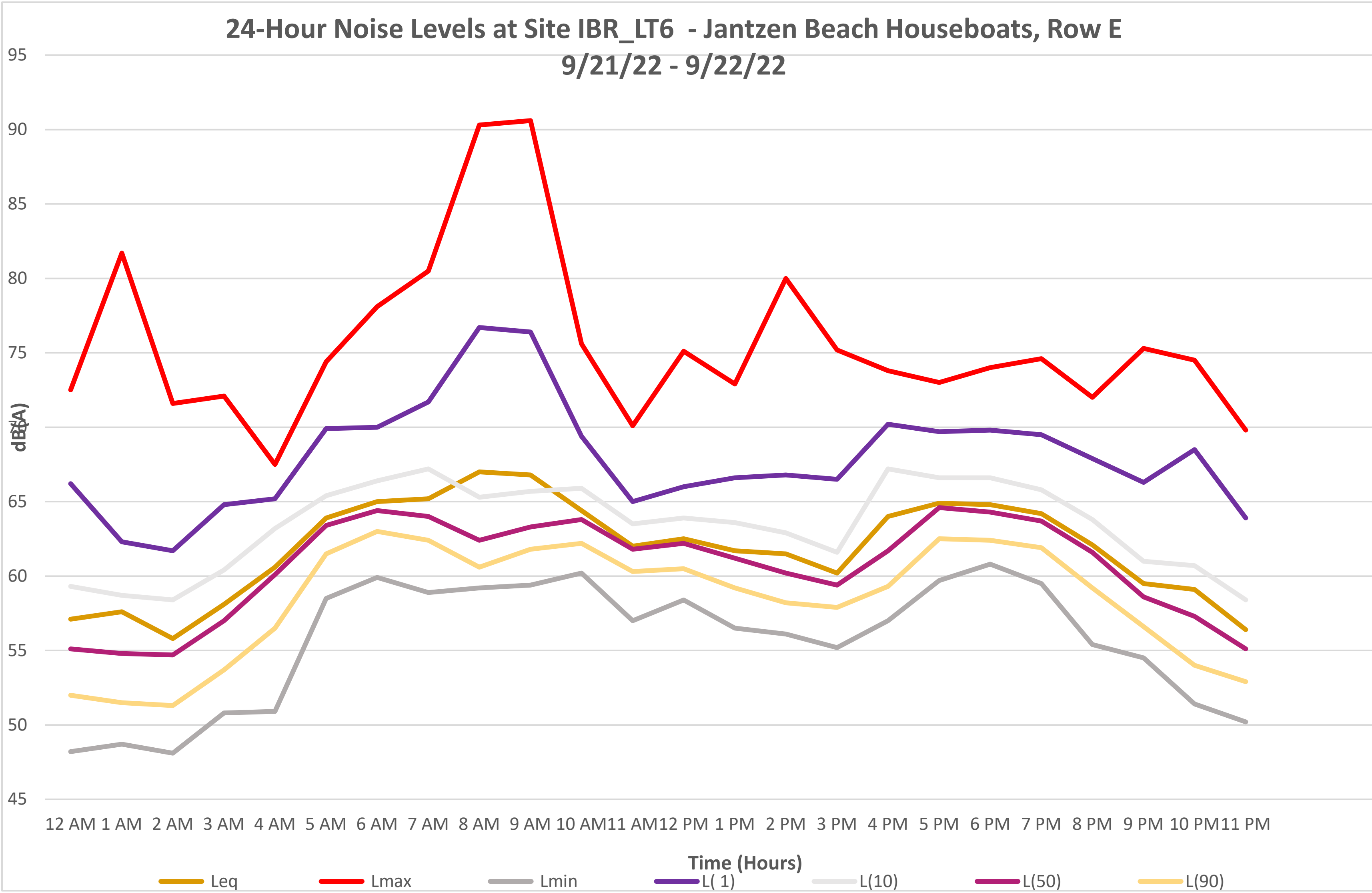
Long-Term Measurement Site LT6: Jantzen Beach Houseboats, Row E

Ambient Noise Monitoring Data collected on September 21, 2022, to September 22, 2022, from south end of Row E (5th row from I-5 bridge).

Site LT6: Jantzen Beach Houseboats, Row E

Daytime Hours (7:00AM to 5:00PM)
Evening Hours (5:00PM to 10:00PM)
Nighttime Hours (10:00PM to 7:00AM)

Site	Location	Number	Date	Start Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	22 Sep 22	0:00:00	3600	57.1	72.5	48.2	85	66.2	59.3	55.1	52
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	22 Sep 22	1:00:00	3600	57.6	81.7	48.7	102	62.3	58.7	54.8	51.5
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	22 Sep 22	2:00:00	3600	55.8	71.6	48.1	92.6	61.7	58.4	54.7	51.3
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	22 Sep 22	3:00:00	3600	58.1	72.1	50.8	91.6	64.8	60.4	57	53.7
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	22 Sep 22	4:00:00	3600	60.6	67.5	50.9	85.7	65.2	63.2	60.1	56.5
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	22 Sep 22	5:00:00	3600	63.9	74.4	58.5	90	69.9	65.4	63.4	61.5
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	22 Sep 22	6:00:00	3600	65	78.1	59.9	92.2	70	66.4	64.4	63
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	22 Sep 22	7:00:00	3600	65.2	80.5	58.9	100.9	71.7	67.2	64	62.4
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	22 Sep 22	8:00:00	3600	67	90.3	59.2	106.7	76.7	65.3	62.4	60.6
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	22 Sep 22	9:00:00	3600	66.8	90.6	59.4	105	76.4	65.7	63.3	61.8
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	22 Sep 22	10:00:00	3600	64.4	75.6	60.2	97.7	69.4	65.9	63.8	62.2
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	11:00:00	3600	62	70.1	57	87.1	65	63.5	61.8	60.3
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	12:00:00	3600	62.5	75.1	58.4	94.5	66	63.9	62.2	60.5
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	13:00:00	3600	61.7	72.9	56.5	92	66.6	63.6	61.2	59.2
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	14:00:00	3600	61.5	80	56.1	99.6	66.8	62.9	60.2	58.2
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	15:00:00	3600	60.2	75.2	55.2	93.4	66.5	61.6	59.4	57.9
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	16:00:00	3600	64	73.8	57	90.7	70.2	67.2	61.7	59.3
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	17:00:00	3600	64.9	73	59.7	87.3	69.7	66.6	64.6	62.5
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	18:00:00	3600	64.8	74	60.8	90	69.8	66.6	64.3	62.4
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	19:00:00	3600	64.2	74.6	59.5	90	69.5	65.8	63.7	61.9
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	20:00:00	3600	62.1	72	55.4	91.8	67.9	63.8	61.6	59.2
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	21:00:00	3600	59.5	75.3	54.5	87.9	66.3	61	58.6	56.6
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	22:00:00	3600	59.1	74.5	51.4	88.2	68.5	60.7	57.3	54
IBR_LT6	Jantzen Beach Houseboats, Row E	LT6	21 Sep 22	23:00:00	3600	56.4	69.8	50.2	83.2	63.9	58.4	55.1	52.9


24-Hour Noise Levels at Site IBR_LT6 - Jantzen Beach Houseboats, Row E
9/21/22 - 9/22/22
dB(A)
95
90
85
80
75
65
60
55
50
45
12 AM 1 AM 2 AM 3 AM 4 AM 5 AM 6 AM 7 AM 8 AM 9 AM 10 AM 11 AM 12 PM 1 PM 2 PM 3 PM 4 PM 5 PM 6 PM 7 PM 8 PM 9 PM 10 PM 11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

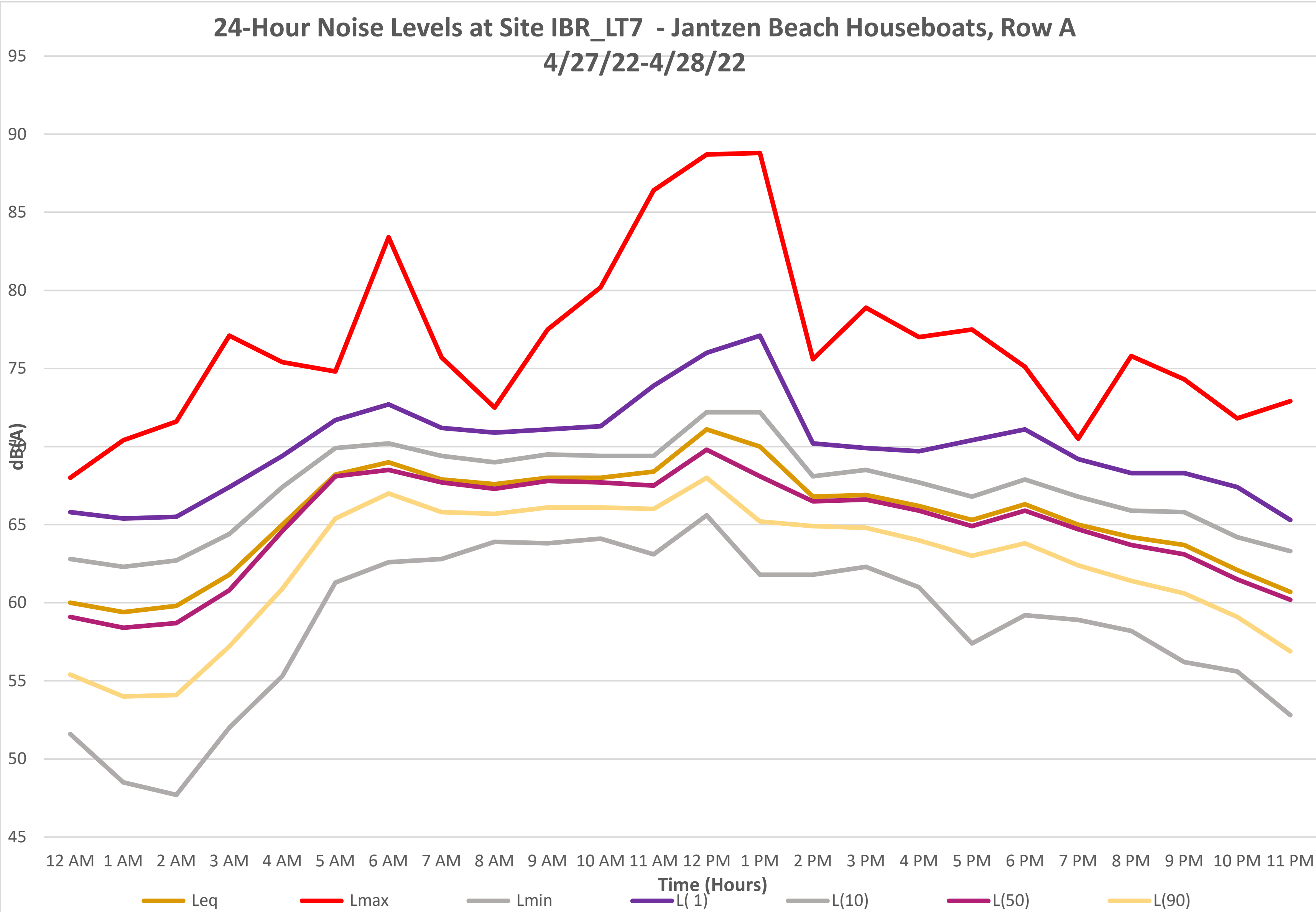
Long-Term Measurement Site LT7: Jantzen Beach Houseboats, Row A

Ambient Noise Monitoring Data collected on April 27, 2022, to April 28, 2022, from south end of Row A (1st row from I-5 bridge).

Site LT7: Jantzen Beach Houseboats, Row A

(white)	**Daytime Hours (7:00AM to 5:00PM)**
(light gray)	**Evening Hours (5:00PM to 10:00PM)**
(dark gray)	**Nighttime Hours (10:00PM to 7:00AM)**

Site	Location	Number	Date	Start Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	0:00:00	3600	60	68	51.6	82.6	65.8	62.8	59.1	55.4
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	1:00:00	3600	59.4	70.4	48.5	82.7	65.4	62.3	58.4	54
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	2:00:00	3600	59.8	71.6	47.7	83.3	65.5	62.7	58.7	54.1
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	3:00:00	3600	61.8	77.1	52	91.8	67.4	64.4	60.8	57.2
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	4:00:00	3600	65	75.4	55.3	87.7	69.4	67.4	64.6	60.9
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	5:00:00	3600	68.2	74.8	61.3	89.2	71.7	69.9	68.1	65.4
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	6:00:00	3600	69	83.4	62.6	104.1	72.7	70.2	68.5	67
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	7:00:00	3600	67.9	75.7	62.8	94.9	71.2	69.4	67.7	65.8
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	8:00:00	3600	67.6	72.5	63.9	88.1	70.9	69	67.3	65.7
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	9:00:00	3600	68	77.5	63.8	95.7	71.1	69.5	67.8	66.1
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	10:00:00	3600	68	80.2	64.1	92.8	71.3	69.4	67.7	66.1
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	28 Apr 22	11:00:00	3600	68.4	86.4	63.1	110.3	73.9	69.4	67.5	66
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	12:00:00	3600	71.1	88.7	65.6	104.7	76	72.2	69.8	68
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	13:00:00	3600	70	88.8	61.8	107	77.1	72.2	68.1	65.2
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	14:00:00	3600	66.8	75.6	61.8	96.7	70.2	68.1	66.5	64.9
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	15:00:00	3600	66.9	78.9	62.3	94.1	69.9	68.5	66.6	64.8
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	16:00:00	3600	66.2	77	61	98.1	69.7	67.7	65.9	64
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	17:00:00	3600	65.3	77.5	57.4	98	70.4	66.8	64.9	63
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	18:00:00	3600	66.3	75.1	59.2	91.3	71.1	67.9	65.9	63.8
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	19:00:00	3600	65	70.5	58.9	89.1	69.2	66.8	64.7	62.4
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	20:00:00	3600	64.2	75.8	58.2	89.9	68.3	65.9	63.7	61.4
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	21:00:00	3600	63.7	74.3	56.2	86.3	68.3	65.8	63.1	60.6
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	22:00:00	3600	62.1	71.8	55.6	90.4	67.4	64.2	61.5	59.1
IBR_LT7	Jantzen Houseboats 1st Row (Row A)	LT7	27 Apr 22	23:00:00	3600	60.7	72.9	52.8	87.6	65.3	63.3	60.2	56.9


24-Hour Noise Levels at Site IBR_LT7 - Jantzen Beach Houseboats, Row A
4/27/22-4/28/22
95
90
85
80
75
70
65
60
55
50
45
dB(A)
12 AM
1 AM
2 AM
3 AM
4 AM
5 AM
6 AM
7 AM
8 AM
9 AM
10 AM
11 AM
12 PM
1 PM
2 PM
3 PM
4 PM
5 PM
6 PM
7 PM
8 PM
9 PM
10 PM
11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

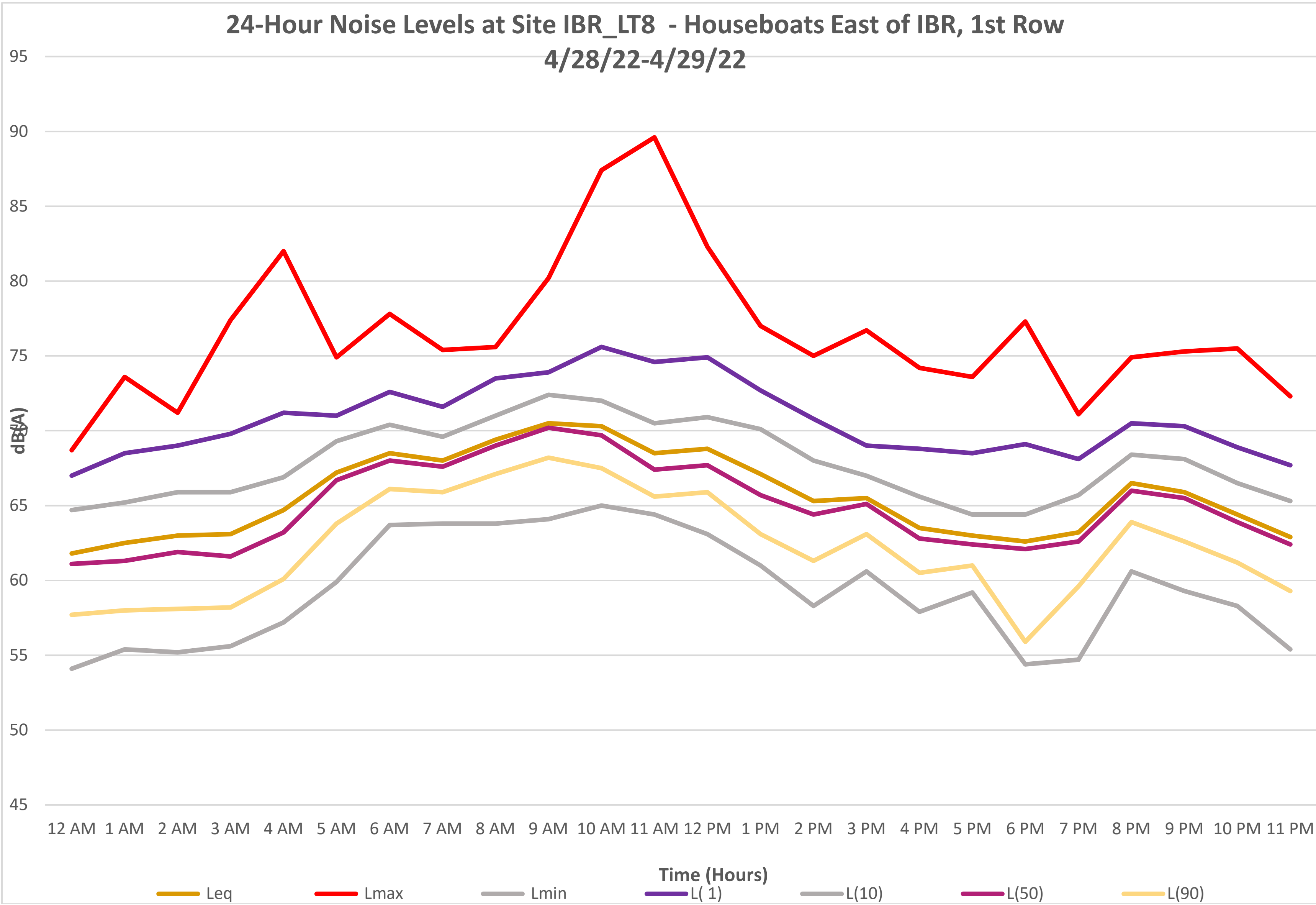
Long-Term Measurement Site LT8: Houseboats east of I-5 bridge, 1st Row

Ambient Noise Monitoring Data collected on April 28, 2022, to April 29, 2022, from south end of first row of houseboats from I-5 bridge.

Site LT8: Houseboats east of I-5, 1st Row

Legend
Daytime Hours (7:00AM to 5:00PM) (white)
Evening Hours (5:00PM to 10:00PM) (light gray)
Nighttime Hours (10:00PM to 7:00AM) (dark gray)

Site	Location	Number	Date	Start Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	29 Apr 22	0:00:00	3600	61.8	68.7	54.1	81.5	67	64.7	61.1	57.7
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	29 Apr 22	1:00:00	3600	62.5	73.6	55.4	85.7	68.5	65.2	61.3	58
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	29 Apr 22	2:00:00	3600	63	71.2	55.2	86.7	69	65.9	61.9	58.1
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	29 Apr 22	3:00:00	3600	63.1	77.4	55.6	89.4	69.8	65.9	61.6	58.2
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	29 Apr 22	4:00:00	3600	64.7	82	57.2	96	71.2	66.9	63.2	60.1
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	29 Apr 22	5:00:00	3600	67.2	74.9	59.9	87.7	71	69.3	66.7	63.8
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	29 Apr 22	6:00:00	3600	68.5	77.8	63.7	97.3	72.6	70.4	68	66.1
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	29 Apr 22	7:00:00	3600	68	75.4	63.8	94.7	71.6	69.6	67.6	65.9
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	29 Apr 22	8:00:00	3600	69.4	75.6	63.8	89.1	73.5	71	69	67.1
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	29 Apr 22	9:00:00	3600	70.5	80.2	64.1	97.4	73.9	72.4	70.2	68.2
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	29 Apr 22	10:00:00	3600	70.3	87.4	65	110.9	75.6	72	69.7	67.5
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	11:00:00	3600	68.5	89.6	64.4	99.2	74.6	70.5	67.4	65.6
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	12:00:00	3600	68.8	82.3	63.1	98.2	74.9	70.9	67.7	65.9
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	13:00:00	3600	67.1	77	61	93	72.7	70.1	65.7	63.1
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	14:00:00	3600	65.3	75	58.3	87.8	70.8	68	64.4	61.3
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	15:00:00	3600	65.5	76.7	60.6	95	69	67	65.1	63.1
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	16:00:00	3600	63.5	74.2	57.9	98	68.8	65.6	62.8	60.5
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	17:00:00	3600	63	73.6	59.2	92.7	68.5	64.4	62.4	61
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	18:00:00	3600	62.6	77.3	54.4	91.7	69.1	64.4	62.1	55.9
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	19:00:00	3600	63.2	71.1	54.7	88	68.1	65.7	62.6	59.6
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	20:00:00	3600	66.5	74.9	60.6	90.3	70.5	68.4	66	63.9
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	21:00:00	3600	65.9	75.3	59.3	86.4	70.3	68.1	65.5	62.6
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	22:00:00	3600	64.4	75.5	58.3	103.9	68.9	66.5	63.9	61.2
IBR_LT8	Houseboats East of IBR (1st Row)	LT8	28 Apr 22	23:00:00	3600	62.9	72.3	55.4	98.9	67.7	65.3	62.4	59.3



24-Hour Noise Levels at Site IBR_LT8 - Houseboats East of IBR, 1st Row
4/28/22-4/29/22
dB(A)
95
90
85
80
75
65
60
55
50
45
12 AM 1 AM 2 AM 3 AM 4 AM 5 AM 6 AM 7 AM 8 AM 9 AM 10 AM 11 AM 12 PM 1 PM 2 PM 3 PM 4 PM 5 PM 6 PM 7 PM 8 PM 9 PM 10 PM 11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

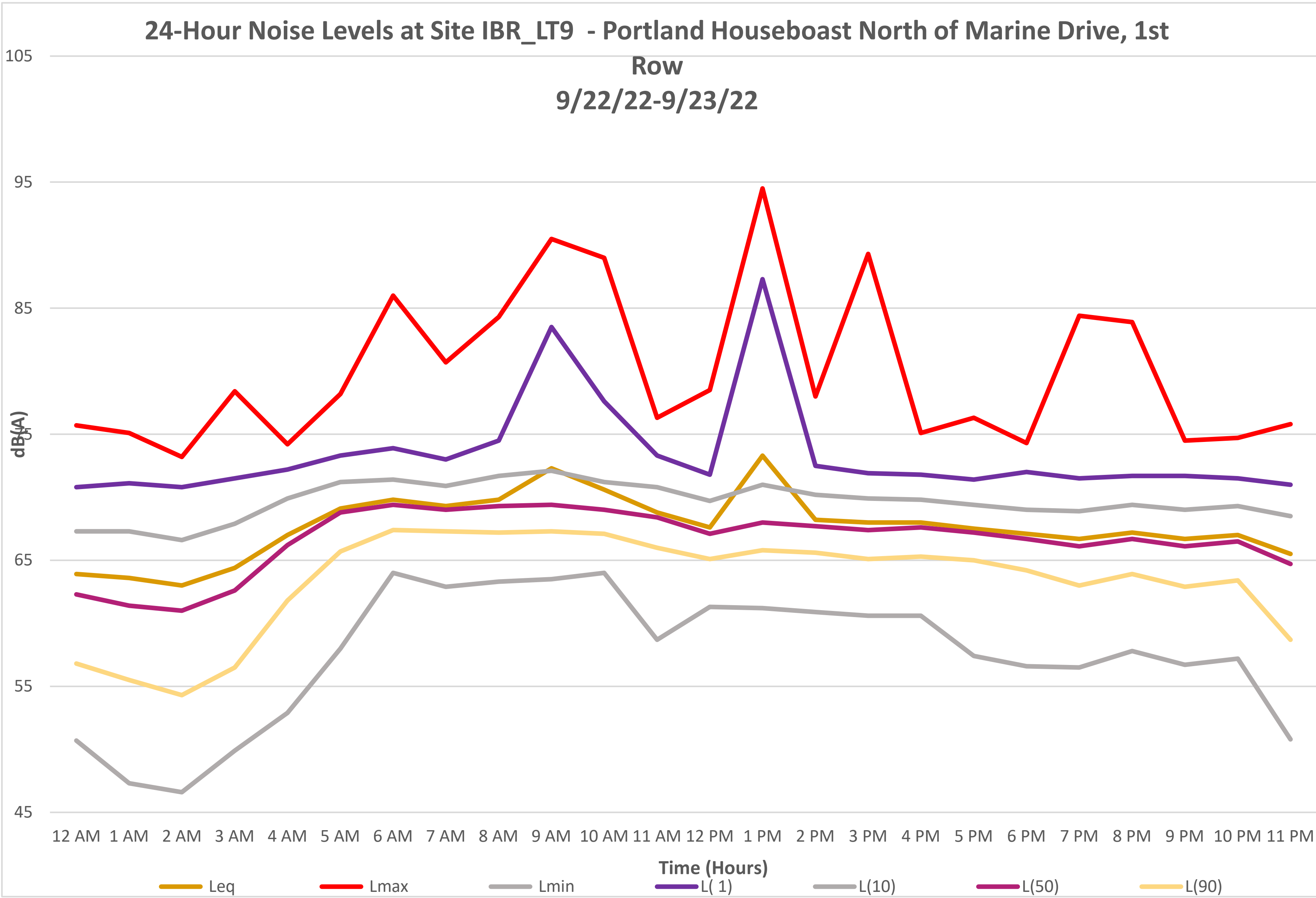
Long-Term Measurement Site LT9: Houseboats North Portland Harbor, 1st Row

Ambient Noise Monitoring Data collected on September 22, 2022, to September 23, 2022, from first row of houseboats west of I-5 bridge.

Site LT9: Houseboats North Portland Harbor South, west of I-5, 1st Row

Daytime Hours (7:00AM to 5:00PM)
Evening Hours (5:00PM to 10:00PM)
Nighttime Hours (10:00PM to 7:00AM)

Site	Location	Number	Date	Start Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	0:00:00	3600	63.9	75.7	50.7	89.5	70.8	67.3	62.3	56.8
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	1:00:00	3600	63.6	75.1	47.3	91.9	71.1	67.3	61.4	55.5
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	2:00:00	3600	63	73.2	46.6	89.9	70.8	66.6	61	54.3
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	3:00:00	3600	64.4	78.4	49.9	91.4	71.5	67.9	62.6	56.5
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	4:00:00	3600	67	74.2	52.9	89.4	72.2	69.9	66.2	61.8
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	5:00:00	3600	69.1	78.2	58	90.6	73.3	71.2	68.8	65.7
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	6:00:00	3600	69.8	86	64	101.3	73.9	71.4	69.4	67.4
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	7:00:00	3600	69.3	80.7	62.9	95	73	70.9	69	67.3
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	8:00:00	3600	69.8	84.3	63.3	104.1	74.5	71.7	69.3	67.2
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	9:00:00	3600	72.3	90.5	63.5	106.9	83.5	72.1	69.4	67.3
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	10:00:00	3600	70.6	89	64	103.9	77.6	71.2	69	67.1
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	11:00:00	3600	68.8	76.3	58.7	95.5	73.3	70.8	68.4	66
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	23 Sep 22	12:00:00	3600	67.6	78.5	61.3	102.4	71.8	69.7	67.1	65.1
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	22 Sep 22	12:00:00	3600	73.3	94.5	61.2	115.3	87.3	71	68	65.8
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	22 Sep 22	14:00:00	3600	68.2	78	60.9	93.1	72.5	70.2	67.7	65.6
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	22 Sep 22	15:00:00	3600	68	89.3	60.6	111.5	71.9	69.9	67.4	65.1
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	22 Sep 22	16:00:00	3600	68	75.1	60.6	90	71.8	69.8	67.6	65.3
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	22 Sep 22	17:00:00	3600	67.5	76.3	57.4	89.7	71.4	69.4	67.2	65
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	22 Sep 22	18:00:00	3600	67.1	74.3	56.6	88.6	72	69	66.7	64.2
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	22 Sep 22	19:00:00	3600	66.7	84.4	56.5	97.6	71.5	68.9	66.1	63
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	22 Sep 22	20:00:00	3600	67.2	83.9	57.8	90.1	71.7	69.4	66.7	63.9
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	22 Sep 22	21:00:00	3600	66.7	74.5	56.7	90.9	71.7	69	66.1	62.9
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	22 Sep 22	22:00:00	3600	67	74.7	57.2	86.5	71.5	69.3	66.5	63.4
IBR_LT9	Portland Houseboats N of N Marine Dr, 1st Row	LT9	22 Sep 22	23:00:00	3600	65.5	75.8	50.8	88.8	71	68.5	64.7	58.7



24-Hour Noise Levels at Site IBR_LT9 - Portland Houseboast North of Marine Drive, 1st Row
9/22/22-9/23/22
105
95
85
75
65
55
45
dB(A)
12 AM
1 AM
2 AM
3 AM
4 AM
5 AM
6 AM
7 AM
8 AM
9 AM
10 AM
11 AM
12 PM
1 PM
2 PM
3 PM
4 PM
5 PM
6 PM
7 PM
8 PM
9 PM
10 PM
11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

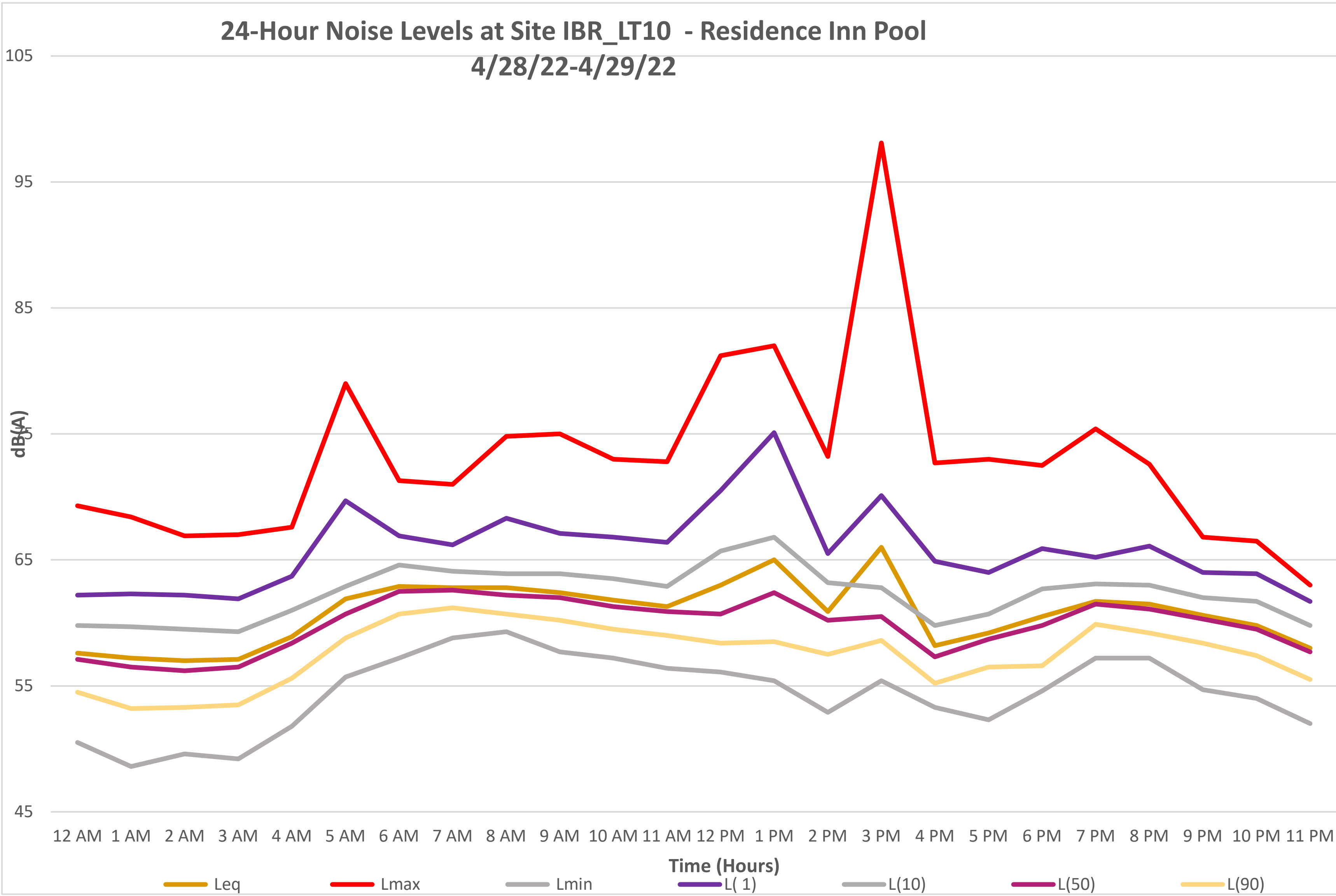
Long-Term Measurement Site LT10: Residence Inn Pool

Ambient Noise Monitoring Data collected on April 27, 2022, to April 28, 2022, from outdoor pool and patio on south side of building.

Site LT10: Residence Inn Pool

Legend
Daytime Hours (7:00AM to 5:00PM)
Evening Hours (5:00PM to 10:00PM)
Nighttime Hours (10:00PM to 7:00AM)

Site	Location	Number	Date	Start Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	0:00:00	3600	57.6	69.3	50.5	84.9	62.2	59.8	57.1	54.5
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	1:00:00	3600	57.2	68.4	48.6	82.3	62.3	59.7	56.5	53.2
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	2:00:00	3600	57	66.9	49.6	80.5	62.2	59.5	56.2	53.3
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	3:00:00	3600	57.1	67	49.2	80.2	61.9	59.3	56.5	53.5
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	4:00:00	3600	58.9	67.6	51.8	82.8	63.7	61	58.4	55.6
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	5:00:00	3600	61.9	79	55.7	93.3	69.7	62.9	60.7	58.8
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	6:00:00	3600	62.9	71.3	57.2	91.1	66.9	64.6	62.5	60.7
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	7:00:00	3600	62.8	71	58.8	90.9	66.2	64.1	62.6	61.2
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	8:00:00	3600	62.8	74.8	59.3	95.3	68.3	63.9	62.2	60.7
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	9:00:00	3600	62.4	75	57.7	88.7	67.1	63.9	62	60.2
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	10:00:00	3600	61.8	73	57.2	94.4	66.8	63.5	61.3	59.5
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	11:00:00	3600	61.3	72.8	56.4	89.4	66.4	62.9	60.9	59
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	12:00:00	3600	63	81.2	56.1	95.2	70.5	65.7	60.7	58.4
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	13:00:00	3600	65	82	55.4	95.1	75.1	66.8	62.4	58.5
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	14:00:00	3600	60.9	73.2	52.9	95.8	65.5	63.2	60.2	57.5
IBR_LT10	Residence Inn Pool	LT10	28 Apr 22	15:00:00	3600	66	98.1	55.4	123.4	70.1	62.8	60.5	58.6
IBR_LT10	Residence Inn Pool	LT10	27 Apr 22	16:00:00	3600	58.2	72.7	53.3	90.7	64.9	59.8	57.3	55.2
IBR_LT10	Residence Inn Pool	LT10	27 Apr 22	17:00:00	3600	59.2	73	52.3	85.9	64	60.7	58.7	56.5
IBR_LT10	Residence Inn Pool	LT10	27 Apr 22	18:00:00	3600	60.5	72.5	54.6	86.5	65.9	62.7	59.8	56.6
IBR_LT10	Residence Inn Pool	LT10	27 Apr 22	19:00:00	3600	61.7	75.4	57.2	90.1	65.2	63.1	61.5	59.9
IBR_LT10	Residence Inn Pool	LT10	27 Apr 22	20:00:00	3600	61.5	72.6	57.2	87.5	66.1	63	61.1	59.2
IBR_LT10	Residence Inn Pool	LT10	27 Apr 22	21:00:00	3600	60.6	66.8	54.7	81.5	64	62	60.3	58.4
IBR_LT10	Residence Inn Pool	LT10	27 Apr 22	22:00:00	3600	59.8	66.5	54	85.1	63.9	61.7	59.5	57.4
IBR_LT10	Residence Inn Pool	LT10	27 Apr 22	23:00:00	3600	58	63	52	77.2	61.7	59.8	57.7	55.5



24-Hour Noise Levels at Site IBR_LT10 - Residence Inn Pool
4/28/22-4/29/22
105
95
85
75
65
55
45
dB(A)
12 AM
1 AM
2 AM
3 AM
4 AM
5 AM
6 AM
7 AM
8 AM
9 AM
10 AM
11 AM
12 PM
1 PM
2 PM
3 PM
4 PM
5 PM
6 PM
7 PM
8 PM
9 PM
10 PM
11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

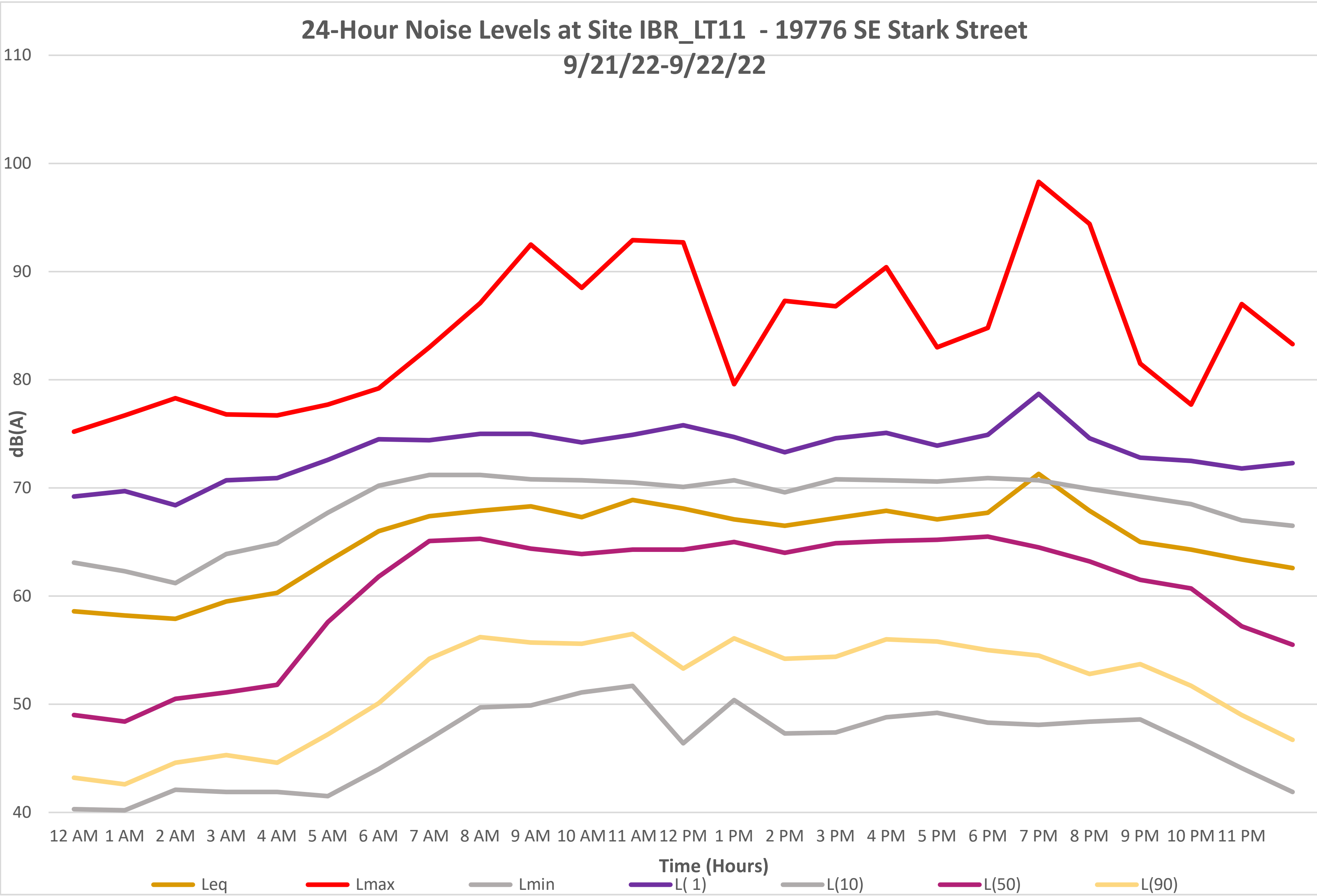
Long-Term Measurement Site LT11: Adjacent to Mobile Park Plaza

Ambient Noise Monitoring Data collected on September 21, 2022, to September 22, 2022, from location adjacent to property line.

Site LT11: Adjacent to Mobile Home Plaza, 19776 SE Stark Street

Daytime Hours (7:00AM to 5:00PM)
Evening Hours (5:00PM to 10:00PM)
Nighttime Hours (10:00PM to 7:00AM)

Site	Location	Number	Date	Start Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	0:00:00	3600	58.6	75.2	40.3	89.1	69.2	63.1	49	43.2
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	1:00:00	3600	58.2	76.7	40.2	90.7	69.7	62.3	48.4	42.6
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	2:00:00	3600	57.9	78.3	42.1	89.8	68.4	61.2	50.5	44.6
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	3:00:00	3600	59.5	76.8	41.9	92.4	70.7	63.9	51.1	45.3
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	4:00:00	3600	60.3	76.7	41.9	94.1	70.9	64.9	51.8	44.6
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	5:00:00	3600	63.2	77.7	41.5	92.4	72.6	67.7	57.6	47.2
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	6:00:00	3600	66	79.2	44	95.7	74.5	70.2	61.8	50.1
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	7:00:00	3600	67.4	83	46.8	99.5	74.4	71.2	65.1	54.2
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	8:00:00	3600	67.9	87.1	49.7	108.4	75	71.2	65.3	56.2
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	9:00:00	3600	68.3	92.5	49.9	104.8	75	70.8	64.4	55.7
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	10:00:00	3600	67.3	88.5	51.1	103.3	74.2	70.7	63.9	55.6
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	11:00:00	3600	68.9	92.9	51.7	105.5	74.9	70.5	64.3	56.5
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	12:00:00	3600	68.1	92.7	46.4	112.4	75.8	70.1	64.3	53.3
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	22 Sep 22	12:00:00	3600	67.1	79.6	50.4	98.2	74.7	70.7	65	56.1
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	13:00:00	3600	66.5	87.3	47.3	107.8	73.3	69.6	64	54.2
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	14:00:00	3600	67.2	86.8	47.4	100.6	74.6	70.8	64.9	54.4
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	15:00:00	3600	67.9	90.4	48.8	105	75.1	70.7	65.1	56
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	16:00:00	3600	67.1	83	49.2	96.6	73.9	70.6	65.2	55.8
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	17:00:00	3600	67.7	84.8	48.3	102.2	74.9	70.9	65.5	55
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	18:00:00	3600	71.3	98.3	48.1	113.2	78.7	70.7	64.5	54.5
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	19:00:00	3600	67.9	94.4	48.4	104.6	74.6	69.9	63.2	52.8
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	20:00:00	3600	65	81.5	48.6	97	72.8	69.2	61.5	53.7
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	21:00:00	3600	64.3	77.7	46.4	94.7	72.5	68.5	60.7	51.7
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	22:00:00	3600	63.4	87	44.1	99.6	71.8	67	57.2	49
IBR_LT11	Adjacent to Mobile Park Plaza at 19776 SE Stark St – 400' NW of Ruby Jct Transit Facility	LT11	21 Sep 22	23:00:00	3600	62.6	83.3	41.9	100.2	72.3	66.5	55.5	46.7


24-Hour Noise Levels at Site IBR_LT11 - 19776 SE Stark Street
9/21/22-9/22/22
110
100
90
80
70
60
50
40
dB(A)
12 AM 1 AM 2 AM 3 AM 4 AM 5 AM 6 AM 7 AM 8 AM 9 AM 10 AM 11 AM 12 PM 1 PM 2 PM 3 PM 4 PM 5 PM 6 PM 7 PM 8 PM 9 PM 10 PM 11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

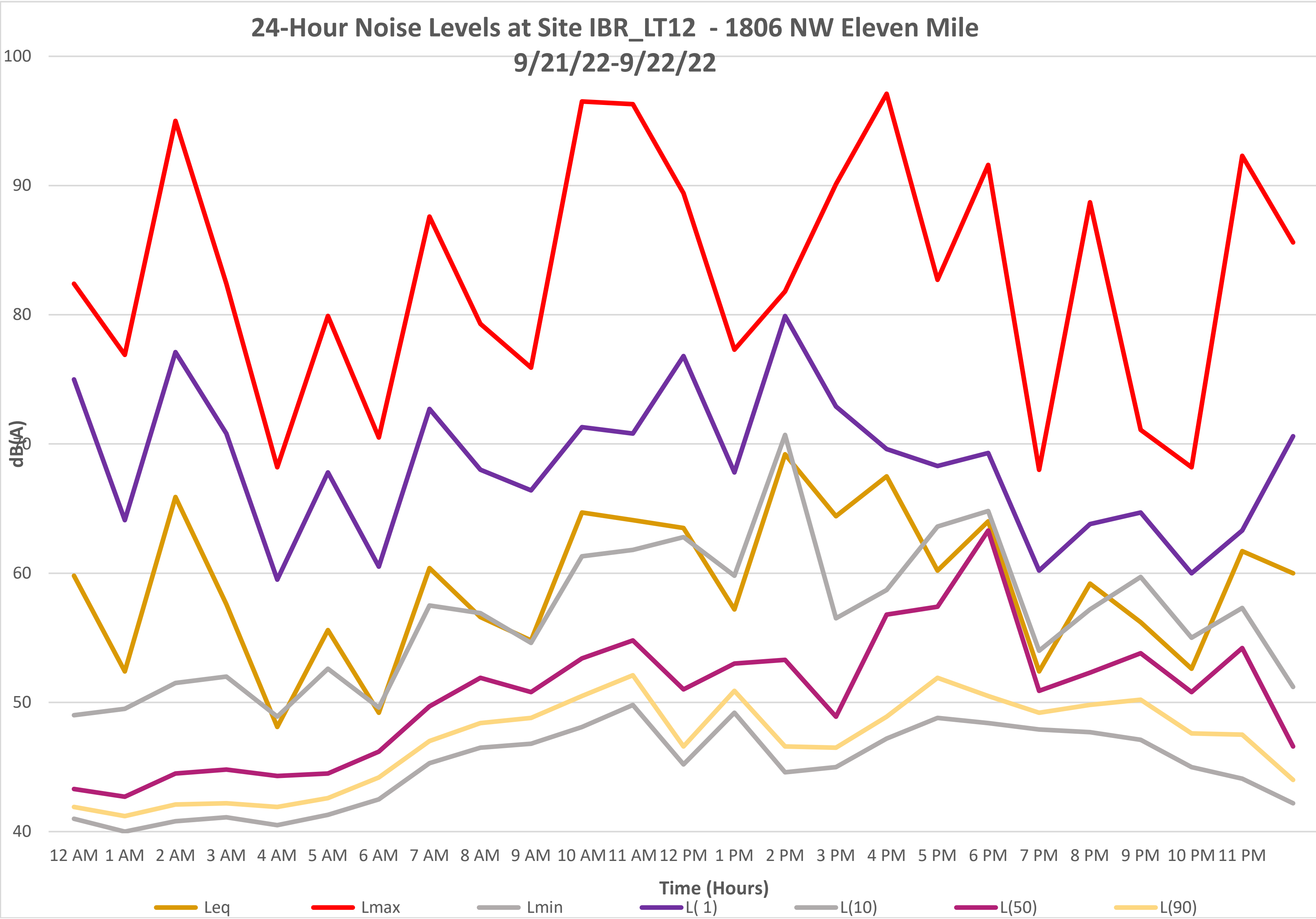
Long-Term Measurement Site LT12: Adjacent to Ruby Junction Transit Facility

Ambient Noise Monitoring Data collected on September 21, 2022, to September 22, 2022, from adjacent location on NW Eleven Mile

Site LT12: Adjacent to SW of Ruby Junction Transit Facility, north of 1806 NW Eleven Mile Avenue, Gresham, OR

Daytime Hours (7:00AM to 5:00PM)
Evening Hours (5:00PM to 10:00PM)
Nighttime Hours (10:00PM to 7:00AM)

Site	Location	Number	Date	Time	Duration	Leq	Lmax	Lmin	Peak	L(1)	L(10)	L(50)	L(90)
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	0:00:00	3600	59.8	82.4	41	95.8	75	49	43.3	41.9
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	1:00:00	3600	52.4	76.9	40	93.9	64.1	49.5	42.7	41.2
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	2:00:00	3600	65.9	95	40.8	113	77.1	51.5	44.5	42.1
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	3:00:00	3600	57.6	82.4	41.1	96.2	70.8	52	44.8	42.2
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	4:00:00	3600	48.1	68.2	40.5	91	59.5	48.9	44.3	41.9
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	5:00:00	3600	55.6	79.9	41.3	95.2	67.8	52.6	44.5	42.6
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	6:00:00	3600	49.2	70.5	42.5	89.5	60.5	49.6	46.2	44.2
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	7:00:00	3600	60.4	87.6	45.3	102.3	72.7	57.5	49.7	47
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	8:00:00	3600	56.6	79.3	46.5	98	68	56.9	51.9	48.4
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	9:00:00	3600	54.8	75.9	46.8	103	66.4	54.6	50.8	48.8
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	10:00:00	3600	64.7	96.5	48.1	113.7	71.3	61.3	53.4	50.5
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	11:00:00	3600	64.1	96.3	49.8	110.2	70.8	61.8	54.8	52.1
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	12:00:00	3600	63.5	89.4	45.2	105.6	76.8	62.8	51	46.6
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	22 Sep 22	12:00:00	3600	57.2	77.3	49.2	92.4	67.8	59.8	53	50.9
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	13:00:00	3600	69.2	81.8	44.6	104.3	79.9	70.7	53.3	46.6
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	14:00:00	3600	64.4	90.1	45	105.5	72.9	56.5	48.9	46.5
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	15:00:00	3600	67.5	97.1	47.2	110.7	69.6	58.7	56.8	48.9
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	16:00:00	3600	60.2	82.7	48.8	105.9	68.3	63.6	57.4	51.9
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	17:00:00	3600	64	91.6	48.4	106.8	69.3	64.8	63.3	50.5
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	18:00:00	3600	52.4	68	47.9	84.2	60.2	54	50.9	49.2
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	19:00:00	3600	59.2	88.7	47.7	103.7	63.8	57.2	52.3	49.8
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	20:00:00	3600	56.2	71.1	47.1	87.9	64.7	59.7	53.8	50.2
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	21:00:00	3600	52.6	68.2	45	83.6	60	55	50.8	47.6
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	22:00:00	3600	61.7	92.3	44.1	109.6	63.3	57.3	54.2	47.5
IBR_LT12	Adjacent to SW of Ruby Jct Transit Facility, north of 1806 NW Eleven Mile, Gresham, OR - 20' South of Ruby Jct Transit Facility	LT12	21 Sep 22	23:00:00	3600	60	85.6	42.2	98.3	70.6	51.2	46.6	44


24-Hour Noise Levels at Site IBR_LT12 - 1806 NW Eleven Mile
9/21/22-9/22/22
100
90
80
70
60
50
40
dB(A)
12 AM 1 AM 2 AM 3 AM 4 AM 5 AM 6 AM 7 AM 8 AM 9 AM 10 AM 11 AM 12 PM 1 PM 2 PM 3 PM 4 PM 5 PM 6 PM 7 PM 8 PM 9 PM 10 PM 11 PM
Time (Hours)
Leq
Lmax
Lmin
L(1)
L(10)
L(50)
L(90)

Appendix F

FIELD INSTRUMENTATION CALIBRATION CERTIFICATES

Appendix F presents calibration certificates from annual laboratory calibration of all field instrumentation used to collect noise measurement data for the IBR Noise/Vibration technical analysis.

CALIBRATION CERTIFICATES FOR LABORATORY CALIBRATION PERFORMED IN 2021

CERTIFICATE OF CALIBRATION
26549-5
FOR LARSON DAVIS
PRECISION INTEGRATING AND LOGGING SOUND LEVEL METER

Model **820** — Serial No. **1194**
ID No. **N/A**

With Microphone Model **2560** — Serial No. **3150**
With Preamplifier Model **PRM828** — Serial No. **1681**

Customer: **WSP USA**
Orange, CA 92868 — P.O. No. **Project#AdminHome2634**

was tested and met Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 1; IEC 651-1979 Type 1

on **16 AUG 2021** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specification.
Re-calibration due on: **16 AUG 2022**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	1051	1846829	26 AUG 2020	26 AUG 2021
B&K	2636	1601487	12 MAY 2021	12 MAY 2022
B&K	4226	3274134	30 NOV 2020	30 NOV 2021
B&K	4231	2094472	12 FEB 2021	12 FEB 2022
HP	34401A	US36071531	26 MAY 2021	26 MAY 2022
HP	3458A	2823A17713	01 SEP 2020	01 SEP 2021

Performed in Compliance with ANSI, NCSL Z-540-1, 1994
and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" condition.

Reference Test Procedure: **ACCT Procedure 812-820 Version 3.5.1.**

Temperature	Relative Humidity	Barometric Pressure
23°C	**36 %**	**984.62** hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: Harold Lynch

ODIN METROLOGY, INC.
CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

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Odin Metrology, Inc.
Calibration of Sound & Vibration Instruments

Certificate Number: **26549-5B**

Certificate of Calibration for
Larson Davis 1/2" Random Incidence Microphone

This calibration is performed by comparison with measurement reference standard microphone:

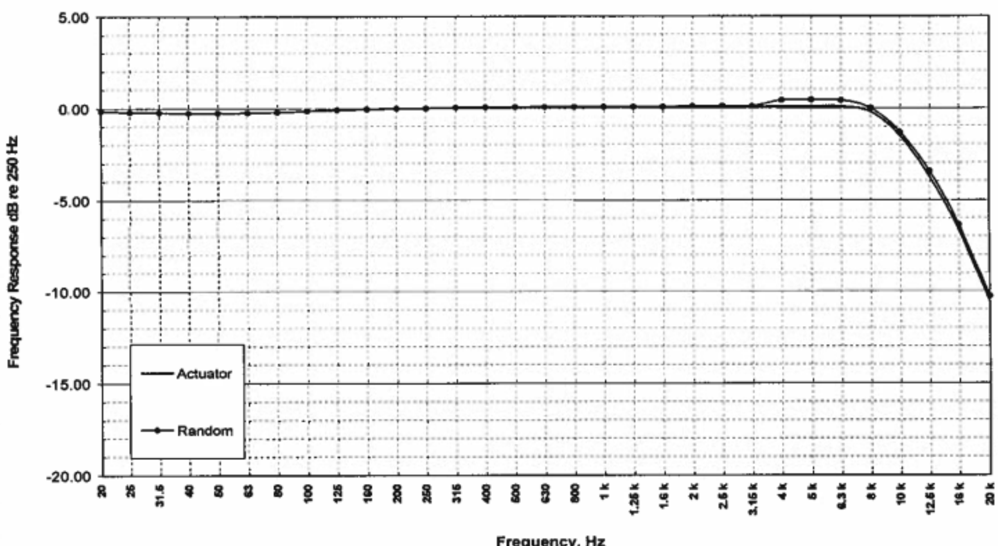
Reference Standards	
Type No.	4134/UA0825
Serial No.	1866523
Calibrated by	DANAK
Cal Date	28 OCT 2020
Due Date	28 OCT 2022

Type no.	**2560**
Serial no.	**3150**
With preamplifier type no.	**N/A**
Preamplifier Serial no.	**N/A**
Submitted by	**WSP USA** **Orange, CA 92868**
Purchase order no.	**Project# Admin Home-2634**
Asset no.	**N/A**

a) Estimated uncertainty of comparison: **± 0.05** dB
b) Estimated uncertainty of reference microphone: **± 0.04** dB
c) Total uncertainty: $\sqrt{a^2+b^2}$ = **± 0.064** dB
d) Expanded uncertainty (coverage factor k = 2 for 95% confidence level): = **± 0.13** dB

Performance Data		
Open circuit sensitivity at 1,013 hPa, 23°C, 50% RH, 251.2 Hz	**-26.42**	dB re 1 V/Pa
	47.74	mV/Pa
System sensitivity (with preamplifier) at 251.2 Hz	**N/A**	dB re 1 V/Pa
	N/A	mV/Pa

Microphone Frequency Response Type 2560
S/N 3150 : Measured 16 Aug 2021



Calibration performed by

Harold Lynch, Service Manager

Condition of Test		
Ambient Pressure	**988.52**	hPa
Temperature	**23**	°C
Relative Humidity	**38**	%
Polarization Voltage	**200**	V
Frequency	**251.2**	Hz
Date of Calibration	**16 AUG 2021**	
Re-calibration due on	**16 AUG 2022**	

ODIN METROLOGY, INC.
3533 OLD CONEJO ROAD, SUITE 125
THOUSAND OAKS, CA 91320
PHONE: (805) 375-0830; FAX: (805) 375-0405

The calibration data is both "as found" and "as final." At the time of calibration this microphone was found to be **within** the manufacturer's specifications.
Calibration Procedure: **OM-P-1008-Microphone Rev. 1.2 20130618.**

This calibration is traceable to DANAK/DPLA No. **M2.10-1423-3.1** and through inter-laboratory comparisons to NIST Test Number: **683/289533-17.** *See page 2 Traceability.

CERTIFICATE OF CALIBRATION
26549-6
FOR LARSON DAVIS PRECISION INTEGRATING SOUND LEVEL METER

Model **LxT1** Serial No. **0003981**
ID No. **N/A**
With Microphone **377B02** Serial No. **146345**
With Preamplifier **PRMLxT1L** Serial No. **035955**

Customer: **WSP USA**
Orange, CA 92868 P.O. No. **Project#AdminHome2634**

was tested and met Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 1; IEC 61672-2002 Class1; 60651-2001 Type 1

on **17 AUG 2021** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specification.
Re-calibration due on: **17 AUG 2022**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	1051	1846829	26 AUG 2020	26 AUG 2021
B&K	2636	1601487	12 MAY 2021	12 MAY 2022
B&K	4226	3274134	30 NOV 2020	30 NOV 2021
B&K	4231	2094472	12 FEB 2021	12 FEB 2022
HP	34401A	US36071531	26 MAY 2021	26 MAY 2022
HP	3458A	2823A17713	01 SEP 2020	01 SEP 2021

Performed in Compliance with ANSI, NCSL Z-540-1, 1994
and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **ACCT Procedure LxT-831 Version 0.5.1.**

Temperature	Relative Humidity	Barometric Pressure
23°C	38 %	985.11 hPa

Signed: Harold Lynch

ODIN METROLOGY, INC.
CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

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Odin Metrology, Inc.
Calibration of Sound & Vibration Instruments

Certificate Number: **26549-6B**

Certificate of Calibration for PCB 1/2" Free-field Microphone

This calibration is performed by comparison with measurement reference standard microphone:

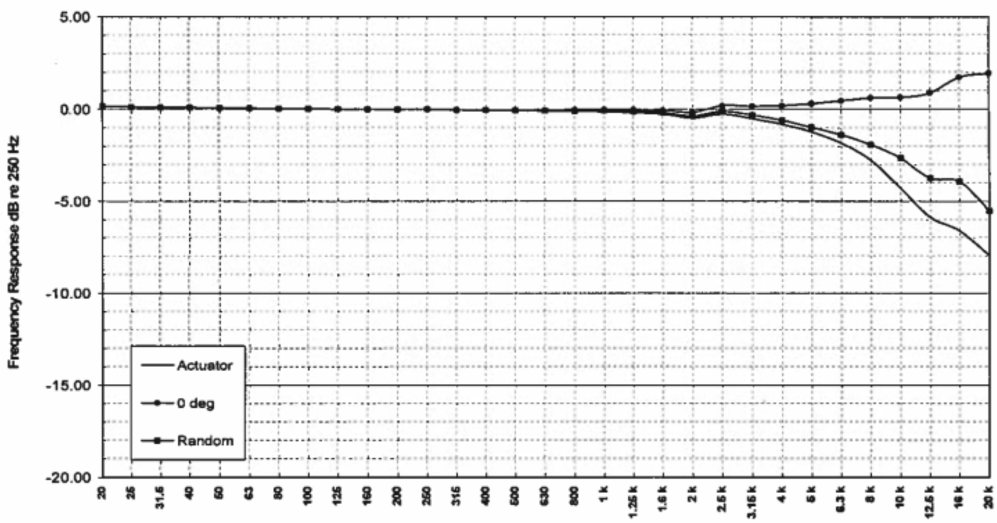
Reference Standards	
Type No.	4134/UA0825
Serial No.	1866523
Calibrated by	DANAK
Cal Date	28 OCT 2020
Due Date	28 OCT 2022

Type no.	**377B02**
Serial no.	**146345**
With preamplifier type no.	**N/A**
Preamplifier Serial no.	**N/A**
Submitted by	**WSP USA** **Orange, CA 92868**
Purchase order no.	**Project# Admin Home-2634**
Asset no.	**N/A**

a) Estimated uncertainty of comparison: ± **0.06** dB
b) Estimated uncertainty of reference microphone: ± **0.04** dB
c) Total uncertainty: $\sqrt{a^2+b^2}$ = ± **0.07** dB
d) Expanded uncertainty (coverage factor k = 2 for 95% confidence level): = ± **0.14** dB

Performance Data		
Open circuit sensitivity at 1,013 hPa, 23°C, 50% RH, 251.2 Hz	**-25.70**	dB re 1 V/Pa
	51.87	mV/Pa
System sensitivity (with preamplifier) at 251.2 Hz	**N/A**	dB re 1 V/Pa
	N/A	mV/Pa

Microphone Frequency Response Type 377B02
S/N 146345 : Measured 16 Aug 2021



Calibration performed by

Harold Lynch, Service Manager

Condition of Test		
Ambient Pressure	**988.52**	hPa
Temperature	**23**	°C
Relative Humidity	**38**	%
Polarization Voltage	**0**	V
Frequency	**251.2**	Hz
Date of Calibration	**16 AUG 2021**	
Re-calibration due on	**16 AUG 2022**	

ODIN METROLOGY, INC.
3533 OLD CONEJO ROAD, SUITE 125
THOUSAND OAKS, CA 91320
PHONE: (805) 375-0830; FAX: (805) 375-0405

The calibration data is both "as found" and "as final." At the time of calibration this microphone was found to be **within** the manufacturer's specifications. Calibration Procedure: **OM-P-1008-Microphone Rev. 1.2 20130618.**

This calibration is traceable to DANAK/DPLA No. **M2.10-1423-3.1** and through inter-laboratory comparisons to NIST Test Number: **683/289533-17.** *See page 2 Traceability.

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CERTIFICATE OF CALIBRATION
26549-1
FOR LARSON DAVIS
INTEGRATING SOUND LEVEL METER

Model **720** — Serial No. **0161**
ID No. **N/A**
With 3/8" electret microphone — Serial No. **B1087**

Customer: **WSP USA**
Orange, CA 92868 — P.O. No. **Project#AdminHome2634**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2; IEC 651-1979 Type 2

on **17 AUG 2021** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **17 AUG 2022**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	24 MAR 2021	24 MAR 2022
B&K	4226	3274134	30 NOV 2020	30 NOV 2021
HP	34401A	3146A48348	08 OCT 2020	08 OCT 2021

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 720.**
Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	**38 %**	**985.11 hPa**

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: Harold Lynch

ODIN METROLOGY, INC.

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PHONE: (805) 375-0830 FAX: (805) 375-0405

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CERTIFICATE OF CALIBRATION
26549-2
FOR LARSON DAVIS
INTEGRATING SOUND LEVEL METER

Model **720** — Serial No. **0514**
ID No. **N/A**
With 3/8" electret microphone — Serial No. **B4105**

Customer: **WSP USA**
Orange, CA 92868 — P.O. No. **Project#AdminHome2634**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2; IEC 651-1979 Type 2

on **17 AUG 2021** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **17 AUG 2022**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	24 MAR 2021	24 MAR 2022
B&K	4226	3274134	30 NOV 2020	30 NOV 2021
HP	34401A	3146A48348	08 OCT 2020	08 OCT 2021

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252

*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 720.**

Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	**38 %**	**985.11** hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: [signature]

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3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

Doc. Rev 14 Jul 2021 — Page 1 of 4

CERTIFICATE OF CALIBRATION
26549-3
FOR LARSON DAVIS
INTEGRATING SOUND LEVEL METER

Model **720** Serial No. **0634**

ID No. **N/A**

With 3/8" electret microphone Serial No. **B8330**

Customer: **WSP USA**
Orange, CA 92868 P.O. No. **Project#AdminHome2634**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2; IEC 651-1979 Type 2

on **17 AUG 2021** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **17 AUG 2022**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	24 MAR 2021	24 MAR 2022
B&K	4226	3274134	30 NOV 2020	30 NOV 2021
HP	34401A	3146A48348	08 OCT 2020	08 OCT 2021

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252

*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 720.**

Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	**38 %**	**985.11** hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: [signature]

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PHONE: (805) 375-0830 FAX: (805) 375-0405

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CERTIFICATE OF CALIBRATION
26752-1
FOR LARSON DAVIS
INTEGRATING SOUND LEVEL METER

Model **720** Serial No. **0477**
ID No. **N/A**
With 3/8" electret microphone Serial No. **B2082**

Customer: **WSP USA**
New York, NY 10119 P.O. No. **Verbal/Brian Isoldi**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2; IEC 651-1979 Type 2

on **18 NOV 2021** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **18 NOV 2022**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	24 MAR 2021	24 MAR 2022
B&K	4226	3274134	30 NOV 2020	30 NOV 2021
HP	34401A	3146A48348	16 OCT 2021	16 OCT 2022

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 720.**
Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	39 %	993.03 hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: [signature]

ODIN METROLOGY, INC.
CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

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Odin Metrology, Inc.
Calibration of Sound & Vibration Instruments

Certificate Number: **26549-4**

Certificate of Calibration for Larson Davis Calibrator

This calibration is performed by comparison with measurement reference standard microphone:

Type No.	4134
Serial No.	1315901
Calibrated by	HL
Cal Date	24 MAR 2021
Due Date	24 MAR 2022

a) Estimated uncertainty of comparison: ± 0.05 dB
b) Estimated uncertainty of calibration service for standard pistonphone: ± 0.06 dB
c) Total uncertainty: $\sqrt{a^2+b^2}$ = ± 0.08 dB
d) Expanded uncertainty (coverage factor k = 2 for 95% confidence level): = ± 0.16 dB

This acoustic calibrator has been calibrated using standards with values traceable to the National Institute of Standards and Technology. This calibration is traceable to NIST Test Number **683/289533-17.**

Condition of Test		
Ambient Pressure	**985.11**	hPa
Temperature	**23**	°C
Relative Humidity	**38**	%
Date of Calibration	**17 AUG 2021**	
Re-calibration due on	**17 AUG 2022**	

The calibration of this acoustic calibrator was performed using a test system conforming to the requirements of ANSI/NCSLZ540-1, 1994, ISO 17025, and ISO 9001:2015, Certification NQA No. 11252.

Calibration procedure: **OM-P-1001-Acoustic_Calibrator, Rev. 1.0 20130522.**

Calibration performed by [signature]

Harold Lynch, Service Manager

Calibrator type	**CAL200**
Serial no.	**2239**
Submitted by	**WSP USA** **Orange, CA 92868**
Purchase order no.	**Project# Admin Home-2634**
Asset no.	**N/A**

This calibrator has been found to perform **within** the specifications listed below at the normalized conditions stated.

SPL produced in coupler terminated by a loading volume of a ½" microphone	94.0 ± 0.2 dB 114 ± 0.2 dB
Frequency	1,000 Hz ± 1%
Distortion	< 2%
At 1,013 hPa, 23°C, and 65% relative humidity	

Performance as Received		
Frequency	**1000.0**	Hz
SPL (94 dB)	**94.04**	dB
SPL (114 dB)	**114.02**	dB
Distortion (at 94 dB)	**0.3**	%
Battery Voltage	**9.5**	V

Was adjustment performed? **No**
Were batteries replaced? **No**

Final Performance		
Frequency	**1000.0**	Hz
SPL (94 dB)	**94.04**	dB
SPL (114 dB)	**114.02**	dB
Distortion (at 94 dB)	**0.3**	%

Note: This calibrator was **within** manufacturer's specifications as received.

ODIN METROLOGY, INC.
3533 OLD CONEJO ROAD, SUITE 125
THOUSAND OAKS, CA 91320
PHONE: (805) 375-0830; FAX: (805) 375-0405

e-mail: calibration@svantek.com.pl Tel.: +48 22 51 88 322 www.svantek.com

SVANTEK

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04-872 Warsaw, ul. Strzygłowska 81
POLAND

PCA Polskie Centrum Akredytacji Wzorcowanie
AP 146

Calibration laboratory accredited by
Polish Center for Accreditation, a signatory to EA MLA and ILAC MRA
that include recognition of calibration certificates
Accreditation No AP 146

ilac-MRA

CALIBRATION CERTIFICATE

Date of issue: 15th June, 2021 **Certificate No:** 00026293/02/2021 **Page:** 1/6

OBJECT OF CALIBRATION
Sound level meter type SVAN 971, number 80354, manufacturer SVANTEK with preamplifier type SV 18, number 71559, manufacturer SVANTEK and microphone type 7052E, number 70155, manufacturer ACO.

APPLICANT
WSP
250 West 34th Street
New York, NY 10119

CALIBRATION METHOD
Method described in instruction IN-02 "Calibration of the sound level meter", issue number 15 date 23.08.2019, written on the basis of international standard EN IEC 61672-3:2013 Electroacoustics. Part 3: Periodic tests.

ENVIRONMENTAL CONDITIONS
Temperature: (21.1 ÷ 21.6) °C
Ambient pressure: (101.1 ÷ 101.2) kPa
Relative humidity: (37 ÷ 38) %

DATE OF CALIBRATION
14th June, 2021

TRACEABILITY
This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the standards maintained in the Central Office of Measures.
SVANTEK Laboratory uses guidance documents to clarify the requirements in EN ISO/IEC 17025 "General requirements for the competence of testing and calibration laboratories", where this is considered to be necessary.

CALIBRATION RESULTS
The results are presented on pages 2 ÷ 6 of this certificate including measurement uncertainty.

UNCERTAINTY OF MEASUREMENTS
Uncertainty of measurement has been evaluated in compliance with EA-4/02:2013. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor *k* = 2.

Akredytowane Laboratorium Wzorcujące AP 146

Technical and Quality Manager
Anna Domańska, M. Sc.

The certificate may be presented or copied as a whole document only.

e-mail: calibration@svantek.com.pl Tel.: +48 22 51 88 322 www.svantek.com

SVANTEK

Calibration Laboratory
SVANTEK
04-872 Warsaw, ul. Strzygłowska 81
POLAND

PCA Polskie Centrum Akredytacji WZORCOWANIE
AP 146

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that include recognition of calibration certificates
Accreditation No AP 146

ilac-MRA

CALIBRATION CERTIFICATE

Date of issue: 15th June, 2021 **Certificate No:** 00026294/02/2021 **Page:** 1/6

OBJECT OF CALIBRATION	Sound level meter type SVAN 971, number 80356, manufacturer SVANTEK with preamplifier type SV 18, number 71555, manufacturer SVANTEK and microphone type 7052E, number 70137, manufacturer ACO.
APPLICANT	WSP 250 West 34th Street New York, NY 10119
CALIBRATION METHOD	Method described in instruction IN-02 "Calibration of the sound level meter", issue number 15 date 23.08.2019, written on the basis of international standard EN IEC 61672-3:2013 Electroacoustics. Part 3: Periodic tests.
ENVIRONMENTAL CONDITIONS	Temperature: (21.1 ÷ 22.0) °C Ambient pressure: (100.9 ÷ 101.1) kPa Relative humidity: (36 ÷ 38) %
DATE OF CALIBRATION	14th June, 2021
TRACEABILITY	This certificate is issued under the agreement EA MLA in the field of calibration and provides traceability of measurement results to the standards maintained in the Central Office of Measures. SVANTEK Laboratory uses guidance documents to clarify the requirements in EN ISO/IEC 17025 "General requirements for the competence of testing and calibration laboratories", where this is considered to be necessary.
CALIBRATION RESULTS	The results are presented on pages 2 ÷ 6 of this certificate including measurement uncertainty.
UNCERTAINTY OF MEASUREMENTS	Uncertainty of measurement has been evaluated in compliance with EA-4/02:2013. The expanded uncertainty assigned corresponds to a coverage probability of 95 % and the coverage factor $k = 2$.

AP 146 Akredytowane Laboratorium Wzorcujące

Technical and Quality Manager
Anna Domańska, M. Sc.

The certificate may be presented or copied as a whole document only.

CALIBRATION CERTIFICATES FOR LABORATORY CALIBRATION PERFORMED IN 2022

Note: SV971 units were not used after Spring 2022, therefore certificates are not provided in 2022 list.

CERTIFICATE OF CALIBRATION
27333-5
FOR LARSON DAVIS
PRECISION INTEGRATING AND LOGGING SOUND LEVEL METER

Model **820** Serial No. **1194**
ID No. **N/A**
With Microphone Model **2560** Serial No. **3150**
With Preamplifier Model **PRM828** Serial No. **1681**

Customer: **WSP USA**
Seattle, WA 98154 P.O. No. **Admin Home 1828**

was tested and met Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 1; IEC 651-1979 Type 1

on **24 AUG 2022** **BY** **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specification.
Re-calibration due on: **24 AUG 2023**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	1051	1846829	08 SEP 2021	08 SEP 2022
B&K	2636	1601487	16 MAY 2022	16 MAY 2023
B&K	4226	3274134	30 NOV 2021	30 NOV 2022
B&K	4231	2094472	15 FEB 2022	15 FEB 2023
HP	34401A	US36071531	25 MAY 2022	25 MAY 2023
HP	3458A	2823A17713	20 SEP 2021	20 SEP 2022

Performed in Compliance with ANSI, NCSL Z-540-1, 1994
and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" condition.

Reference Test Procedure: **ACCT Procedure 812-820 Version 3.5.1.**

Temperature	Relative Humidity	Barometric Pressure
23°C	39 %	984.36 hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: [signature]

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CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

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Odin Metrology, Inc.
Calibration of Sound & Vibration Instruments

Certificate Number: **27333-7**

Certificate of Calibration for
Larson Davis 1/2" Random Incidence Microphone

This calibration is performed by comparison with measurement reference standard microphone:

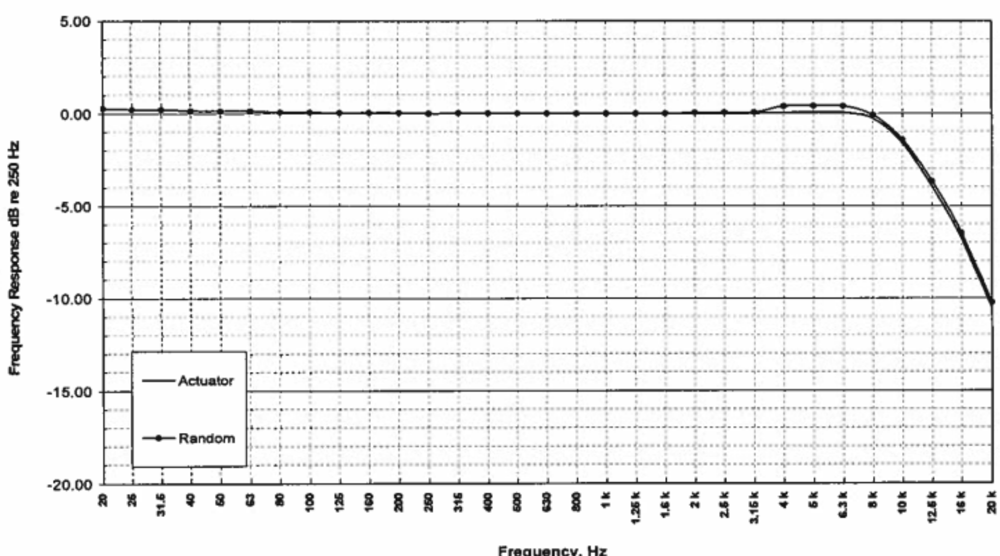
Reference Standards	
Type No.	4134/UA0825
Serial No.	1866524
Calibrated by	DANAK
Cal Date	23 SEP 2021
Due Date	23 SEP 2023

Type no.	**2560**
Serial no.	**3150**
With preamplifier type no.	**N/A**
Preamplifier Serial no.	**N/A**
Submitted by	**WSP USA** **Seattle, WA 98154**
Purchase order no.	**Admin Home 1828**
Asset no.	**N/A**

a) Estimated uncertainty of comparison: ± 0.05 dB
b) Estimated uncertainty of reference microphone: ± 0.04 dB
c) Total uncertainty: $\sqrt{a^2+b^2}$ = ± 0.064 dB
d) Expanded uncertainty (coverage factor *k* = 2 for 95% confidence level): = ± 0.13 dB

Performance Data		
Open circuit sensitivity at 1,013 hPa, 23°C, 50% RH, 251.2 Hz	-26.31	dB re 1 V/Pa
	48.39	mV/Pa
System sensitivity (with preamplifier) at 251.2 Hz	N/A	dB re 1 V/Pa
	N/A	mV/Pa

Microphone Frequency Response Type 2560
S/N 3150 : Measured 25 Aug 2022



Calibration performed by

Harold Lynch, Service Manager

Condition of Test		
Ambient Pressure	988.38	hPa
Temperature	23	°C
Relative Humidity	39	%
Polarization Voltage	200	V
Frequency	251.2	Hz
Date of Calibration	25 AUG 2022	
Re-calibration due on	25 AUG 2023	

ODIN METROLOGY, INC.
3533 OLD CONEJO ROAD, SUITE 125
THOUSAND OAKS, CA 91320
PHONE: (805) 375-0830; FAX: (805) 375-0405

The calibration data is both "as found" and "as final." At the time of calibration this microphone was found to be **within** the manufacturer's specifications. Calibration Procedure: **OM-P-1008-Microphone Rev. 1.2 20130618.**

This calibration is traceable to DANAK/DPLA No. **M2.10-1478-2.1** and through inter-laboratory comparisons to NIST Test Number: **683/289533-17.** *See page 2 Traceability.

CERTIFICATE OF CALIBRATION
27333-8
FOR LARSON DAVIS PRECISION INTEGRATING SOUND LEVEL METER

Model **LxT1** Serial No. **0003981**
ID No. **N/A**

With Microphone **377B02** Serial No. **146345**
With Preamplifier **PRMLxT1L** Serial No. **035955**

Customer: **WSP USA**
Seattle, WA 98154 P.O. No. **Admin Home 1828**

was tested and met Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 1; IEC 61672-2002 Class1; 60651-2001 Type 1

on **24 AUG 2022** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specification.
Re-calibration due on: **24 AUG 2023**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	1051	1846829	08 SEP 2021	08 SEP 2022
B&K	2636	1601487	16 MAY 2022	16 MAY 2023
B&K	4226	3274134	30 NOV 2021	30 NOV 2022
B&K	4231	2094472	15 FEB 2022	15 FEB 2023
HP	34401A	US36071531	25 MAY 2022	25 MAY 2023
HP	3458A	2823A17713	20 SEP 2021	20 SEP 2022

Performed in Compliance with ANSI, NCSL Z-540-1, 1994
and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **ACCT Procedure LxT-831 Version 0.5.1.**

Temperature	Relative Humidity	Barometric Pressure
23°C	39 %	984.36 hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: [signature]

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CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
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Odin Metrology, Inc.
Calibration of Sound & Vibration Instruments

Certificate Number: **27333-10**

Certificate of Calibration for PCB 1/2" Free-field Microphone

This calibration is performed by comparison with measurement reference standard microphone:

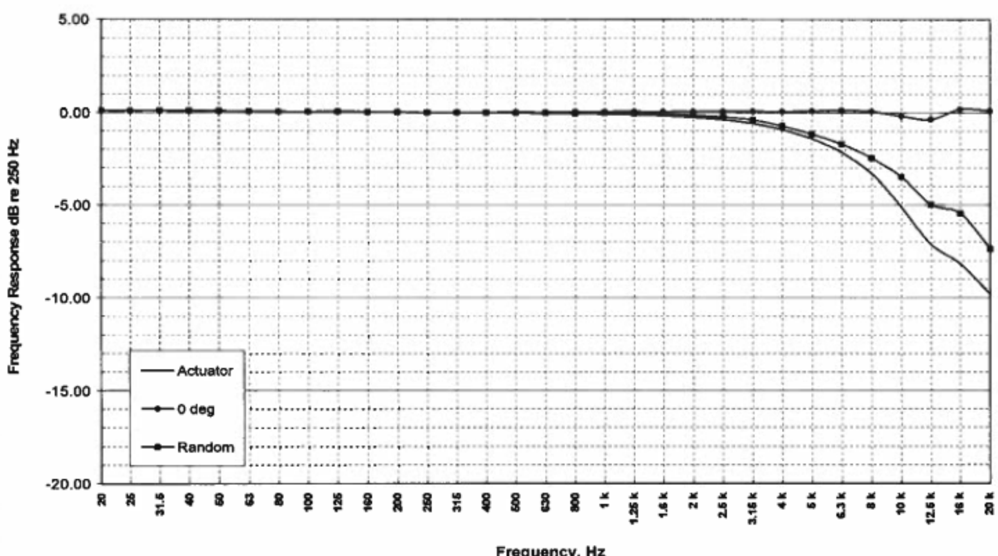
Reference Standards	
Type No.	4134/UA0825
Serial No.	1866524
Calibrated by	DANAK
Cal Date	23 SEP 2021
Due Date	23 SEP 2023

Type no.	377B02
Serial no.	146345
With preamplifier type no.	N/A
Preamplifier Serial no.	N/A
Submitted by	WSP USA Seattle, WA 98154
Purchase order no.	Admin Home 1828
Asset no.	N/A

a) Estimated uncertainty of comparison: ± 0.06 dB
b) Estimated uncertainty of reference microphone: ± 0.04 dB
c) Total uncertainty: $\sqrt{a^2 + b^2}$ = ± 0.07 dB
d) Expanded uncertainty (coverage factor k = 2 for 95% confidence level): = ± 0.14 dB

Performance Data		
Open circuit sensitivity at 1,013 hPa, 23°C, 50% RH, 251.2 Hz	-25.65	dB re 1 V/Pa
	52.21	mV/Pa
System sensitivity (with preamplifier) at 251.2 Hz	N/A	dB re 1 V/Pa
	N/A	mV/Pa

Microphone Frequency Response Type 377B02
S/N 146345 : Measured 25 Aug 2022



Calibration performed by

Harold Lynch, Service Manager

Condition of Test		
Ambient Pressure	988.38	hPa
Temperature	23	°C
Relative Humidity	39	%
Polarization Voltage	0	V
Frequency	251.2	Hz
Date of Calibration	25 AUG 2022	
Re-calibration due on	25 AUG 2023	

Odin Metrology, Inc.
3533 Old Conejo Road, Suite 125
Thousand Oaks, CA 91320
Phone: (805) 375-0830; Fax: (805) 375-0405

The calibration data is both "as found" and "as final." At the time of calibration this microphone was found to be **within** the manufacturer's specifications. Calibration Procedure: **OM-P-1008-Microphone Rev. 1.2 20130618.**

This calibration is traceable to DANAK/DPLA No. **M2.10-1478-2.1** and through inter-laboratory comparisons to NIST Test Number: **683/289533-17.** *See page 2 Traceability.

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CERTIFICATE OF CALIBRATION
27333-1
FOR LARSON DAVIS
INTEGRATING SOUND LEVEL METER

Model **720**

With 3/8" electret microphone

Serial No. **0161**
ID No. **N/A**
Serial No. **B1087**

Customer: **WSP USA**
Seattle, WA 98154

P.O. No. **Admin Home 1828**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2; IEC 651-1979 Type 2

on **24 AUG 2022** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **24 AUG 2023**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	16 FEB 2022	16 FEB 2023
B&K	4226	3274134	30 NOV 2021	30 NOV 2022
HP	34401A	3146A48348	16 OCT 2021	16 OCT 2022

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252

*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 720.**

Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	**39 %**	**984.36** hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: Harold Lynch

ODIN METROLOGY, INC.

CALIBRATION OF SOUND & VIBRATION INSTRUMENTATION
3533 OLD CONEJO ROAD, SUITE 125 THOUSAND OAKS CA 91320
PHONE: (805) 375-0830 FAX: (805) 375-0405

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CERTIFICATE OF CALIBRATION
27333-2
FOR LARSON DAVIS
INTEGRATING SOUND LEVEL METER

Model **720** | Serial No. **0514**
ID No. **N/A**
With 3/8" electret microphone | Serial No. **B4105**

Customer: **WSP USA**
Seattle, WA 98154
P.O. No. **Admin Home 1828**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2; IEC 651-1979 Type 2

on **24 AUG 2022** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **24 AUG 2023**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	16 FEB 2022	16 FEB 2023
B&K	4226	3274134	30 NOV 2021	30 NOV 2022
HP	34401A	3146A48348	16 OCT 2021	16 OCT 2022

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 720.**
Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	**39** %	**984.36** hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.
Signed: Harold Lynch

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CERTIFICATE OF CALIBRATION
27333-3
FOR LARSON DAVIS
INTEGRATING SOUND LEVEL METER

Model **720** | Serial No. **0634**
ID No. **N/A**
With 3/8" electret microphone | Serial No. **B8330**

Customer: **WSP USA**
Seattle, WA 98154 | P.O. No. **Admin Home 1828**

was tested to Larson Davis specifications at the points tested and as outlined in ANSI S1.4-1983 Type 2; IEC 651-1979 Type 2

on **24 AUG 2022** BY **HAROLD LYNCH**
Service Manager

As received and as left condition: Within Specifications.
Re-calibration due on: **24 AUG 2023**

Certified References*

Mfg.	Type	Serial No.	Cal Date	Due Date
B&K	4134	1315901	16 FEB 2022	16 FEB 2023
B&K	4226	3274134	30 NOV 2021	30 NOV 2022
HP	34401A	3146A48348	16 OCT 2021	16 OCT 2022

Calibration System operates in conformance to ANSI/ NCSL Z540-1, 1994 and ISO 17025, ISO 9001:2015 Certification NQA No. 11252
*References are traceable to NIST (National Institute of Standards and Technology).

Note: For calibration data see enclosed pages.
The data represent both "as found" and "as left" conditions.

Reference Test Procedure: **Odin Metrology Procedure for Larson Davis 720.**
Uncertainty of Reference 4226 in Pressure:
31.5 Hz-4k Hz: ± .20 dB 4k Hz-8k Hz: ± .25 dB
Uncertainty of ANSI Type 2 S.L.M.: 31.5 Hz-2k Hz: ± 2 dB
2k Hz-4k Hz: ± 2.5 dB 4k Hz-5k Hz: ± 3.0 dB 5k Hz-6.3k Hz: ± 3.5 dB 6.3k Hz-8k Hz: ± 4.5 dB
Uncertainty Ratio: > 4:1

Temperature	Relative Humidity	Barometric Pressure
23°C	**39 %**	**984.36** hPa

Note: This calibration report shall not be reproduced, except in full, without written consent by Odin Metrology, Inc.

Signed: Harold Lynch

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Odin Metrology, Inc.
Calibration of Sound & Vibration Instruments

Certificate Number: **27333-4**

Certificate of Calibration for Larson Davis Calibrator

This calibration is performed by comparison with measurement reference standard microphone:

Type No.	4134
Serial No.	1315901
Calibrated by	HL
Cal Date	16 FEB 2022
Due Date	16 FEB 2023

a) Estimated uncertainty of comparison: ± **0.05** dB
b) Estimated uncertainty of calibration service for standard pistonphone: ± **0.06** dB
c) Total uncertainty: $\sqrt{a^2 + b^2}$ = ± **0.08** dB
d) Expanded uncertainty (coverage factor *k* = 2 for 95% confidence level): = ± **0.16** dB

This acoustic calibrator has been calibrated using standards with values traceable to the National Institute of Standards and Technology. This calibration is traceable to NIST Test Number **683/289533-17.**

Condition of Test		
Ambient Pressure	**988.38**	hPa
Temperature	**23**	°C
Relative Humidity	**39**	%
Date of Calibration	**25 AUG 2022**	
Re-calibration due on	**25 AUG 2023**	

The calibration of this acoustic calibrator was performed using a test system conforming to the requirements of ANSI/NCSLZ540-1, 1994, ISO 17025, and ISO 9001:2015, Certification NQA No. 11252.

Calibration procedure: **OM-P-1001-Acoustic_Calibrator, Rev. 1.0 20130522.**

Calibration performed by [signature]

Harold Lynch, Service Manager

Calibrator type	**CAL200**
Serial no.	**2239**
Submitted by	**WSP USA** **Seattle, WA 98154**
Purchase order no.	**Admin Home 1828**
Asset no.	**N/A**

This calibrator has been found to perform **within** the specifications listed below at the normalized conditions stated.

SPL produced in coupler terminated by a loading volume of a ½" microphone	94.0 ± 0.2 dB 114 ± 0.2 dB
Frequency	1,000 Hz ± 1%
Distortion	< 2%
At 1,013 hPa, 23°C, and 65% relative humidity	

Performance as Received		
Frequency	**1000.0**	Hz
SPL (94 dB)	**93.95**	dB
SPL (114 dB)	**113.97**	dB
Distortion (at 94 dB)	**0.3**	%
Battery Voltage	**9.3**	V

Was adjustment performed? **No**
Were batteries replaced? **No**

Final Performance		
Frequency	**1000.0**	Hz
SPL (94 dB)	**93.95**	dB
SPL (114 dB)	**113.97**	dB
Distortion (at 94 dB)	**0.3**	%

Note: This calibrator was **within** manufacturer's specifications as received.

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3533 OLD CONEJO ROAD, SUITE 125
THOUSAND OAKS, CA 91320
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Appendix G

MODELED SITE DESCRIPTORS

Appendix G provides additional information on modeling site locations and residential equivalency calculations using WSDOT's residential equivalency and ODOT's equivalent residential receptors calculations.

Table G-1. Washington Modeled Site Descriptions and WSDOT's Residential Equivalency Calculations

Site ID	Site Description/ Land Use	Usage Factor Calculation (Hours/Day, Days/Week, Months/Year)[a]	Average Users at Site[b]	Average Number of People Per Household[c]	Dwelling Units Residential Equivalency (per site)[d]
VE-005	Discovery/Burnt Bridge Creek Trail/ Bicycle and Pedestrian Trail	0.50	30 [e]	2.53	6
VW-001, VW-002	Kiggins Athletic Field/ Athletic Field at Discovery Middle School	0.20	50	2.53	2
VW-003	Kiggins Bowl Athletic Field / Athletic Field at Discovery Middle School	0.20	50	2.53	4
VE-016, VE-017, VE-020, VE-021	Leverich Park / Picnic Areas	0.28	10	2.53	1
VE-018, VE-019, VE-022, VE-023	Leverich Park / Disc Golf Course	0.28	10	2.53	1
VE-091	United Pentecostal Church / Outdoor use at place of worship	0.12	24	2.53	1
VW-143	The Lords Church / Outdoor use at place of worship	0.12	24	2.53	1
VE-151	Leach Park / Playground and benches	0.28	10	2.53	1
VE-158	Revival Tab Ministries / Outdoor use at place of worship	0.12	24	2.53	1
VE-170, VE-171	Vancouver Barracks/ National Cemetery	0.42	10	2.53	2
VE-172	Mother Joseph Catholic Church/ Cemetery	0.42	10	2.53	2
VW-282	Arnada Park Play Field	0.28	10	2.53	1
VW-283	Arnada Park Benches	0.28	5	2.53	1
VW-284	Arnada Park Playground	0.28	5	2.53	1

Site ID	Site Description/ Land Use	Usage Factor Calculation (Hours/Day, Days/Week, Months/Year)[a]	Average Users at Site[b]	Average Number of People Per Household[c]	Dwelling Units Residential Equivalency (per site)[d]
VE-173, VE-174	Vancouver VA Medical Center/ Outdoor use at medical center	1.00	2	2.53	1
VE-175	Veterans Memorial / Garden & Museum	0.50	10	2.53	2
VE-177	Kindsfather Field / Athletic Field	0.20	20	2.53	2
VE-178	Softball Field / Athletic Field	0.20	20	2.53	2
VE-179	Luepke Senior Center and Marshall Center / outdoor use area	0.50	5	2.53	1
VE-180	Luepke Center / outdoor use area	0.50	5	2.53	1
VE-185	Marshall Park / playground	0.28	10	2.53	1
VE-186	Marshall Park / benches	0.28	5	2.53	1
VE-189	Marshall Park / play area	0.28	5	2.53	1
VE-181, VE-182	Marshall Park / horse shoe pits	0.28	5	2.53	1
VE-184, VE-187, VE-188, VE-190, VE-191	Marshall Park / Athletic Fields	0.28	20	2.53	2
VW-246	Apartments at 700 Block E McLaughlin Blvd/ Common outdoor use area	0.42	8	2.53	1
DT-018	Comfort Inn & Suites Vancouver / Swimming Pool	0.28	10	2.53	1
DT-020	Academy Chapel / outdoor use area	0.10	24	2.53	1
DT-021	The Academy Offices / common outdoor use area for 7 businesses	0.24	6	2.53	1
DT-022	Vancouver Community Library / benches	0.42	5	2.53	1

Site ID	Site Description/ Land Use	Usage Factor Calculation (Hours/Day, Days/Week, Months/Year)[a]	Average Users at Site[b]	Average Number of People Per Household[c]	Dwelling Units Residential Equivalency (per site)[d]
DT-025	Restaurant Café Patio	0.33	10	2.53	1
DT-027	Normandy Apartments / common outdoor use area	0.67	24	2.53	6
DT-028	Econo Lodge Entrance / rest area outside entrance	1.00	2	2.53	1
DT-031	Ace Hotel / outdoor patio	1.00	2	2.53	1
FV-027A to FV-027H	Historic District: Fort Vancouver Village / Historic Structures / Historic Cabins	0.28	5	2.53	1
FV-028 to FV-038	Historic District: Fort Vancouver Trail/ Bicycle and Pedestrian Trail	0.50	61[e]	2.53	1
FV-040 to FV-047	Historic District: Vancouver Land Bridge Trail / Bicycle and Pedestrian Trail	0.50	31 [e]	2.53	1
DT-032, FV-048 to FV-059, FV-061 to FV-069	Waterfront Renaissance Trail / Bicycle and Pedestrian Trail / Historic District Trail	0.50	31 [e]	2.53	1
FV-060	Historic District Trail	0.50	5 [e]	2.53	1
DT-030	Vancouver Waterfront Trail / Bicycle and Pedestrian Trail	0.50	6 [e]	2.53	1
FV-039	Historic District Park / Old Apple Tree Park	0.42	4	2.53	1

a Calculated using WSDOT's Residential Equivalency Calculations, unless noted

b Estimated based on size of area, site observations, and seasonal use

c Average number of people per household in Washington State 2.53 (WSDOT 2020)

d Dwelling Units Residential Equivalency = Usage Factor x Average Users at site ÷ Average Number of People per Household

e Based on average City of Vancouver trail user counts: https://drcmetro.maps.arcgis.com/apps/dashboards/e84241cd4ff148168a88058dc1da477c

Table G-2. Oregon Modeled Site Descriptions and ODOT's Equivalent Residential Receptors Calculations

Site ID	Site Description/ Land Use	Equivalent Residential Receptors Calculation[a]	Average Users at Site[b]	Average Number of People Per Household[c]	Dwelling Units Equivalent Residential Receptors[d]
PD-032	Rodeway Inn & Suites / rest area outside front entrance	2 / 2.51 = 0.80	16 / 24 = 0.67	2.51	1
PD-036	Holiday Inn / Tennis Courts	4 / 2.51 = 1.59	8 / 24 = 0.33	2.51	1
PD-037	Holiday Inn Entrance / rest area outside entrance	2 / 2.51 = 0.80	16 / 24 = 0.67	2.51	1
PD-040	Restaurant / rest around outside entrance	2 / 2.51 = 0.80	16 / 24 = 0.67	2.51	1
PD-045	Oxford Suites/ rest area outside entrance	2 / 2.51 = 0.80	16 / 24 = 0.67	2.51	1
PD-056	Portland Fire & Rescue Fire Boat 17 / outdoor patio	4 / 2.51 = 1.59	8 / 24 = 0.33	2.51	1
PD-130	Expo Center Rest Area/ benches	2 / 2.51 = 0.80	16 / 24 = 0.67	2.51	1
PD-133	Harbor Sky Apartments / common outdoor patio	20 / 2.51 = 7.97	16 / 24 = 0.67	2.51	5
PD-135	Residence Inn by Marriott Portland North/ common outdoor patio	20 / 2.51 = 7.97	16 / 24 = 0.67	2.51	5
PD-146	Fairfield Inn & Suites by Marriott Portland North/ rest area outside entrance	2 / 2.51 = 0.80	16 / 24 = 0.67	2.51	1
PD-178	Delta Park / DeMarini Baseball Field	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-179	Delta Park / Baseball Field	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-180	Delta Park / Baseball Field	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-181	Delta Park / Baseball Field	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-182	Delta Park / Baseball Field	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-183	Delta Park / Baseball Field	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-184	Delta Park / Sports Office	2 / 2.51 = 0.80	16 / 24 = 0.67	2.51	1
PD-185	Portland Model Rocket Park	4 / 2.51 = 1.59	8 / 24 = 0.33	2.51	1

Site ID	Site Description/ Land Use	Equivalent Residential Receptors Calculation[a]	Average Users at Site[b]	Average Number of People Per Household[c]	Dwelling Units Equivalent Residential Receptors[d]
PD-186	Delta Park / Soccer Field #1	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-187	Delta Park / Rob Strasser Memorial Field #8	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-188	Delta Park / Soccer Field #2	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-189	Delta Park / Soccer Field #7	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-190	Delta Park / Soccer Field #3	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-191	Delta Park / Soccer Field #6	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-192	Delta Park / Soccer Field #4	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-193	Delta Park / Soccer Field #5	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-194	Delta Park / Sand Volleyball Courts	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2
PD-195	Country Inn & Suites by Radisson / rest area outside entrance	2 / 2.51 = 0.80	16 / 24 = 0.67	2.51	1
PD-196	Best Western Inn At the Meadows / rest area outside entrance	2 / 2.51 = 0.80	16 / 24 = 0.67	2.51	1
PD-197	Delta Park – Baseball Field #7	24 / 2.51 = 9.56	6 / 24 = 0.25	2.51	2

a Calculated using ODOT's Equivalent Residential Receptors Calculations (# Persons divided by 2.51 Persons/Household) unless noted

b Average Daily Hours Use divided by 24 hours/day. Estimate includes consideration of size of area, site observations, and seasonal use

c Average number of people per household in the State of Oregon (US Census Bureau, 2015-2019)

d Dwelling Units Equivalent Residential Receptors = # Persons/2.51 Persons/Household X Average Daily Hours Use/ 24 Hours/Day.

Appendix H

BRIDGE STRUCTURE-BORNE NOISE

BRIDGE STRUCTURE-BORNE NOISE

Vibration is caused within a bridge structure when vehicles travel over the bridge. These vibrations can result from can be caused by normal vehicle movement but can also be the result of tire interaction and impact at bridge expansion joints. The noise generated from these movements is often at low-frequencies and can vary depending on bridge design and construction. When predicting noise resulting from vehicles traveling on the bridge, consideration should be given to the contribution of structure-borne noise as it has the potential to alter the acoustic effectiveness of noise walls and feasibility of abatement.

Methodology

FHWA's Traffic Noise Model used in the IBR traffic noise analysis does not have the capability to calculate structure-borne noise directly. To calculate and analyze the potential effect of structure-borne noise for this project, structure-borne noise was analyzed following the procedures documented in the NCHRP Report 791 (NCHRP 2014). Information is included in Chapter 2 and Appendix A of NCHRP Report 791 and a description of the procedures applied to this part of the IBR noise study is described in detail in Section 2.2.2: Best Modeling Practice #2. This is summarized below:

- Model direct highway noise contributions from all roadways using FHWA TNM.
- Conduct multiple (minimum of three) sets of noise measurements at the drip edge ground level location and at a minimum of two setback distances to validate the FHWA TNM runs and determine the contribution of structure-borne noise.
- Apply the adjustments from the provided worksheet to levels at setback locations to determine total modeled noise levels at each setback location.
- If expansion-joint noise is the predominant source of structure-related noise, assume that the noise emanates from the joint above the measurement point rather than at the midpoint of the structure.
- Apply the values from the Table 2 worksheet to FHWA TNM predicted levels for the proposed project using the drop-off rates that best correlate with the measured levels.

Field Measurements

Noise level measurements were conducted at three locations on the eastern and western side of the southern section of the North Portland Harbor Bridge along N Center Ave. This location was chosen as a proxy of the project design due to its concrete construction, but also to provide a conservative assessment of structure borne noise. The bridge's low height and its proximity to an expansion joint was expected to increase structure borne noise at this location.

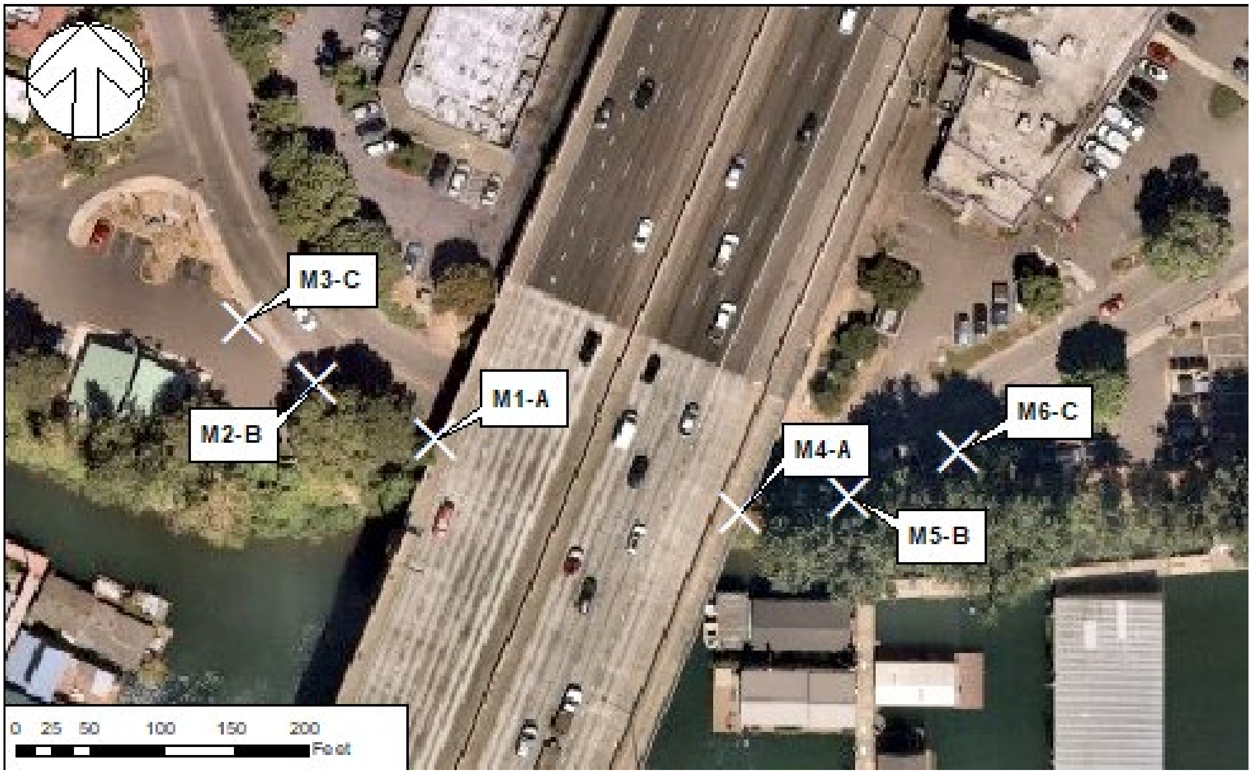
Measurements for each set (either side of the bridge) were conducted simultaneously at the drip edge and at two setback distances. The measurements on the western side of the bridge were completed on April 6 and the eastern side on April 7 2022. The measurement locations were within 200ft of the expansion joint on the bridge and approximately 50-100ft to the north of noise sensitive receptors (houseboats located east and west of the bridge). The locations of the measurements are shown on Figure H-1.

This north side of the North Portland Harbor Bridge was selected to conduct noise measurements for this analysis because of the following factors:

- the replacement bridge at North Portland Harbor is planned to have similar structural characteristics and height (approximately 10 feet taller than the current North Portland Harbor Bridge);
- presence of bridge joint nearby;
- presence of noise-sensitive receptors in the area;
- and noise walls are evaluated as part of the project in this location; thus this analysis serves to confirm any planned noise mitigation. At this time, noise walls do not meet Oregon DOT Feasibility and Reasonableness Criteria for inclusion in the project).

Other areas were considered for inclusion in this analysis including the south landing of the North Portland Harbor Bridge and both the north and south landings of the Interstate Bridge. The south landing of the North Portland Harbor Bridge wasn't selected due to the greater distance to future noise sensitive-land uses, site restrictions, and more contributing noise from local streets. The Interstate Bridge (two bridges than span the main channel of the Columbia River) was not included in this analysis because the steel vertical-lift through-truss bridges are structurally different and noticeably lower in elevation than the replacement bridge planned in this area; therefore, the resulting structure-borne noise would not apply to the future replacement bridge. As described in the Results Section, identification and analysis of existing bridges similar in structure and height to the replacement bridge planned over the main channel over the Columbia River could provide additional insight into the vibro-acoustic properties of the replacement bridge.

Figure H-1. Structure-borne Noise Measurement Locations



Measurements M1-A and M4-A were conducted underneath the drip edge either side of the structure. The measurements on the west side of the I-5 were approximately 65ft (M2-B) and 110ft (M3-C) from the drip edge. Measurements on the east side of the I-5 were approximately 50ft (M5-B) and 90ft (M6-C) from the drip edge. The traffic volumes were collected on the I-5 and N Center Ave during each set of measurements and the position of each measurement was captured using GPS. A TNM model was then created using this information to validate predictions at these locations. Site photographs taken during the measurements and field data sheets are included in Appendix D of the IBR Noise and Vibration Report.

Results

The difference between the measured and modelled sound levels were tabulated to determine the extent of structure-related noise contributions. Table H-1 shows the measured and modelled noise level and the estimated effect of the structure-borne noise.

Table H-1. Structure-borne Noise Validation

Measurement Location	Location of Measurement in Relation to Drip Edge (Feet)	Measured $L_{eq, 1hr}$ Noise Level (dBA)	FHWA TNM Modeled $L_{eq,1hr}$ Noise Level due to Highway Traffic	Estimated Effect of Structure-borne Noise
M1-A	0	73.0	/	/
M2-B	65	71.5	72.2	-0.7
M3-C	110	70.1	70.9	-0.8
M4-A	0	74.1	/	/
M5-B	50	72.7	72.9	-0.2
M6-C	90	70.9	71.5	-0.6

Notes
Traffic Noise Modeling files were included in the TNM files for the IBR Traffic Noise Analysis and available electronically.

Discussion and Analysis

The results show that in all modeled locations the TNM model validates well with measurement results and are within 1 dBA of the predicted values. This indicates that structure-borne noise is not influencing noise levels at these modeled locations. For example, at location M3-C, the measured noise level is 70.1 dBA while the TNM prediction (which represents highway traffic only) is 70.9 dBA. The TNM calculated levels are considered “valid” for prediction purposes and show good agreement with the measured values. In line with the NCHRP guidance following the validation of the model, further analysis has not been conducted and there is no requirement to apply corrections for structure-borne noise to predicted results.

This study assumes that the structure-radiated noise from the project will be similar to the southern portion of the existing North Portland Harbor Bridge, and has endeavored to provide a conservative assessment for the prediction of nearby impacts. This approach is recommended by the NCHRP guidance; however, it should be noted that changes to the detailed design have the potential to alter the radiated sound from the structure. The project design team will analyze the vibro-acoustic properties of the replacement bridges during the design process and the potential for abatement of structure-borne noise near to noise sensitive locations.

Detailed information on potential abatement strategies for expansion joints is provided in the ‘Modular Expansion Joint Noise Mitigation Study’ (University of Washington 2022).

Appendix I

TRAFFIC NOISE MODELING DATA

TNM v2.5 files of all noise modeling files are provided electronically with the Final Noise Technical and Vibration Report. Modeling files developed for this report are organized and labeled as shown in Table I-1.

Table I-1. TNM File Names and Descriptions

TNM File Name	Description of Contents
IBR_Validation	Folder contains 34 Validation files for sites in Washington with file names: • "TNM_WashExist_ST1" through "TNM_WashExist_ST34." Folder contains 12 Validation files for sites in Oregon with file names: • "TNM_OregonExist_ST35" through "TNM_OregonExist_ST46."
IBR_Existing	Folder contains 3 subfolders for Existing Conditions 2019 divided as follows: • Oregon: "REV_Oregon_EX_PM_V2_(DDD)_ks_pr_gy2" • Washington Columbia River to 4th Plain Blvd: "S Wash EX PM_V8 (DDD)_ks • Washington 4th Plain Blvd to North Terminus: "N Wash Existing_PM _V9 (DDD)_ks
IBR_TNM_No Build	Folder contains 3 subfolders for No Build 2045 divided as follows: • Oregon: "REV_Oregon NB PM_(DDD)_ks_pr_ml_gy2" • Washington Columbia River to 4th Plain Blvd: "S Wash No Build PM_V9 (DDD)_ks • Washington 4th Plain Blvd to North Terminus: "N Wash NoBuild_PM _V11_ks (D)

TNM File Name	Description of Contents
IBR_TNM_Build	Folder contains 3 folders for Modified LPA Build 2045 divided as follows: • Oregon: "REV_Oregon Build PM_V6 (DDDD)_ks_pr_gy" • Washington Columbia River to 4th Plain Blvd: "REV_S Wash Build PM_V7 (DDD)_ks_pr_gy • Washington 4th Plain Blvd to North Terminus: "N Wash PM Build V10_R (DD)_gy_pr
IBR_MLPA Build_ Noise Walls	Folder contains 12 Modified LPA Build 2045 divided by project segment for the 19 noise walls evaluated for the project: • North Washington (4th Plain Blvd to North Terminus): Noise Walls 1 to 7 (notes on noise wall numbering below also contained in notes within TNM files) ○ Noise Wall 1 (west of I-5) ljocated in file: "N Wash PM Build V10_NW1 (D)" ○ Noise Wall 2 (west of I-5) labeled as Noise Barrier 3 in file: "N Wash PM Build V10_NW3_5_7 (D)" ○ Noise Wall 4 (west of I-5) labeled as Noise Barrier 5 in file: "N Wash PM Build V10_NW3_5_7 (D)" ○ Noise Wall 6 (west of I-5) labeled as Noise Barrier 7 in file: "N Wash PM Build V10_NW3_5_7 (D)" ○ Noise Wall 3 (east of I-5) labeled as Noise Barrier 4 in file: "N Wash PM Build V10_NW4_6_8 (D)" ○ Noise Wall 5 (east of I-5) labeled as Noise Barrier 6 in file: "N Wash PM Build V10_NW4_6_8 (D)" ○ Noise Wall 7 (east of I-5) labeled as Noise Barrier 8 in file: "N Wash PM Build V10_NW4_6_8 (D)" • South Washington (Columbia River to 4th Plain Blvd): Noise Walls 8 to 15 ○ Noise Wall 8 (west of I-5) labeled as Noise Barrier 9 (Bar 9 North in Barrier Eval) in file: "S Wash Build PM V6_NW9_10 (D)_ML_v2" ○ Noise Wall 9 (west of I-5) labeled as Noise Barrier 9 (Bar 9 South in Barrier Eval) in file: "S Wash Build PM V6_NW9_10 (D)_ML_v3" ○ Noise Wall 10 (east of I-5) labeled as Noise Barrier 10 in file: "S Wash Build PM V6_NW9_10 (D)_ML_v3"

TNM File Name	Description of Contents
	○ Noise Wall 11 (west of I-5) labeled as Noise Barrier 11 in file: "S Wash Build PM V6_NW11 (D)_v2" ○ Noise Wall 11A (west of I-5) labeled as Noise Barrier 11A in file: “REV_S Wash_Build PM_V7 (DDD)_ks_pr_gy_NW11A” ○ Noise Wall 12 (west of I-5) labeled as Noise Barrier 12 in file: "S Wash Build PM V6_NW12_13 (D)" ○ Noise Wall 13 (west of I-5) labeled as Noise Barrier 13 in file: "S Wash Build PM V6_NW12_13 (D)" ○ Noise Wall 14 (east of I-5) labeled as Noise Barrier 14 in file: "S Wash Build PM V7_NW14_FV (D)" ○ Noise Wall 15 (east of I-5) labeled as Noise Barrier 15 in file: "S Wash Build PM V6_NW14_15 (D)" • Oregon: Noise Walls 16 to 18: ○ Noise Wall 16 (west of I-5) labeled as Noise Barrier 16 in file: "REV_Oregon Build PM V6_NW16 (DD)_v2_gy" ○ Noise Wall 17 (west of I-5) labeled as Noise Barrier 17 in file: "REV_Oregon Build PM V6_NW17 (DD)_v2_gy" ○ Noise Wall 18 (east of I-5 at N Marine Dr) labeled as Noise Barrier 18 in file: "REV_Oregon Build PM V6_NW18 (DD)_v2_gy"
IBR_TNM_Bridge_Noise	Folder contains 2 subfolders included in the analysis for structure-borne noise detailed in Appendix H.

Appendix J

NOISE MODELING RESULTS COMPARING PEAK HOURS

This attachment contains a comparison of noise modeling results using traffic data for morning and evening peak hours and morning and evening peak truck hours. As provided in the tables below, the IBR project noise modeling was divided into three segments: Oregon, South Washington from the Columbia River to Fourth Plain Boulevard, and North Washington from Fourth Plain Boulevard to the northern project terminus north of the I-5/SR 500 Interchange. The loudest hour was determined separately for each of the three segments by comparing the number of noise impacts.

Table J-1 provides a comparison of 2045 Modified LPA I-5 mainline truck volumes and total vehicles used to identify the peak hour traffic condition resulting in the highest noise levels. The 2045 Modified LPA peak hour traffic conditions were modeled for comparison to identify the peak hour traffic condition resulting in the most traffic noise impacts for analysis and reporting as shown in Tables J-2 to J-4.

The comparison of peak hour traffic for the Oregon segment is provided in Table J-2, for the South Washington segment in Table J-3, and for the North Washington segment in Table J-4. As shown in the results at the end of each table, the PM peak hour would undergo the most impacts for all three project segments.

Table J-1. Modified LPA Build 2045 –Comparison of I-5 Mainline Truck Volumes and Total Vehicles

Roadway	AM Peak Truck Volume	PM Peak Truck Volume	AM Peak Truck Truck Volume	PM Peak Truck Truck Volume	AM Total Vehicles	PM Total Vehicles	AM Peak Truck Total Vehicles	PM Peak Truck Total Vehicles
Mainline - On Ramp from Main St	501	450	513	417	7,165	10,015	5,575	5,330
Mainline - Off Ramp to E 39th St/4th Plain	603	513	589	478	7,975	11,285	6,235	5,980
Mainline - On Ramp from SR 500/E 39th St	377	415	431	358	6,145	9,330	4,885	4,730
Mainline - On Ramp from E 4th Plain Blvd	873	749	802	695	10,040	13,605	7,855	7,535
Mainline - Off Ramp to E Mill Plain Blvd	918	732	812	698	10,255	13,230	7,890	7,485
Mainline - Off ramp to CD	600	546	627	528	7,810	9,840	6,050	5,765
Mainline - On ramp from CD	308	288	303	273	6,180	7,275	4,315	4,035
Mainline - On Ramp from Washington/SR 14	708	516	843	741	8,960	9,705	7,000	6,705
Mainline (Interstate Bridge) - Off Ramp to Hayden Island	1,083	743	1,154	993	11,535	12,730	9,025	8,650
Mainline - Off Ramp to Marine Dr W	955	632	1,062	918	10,520	11,295	8,240	7,910
Mainline - Off ramp to Interstate/Victory	443	324	485	392	6,690	7,980	5,270	5,080

Roadway	AM Peak Truck Volume	PM Peak Truck Volume	AM Peak Truck Truck Volume	PM Peak Truck Truck Volume	AM Total Vehicles	PM Total Vehicles	AM Peak Truck Total Vehicles	PM Peak Truck Total Vehicles
Mainline - On ramp from Marine/Lower Roadway	119	176	229	158	4,505	5,935	3,580	3,465
Mainline - On ramp from N Victory Blvd	786	549	956	797	6,555	7,140	5,255	5,105
Mainline – Southern Terminus	858	586	1,005	837	6,800	7,505	5,460	5,305

Table J-2. Comparison of Modeled Noise Levels - PM Peak Hour and AM and Peak Truck Hour – Modified LPA Build Alternative - Oregon

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-001	1	B (65)	60	0	59	0
PD-002	1	B (65)	60	0	60	0
PD-003	1	B (65)	62	0	61	0
PD-004	1	B (65)	58	0	58	0
PD-005	1	B (65)	56	0	56	0
PD-006	1	B (65)	59 (substantial increase)	1	58	0
PD-007	1	B (65)	58 (substantial increase)	1	57 (substantial increase)	1
PD-008	1	B (65)	54	0	54	0
PD-009	1	B (65)	57	0	57	0
PD-010	1	B (65)	55	0	55	0
PD-011	1	B (65)	57	0	57	0
PD-012	1	B (65)	57 (substantial increase)	1	57 (substantial increase)	1
PD-013	1	B (65)	54	0	54	0
PD-014	1	B (65)	57	0	57	0
PD-015	1	B (65)	51	0	52	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-016	1	B (65)	57	0	58	0
PD-017	1	B (65)	56	0	56	0
PD-018	1	B (65)	52	0	52	0
PD-019	1	B (65)	57	0	57	0
PD-020	1	B (65)	56	0	56	0
PD-021	1	B (65)	51	0	52	0
PD-022	1	B (65)	54	0	54	0
PD-023	1	B (65)	56	0	56	0
PD-024	1	B (65)	56	0	57	0
PD-025	1	B (65)	57	0	57	0
PD-026	1	B (65)	56	0	56	0
PD-027	1	B (65)	58	0	58	0
PD-028	1	B (65)	56	0	57	0
PD-029	1	B (65)	59	0	59	0
PD-030	1	B (65)	58	0	58	0
PD-031	1	B (65)	58	0	58	0
PD-032	1	E (70)	67	0	67	0
PD-033	0	F	59	0	60	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-034	1	E (70)	65	0	65	0
PD-035	1	E (70)	67	0	68	0
PD-036	1	C (65)	52	0	52	0
PD-037	1	E (70)	64	0	64	0
PD-038	0	F	ACQ	0	69	0
PD-039	0	F	ACQ	0	ACQ	0
PD-040	1	E (70)	ACQ	0	70	1
PD-041	1	E (70)	66	0	65	0
PD-042	1	E (70)	ACQ	0	ACQ	0
PD-043	0	F	ACQ	0	ACQ	0
PD-044	1	E (70)	66	0	65	0
PD-045	1	E (70)	66	0	63	0
PD-046	1	E (70)	ACQ	0	ACQ	0
PD-047	0	F	64	0	63	0
PD-048	1	E (70)	ACQ	0	67	0
PD-049	1	E (70)	62	0	63	0
PD-050	1	E (70)	ACQ	0	ACQ	0
PD-051	1	E (70)	ACQ	0	ACQ	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-052	0	F	ACQ	0	ACQ	0
PD-053	1	E (70)	ACQ	0	ACQ	0
PD-054	1	E (70)	ACQ	0	ACQ	0
PD-055	1	E (70)	ACQ	0	ACQ	0
PD-056	1	B (65)	59	0	60	0
PD-057	0	F	59	0	60	0
PD-058	0	F	60	0	60	0
PD-059	0	F	67	0	67	0
PD-060	1	B (65)	61	0	61	0
PD-061	1	B (65)	61	0	61	0
PD-062	1	B (65)	62	0	63	0
PD-063	1	B (65)	62	0	63	0
PD-064	1	B (65)	62	0	63	0
PD-065	1	B (65)	63	0	63	0
PD-066	1	B (65)	63	0	63	0
PD-067	1	B (65)	63	0	64	0
PD-067B	1	B (65)	60	0	62	0
PD-068	1	B (65)	62	0	62	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-069	1	B (65)	62	0	62	0
PD-070	1	B (65)	63	0	64	0
PD-071	1	B (65)	64	0	64	0
PD-072	1	B (65)	64	0	64	0
PD-073	1	B (65)	64	0	64	0
PD-074	1	B (65)	64	0	64	0
PD-075	1	B (65)	64	0	65	1
PD-076	1	B (65)	63	0	63	0
PD-077	1	B (65)	65	1	65	1
PD-078	1	B (65)	65	1	65	1
PD-079	1	B (65)	65	1	65	1
PD-080	1	B (65)	65	1	65	1
PD-081	1	B (65)	65	1	66	1
PD-082	1	B (65)	66	1	66	1
PD-083	1	B (65)	64	0	64	0
PD-084	1	B (65)	67	1	67	1
PD-085	1	B (65)	66	1	67	1
PD-086	1	B (65)	66	1	67	1

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-087	1	B (65)	66	1	66	1
PD-088	1	B (65)	67	1	67	1
PD-089	1	B (65)	67	1	67	1
PD-090	1	B (65)	67	1	68	1
PD-091	1	B (65)	70	1	70	1
PD-092	1	B (65)	70	1	70	1
PD-093	1	B (65)	70	1	70	1
PD-094	1	B (65)	70	1	70	1
PD-095	1	B (65)	70	1	70	1
PD-096	1	B (65)	ACQ	0	ACQ	0
PD-097	1	B (65)	ACQ	0	ACQ	0
PD-098	1	B (65)	ACQ	0	ACQ	0
PD-099	1	B (65)	ACQ	0	ACQ	0
PD-100	1	B (65)	ACQ	0	ACQ	0
PD-101	1	B (65)	ACQ	0	ACQ	0
PD-102	1	B (65)	ACQ	0	ACQ	0
PD-103	1	B (65)	ACQ	0	ACQ	0
PD-104	2	B (65)	ACQ	0	ACQ	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-105	1	B (65)	ACQ	0	ACQ	0
PD-106	1	B (65)	ACQ	0	ACQ	0
PD-107	1	B (65)	ACQ	0	ACQ	0
PD-108	1	B (65)	ACQ	0	ACQ	0
PD-109	1	B (65)	ACQ	0	ACQ	0
PD-110	1	B (65)	ACQ	0	ACQ	0
PD-111	1	B (65)	ACQ	0	ACQ	0
PD-112	1	B (65)	ACQ	0	ACQ	0
PD-113	1	B (65)	ACQ	0	ACQ	0
PD-114	1	B (65)	ACQ	0	ACQ	0
PD-115	1	B (65)	ACQ	0	ACQ	0
PD-116	1	B (65)	ACQ	0	ACQ	0
PD-117	1	B (65)	ACQ	0	ACQ	0
PD-118	1	B (65)	ACQ	0	ACQ	0
PD-119	1	B (65)	ACQ	0	ACQ	0
PD-120	1	B (65)	ACQ	0	ACQ	0
PD-121	1	B (65)	ACQ	0	ACQ	0
PD-122	1	B (65)	ACQ	0	ACQ	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-123	1	B (65)	ACQ	0	ACQ	0
PD-124	1	B (65)	ACQ	0	ACQ	0
PD-125	1	E (70)	ACQ	0	ACQ	0
PD-126	1	B (65)	ACQ	0	ACQ	0
PD-127	1	B (65)	ACQ	0	ACQ	0
PD-128	1	B (65)	ACQ	0	ACQ	0
PD-129	1	B (65)	ACQ	0	ACQ	0
PD-130	1	C (65)	57	0	60	0
PD-130B	0	G	58	0	61	0
PD-130C	0	G	59	0	62	0
PD-130D	0	G	59	0	63	0
PD-130E	0	G	60	0	64	0
PD-131	0	F	ACQ	0	ACQ	0
PD-132	0	F	ACQ	0	ACQ	0
PD-133	5	B (65)	49	0	50	0
PD-135	5	E (70)	54	0	57	0
PD-136A	1	B (65)	53	0	56	0
PD-136B	1	B (65)	54	0	58	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-136C	1	B (65)	58	0	61	0
PD-137A	1	B (65)	53	0	56	0
PD-137B	1	B (65)	55	0	57	0
PD-137C	1	B (65)	58	0	61	0
PD-138A	1	B (65)	53	0	56	0
PD-138B	1	B (65)	55	0	57	0
PD-138C	1	B (65)	58	0	61	0
PD-144A	1	B (65)	56	0	55	0
PD-144B	1	B (65)	56	0	56	0
PD-144C	1	B (65)	57	0	57	0
PD-145A	1	B (65)	52	0	54	0
PD-145B	1	B (65)	53	0	55	0
PD-145C	1	B (65)	55	0	57	0
PD-146	1	E (70)	58	0	59	0
PD-147A	2	B (65)	50	0	52	0
PD-147B	2	B (65)	52	0	53	0
PD-147C	2	B (65)	54	0	56	0
PD-148A	2	B (65)	50	0	51	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-148B	2	B (65)	51	0	53	0
PD-148C	2	B (65)	54	0	55	0
PD-149A	2	B (65)	49	0	50	0
PD-149B	2	B (65)	51	0	52	0
PD-149C	2	B (65)	53	0	55	0
PD-155A	2	B (65)	61	0	60	0
PD-155B	2	B (65)	61	0	61	0
PD-155C	2	B (65)	62	0	61	0
PD-156A	2	B (65)	56	0	56	0
PD-156B	2	B (65)	57	0	57	0
PD-156C	2	B (65)	58	0	59	0
PD-157A	1	B (65)	67	1	66	1
PD-157B	1	B (65)	67	1	67	1
PD-157C	1	B (65)	68	1	68	1
PD-158A	1	B (65)	67	1	66	1
PD-158B	1	B (65)	68	1	67	1
PD-158C	1	B (65)	68	1	68	1
PD-159A	1	B (65)	67	1	67	1

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-159B	1	B (65)	68	1	67	1
PD-159C	1	B (65)	68	1	68	1
PD-160A	1	B (65)	68	1	67	1
PD-160B	1	B (65)	68	1	68	1
PD-160C	1	B (65)	69	1	68	1
PD-161A	1	B (65)	68	1	67	1
PD-161B	1	B (65)	69	1	68	1
PD-161C	1	B (65)	69	1	68	1
PD-162A	2	B (65)	60	0	60	0
PD-162B	2	B (65)	61	0	62	0
PD-162C	2	B (65)	64	0	66	2
PD-163A	2	B (65)	64	0	63	0
PD-163B	2	B (65)	65	2	64	0
PD-163C	2	B (65)	65	2	64	0
PD-164A	1	B (65)	53	0	55	0
PD-164B	1	B (65)	54	0	56	0
PD-164C	1	B (65)	57	0	59	0
PD-165A	1	B (65)	53	0	54	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-165B	1	B (65)	54	0	56	0
PD-165C	1	B (65)	57	0	58	0
PD-166A	1	B (65)	52	0	54	0
PD-166B	1	B (65)	54	0	56	0
PD-166C	1	B (65)	56	0	58	0
PD-167A	2	B (65)	64	0	62	0
PD-167B	2	B (65)	64	0	63	0
PD-167C	2	B (65)	65	2	64	0
PD-168A	1	B (65)	70	1	69	1
PD-168B	1	B (65)	70	1	69	1
PD-168C	1	B (65)	70	1	69	1
PD-169A	1	B (65)	71	1	69	1
PD-169B	1	B (65)	71	1	69	1
PD-169C	1	B (65)	71	1	70	1
PD-170A	1	B (65)	71	1	69	1
PD-170B	1	B (65)	71	1	70	1
PD-170C	1	B (65)	71	1	70	1
PD-171A	1	B (65)	71	1	70	1

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-171B	1	B (65)	71	1	70	1
PD-171C	1	B (65)	71	1	70	1
PD-172A	1	B (65)	71	1	70	1
PD-172B	1	B (65)	71	1	70	1
PD-172C	1	B (65)	71	1	70	1
PD-173A	2	B (65)	65	2	64	0
PD-173B	2	B (65)	65	2	64	0
PD-173C	2	B (65)	65	2	65	2
PD-174	0	F	69	0	68	0
PD-175	0	F	70	0	69	0
PD-176	0	F	69	0	70	0
PD-177	0	F	68	0	69	0
PD-178	2	C (65)	62	0	65	1
PD-179	2	C (65)	60	0	61	0
PD-180	2	C (65)	59	0	61	0
PD-181	2	C (65)	59	0	61	0
PD-182	2	C (65)	58	0	60	0
PD-183	2	C (65)	58	0	60	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-184	1	E (70)	56	0	58	0
PD-185	1	C (65)	51	0	54	0
PD-185B	0	G	52	0	55	0
PD-185C	0	G	53	0	55	0
PD-185D	0	G	54	0	56	0
PD-185E	0	G	55	0	58	0
PD-185F	0	G	56	0	59	0
PD-185G	0	G	57	0	60	0
PD-185H	0	G	58	0	62	0
PD-186	2	C (65)	61	0	61	0
PD-187	2	C (65)	58	0	59	0
PD-188	2	C (65)	62	0	62	0
PD-189	2	C (65)	59	0	60	0
PD-190	2	C (65)	63	0	64	0
PD-191	2	C (65)	60	0	60	0
PD-192	2	C (65)	65	2	65	2
PD-193	2	C (65)	61	0	62	0
PD-194	2	C (65)	62	0	64	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
PD-195	1	E (70)	59	0	60	0
PD-196	1	E (70)	60	0	60	0
PD-197	2	C (65)	59	0	61	0
PD-198	0	G	66	0	0	0
PD-198B	0	G	63	0	66	0
PD-198C	0	G	62	0	64	0
PD-198D	0	G	60	0	63	0
PD-198E	0	G	59	0	62	0
PD-199	0	G	68	0	70	0
PD-199B	0	G	66	0	70	0
PD-199C	0	G	66	0	70	0
PD-199D	0	G	67	0	72	0
PD-200	0	G	69	0	68	0
PD-200B	0	G	65	0	67	0
PD-200C	0	G	65	0	69	0
PD-200D	0	G	69	0	73	0
Impact Totals			65		59	

Notes
Build PM Peak resulted in the most impacts; therefore was used for future conditions modeling.

Receivers representing the future Shared Use Path were not included in all model runs and were not included in this comparison.
ACQ = sites that planned for acquisition under the Modified LPA Build Alternative and were not included modeling results.
a Receivers shown on Figures 3-4, 3-5, and 3-6.
b Number of residences or residential equivalents.
c Traffic noise impact criteria (ODOT Noise Abatement Approach Criteria)

Table J-3. Comparison of Modeled Noise Levels- PM Peak Hour and AM Peak Truck Hour – Modified LPA Build Alternative – South Washington

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
DT-001	1	E (71)	67	0	67	0
DT-002	1	B (66)	69	1	69	1
DT-003	1	B (66)	70	1	70	1
DT-004	1	B (66)	68	1	68	1
DT-005	1	B (66)	70	1	0	0
DT-006	1	B (66)	69	1	69	1
DT-007	1	B (66)	71	1	70	1
DT-008	1	E (71)	52	0	52	0
DT-009	1	B (66)	58	0	58	0
DT-010	1	B (66)	60	0	60	0
DT-011	1	B (66)	62	0	62	0
DT-012	1	B (66)	56	0	56	0
DT-013	1	B (66)	62	0	62	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
DT-014	1	B (66)	65	0	65	0
DT-015	1	B (66)	67	1	66	1
DT-016	1	B (66)	68	1	68	1
DT-017	1	E (71)	61	0	61	0
DT-018	1	C (66)	65	0	65	0
DT-019	1	E (71)	74	1	73	1
DT-020	1	C (66)	62	0	62	0
DT-021	1	E (71)	68	0	67	0
DT-022	1	C (66)	67	1	67	1
DT-023	1	E (71)	63	0	63	0
DT-024	0	G	71	0	70	0
DT-025	1	E (71)	59	0	59	0
DT-026	1	E (71)	64	0	66	0
DT-027	6	B (66)	71	6	71	6
DT-028	1	E (71)	62	0	61	0
DT-029	1	E (71)	64	0	64	0
DT-030	1	C (66)	57	0	58	0
DT-031	1	E (71)	58	0	58	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
DT-032	1	C (66)	58	0	58	0
DT-033A	6	B (66)	61	0	62	0
DT-033B	4	B (66)	61	0	63	0
DT-033C	4	B (66)	61	0	62	0
DT-034A	5	B (66)	60	0	62	0
DT-034B	4	B (66)	62	0	63	0
DT-034C	4	B (66)	63	0	63	0
DT-035A	5	B (66)	52	0	53	0
DT-035B	4	B (66)	62	0	62	0
DT-035C	4	B (66)	64	0	64	0
DT-036	82	B (66)/D (51)	36	0	36	0
DT-037	4	B (66)	60	0	59	0
DT-038	4	B (66)	59	0	56	0
DT-039	8	B (66)	60	0	57	0
DT-040	4	B (66)	62	0	59	0
DT-041	4	B (66)	70	4	66	4
DT-042	4	B (66)	69	4	66	4
DT-043	8	B (66)	69	8	67	8

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
DT-044	4	B (66)	69	4	67	4
DT-045	4	B (66)	63	0	63	0
DT-046	4	B (66)	63	0	63	0
DT-047	8	B (66)	65	0	65	0
DT-048	4	B (66)	66	4	66	4
DT-049	0	G	68	0	68	0
FV-001	1	E (71)	57	0	58	0
FV-002	1	C (66)	72	1	72	1
FV-003	1	C (66)	66	1	65	0
FV-004	1	C (66)	72	1	71	1
FV-005	1	C (66)	66	1	65	0
FV-006	1	C (66)	60	0	60	0
FV-007	1	C (66)	57	0	57	0
FV-008	1	C (66)	65	0	64	0
FV-009	1	C (66)	56	0	55	0
FV-010	1	C (66)/B (66)	64	0	64	0
FV-011	1	C (66)	59	0	58	0
FV-012	1	C (66)	54	0	54	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
FV-013	1	C (66)	59	0	59	0
FV-014	1	C (66)/B (66)	65	0	65	0
FV-015	1	C (66)/B (66)	64	0	65	0
FV-016	1	C (66)	59	0	59	0
FV-017	1	C (66)	56	0	56	0
FV-018	1	C (66)/B (66)	66	1	66	1
FV-019	1	C (66)/B (66)	62	0	62	0
FV-020	1	C (66)/B (66)	59	0	59	0
FV-021	1	C (66)/B (66)	63	0	63	0
FV-022	1	C (66)/B (66)	57	0	58	0
FV-023	1	C (66)	64	0	65	0
FV-024	1	C (66)	56	0	57	0
FV-025	1	C (66)	57	0	58	0
FV-026	1	C (66)	57	0	57	0
FV-027A	1	C (66)	58	0	59	0
FV-027B	1	C (66)	59	0	59	0
FV-027C	1	C (66)	62	0	62	0
FV-027D	1	C (66)	60	0	60	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
FV-027E	1	C (66)	65	0	66	1
FV-027F	1	C (66)	61	0	61	0
FV-027G	1	C (66)	71	1	72	1
FV-027H	1	C (66)	65	0	65	0
FV-028	1	C (66)	58	0	58	0
FV-029	1	C (66)	59	0	59	0
FV-030	1	C (66)	59	0	59	0
FV-031	1	C (66)	60	0	60	0
FV-032	1	C (66)	60	0	60	0
FV-033	1	C (66)	61	0	61	0
FV-034	1	C (66)	62	0	62	0
FV-035	1	C (66)	65	0	65	0
FV-036	1	C (66)	71	1	71	1
FV-037	1	C (66)	69	1	69	1
FV-038	1	C (66)	71	1	70	1
FV-039	1	C (66)	61	0	62	0
FV-040	1	C (66)	61	0	62	0
FV-041	1	C (66)	63	0	64	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
FV-042	1	C (66)	65	0	65	0
FV-043	1	C (66)	67	1	67	1
FV-044	1	C (66)	70	1	70	1
FV-045	1	C (66)	73	1	73	1
FV-046	1	C (66)	74	1	74	1
FV-047	1	C (66)	75	1	75	1
FV-048	1	C (66)	68	1	67	1
FV-049	1	C (66)	66	1	66	1
FV-050	1	C (66)	66	1	65	0
FV-051	1	C (66)	65	0	64	0
FV-052	1	C (66)	64	0	64	0
FV-053	1	C (66)	63	0	63	0
FV-054	1	C (66)	62	0	63	0
FV-055	1	C (66)	62	0	62	0
FV-056	1	C (66)	61	0	62	0
FV-057	1	C (66)	60	0	61	0
FV-058	1	C (66)	60	0	61	0
FV-059	1	C (66)	60	0	61	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
FV-060	1	C (66)	59	0	61	0
FV-061	1	C (66)	59	0	61	0
FV-062	1	C (66)	59	0	61	0
FV-063	1	C (66)	59	0	60	0
FV-064	1	C (66)	59	0	60	0
FV-065	1	C (66)	59	0	60	0
FV-066	1	C (66)	59	0	60	0
FV-067	1	C (66)	59	0	61	0
FV-068	1	C (66)	59	0	61	0
FV-069	1	C (66)	60	0	61	0
FV-070	1	E (71)	61	0	61	0
FV-071	0	G	65	0	65	0
VE-173	1	C (66)	64	0	66	1
VE-174	1	C (66)	54	0	56	0
VE-175	2	C (66)	56	0	57	0
VE-176	1	E (71)	55	0	56	0
VE-177	2	C (66)	52	0	52	0
VE-178	2	C (66)	59	0	59	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VE-179	1	C (66)	59	0	58	0
VE-180	1	C (66)	65	0	64	0
VE-181	1	C (66)	70	1	69	1
VE-182	1	C (66)	66	1	65	0
VE-183	2	C (66)	58	0	58	0
VE-184	2	C (66)	66	2	65	0
VE-185	1	C (66)	62	0	62	0
VE-186	1	C (66)	61	0	60	0
VE-187	2	C (66)	66	2	66	2
VE-188	2	C (66)	64	0	64	0
VE-189	1	C (66)	60	0	60	0
VE-190	2	C (66)	63	0	63	0
VE-191	2	C (66)	62	0	62	0
VW-178	3	B (66)	56	0	58	0
VW-179	1	B (66)	60	0	62	0
VW-180	1	B (66)	60	0	61	0
VW-181	1	E (71)	58	0	59	0
VW-182	2	B (66)	58	0	58	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-183	1	B (66)	68	1	68	1
VW-184	1	B (66)	56	0	57	0
VW-185	1	B (66)	59	0	59	0
VW-186	1	B (66)	68	1	68	1
VW-187	1	B (66)	66	1	66	1
VW-188	1	B (66)	55	0	56	0
VW-189	1	B (66)	57	0	57	0
VW-190	1	B (66)	66	1	66	1
VW-191	1	B (66)	57	0	57	0
VW-192	1	B (66)	65	0	64	0
VW-193	1	B (66)	56	0	56	0
VW-194	3	B (66)	56	0	55	0
VW-195	1	B (66)	64	0	64	0
VW-196	1	E (71)	56	0	56	0
VW-197	2	B (66)	53	0	53	0
VW-198	3	B (66)	56	0	56	0
VW-199	1	B (66)	58	0	58	0
VW-200	1	B (66)	59	0	59	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-201	1	B (66)	62	0	62	0
VW-202	1	B (66)	68	1	68	1
VW-203	4	B (66)	59	0	58	0
VW-204	2	B (66)	58	0	57	0
VW-205	1	B (66)	57	0	57	0
VW-206	2	B (66)	58	0	57	0
VW-207	1	B (66)	57	0	57	0
VW-208	1	B (66)	58	0	58	0
VW-209	1	B (66)	64	0	63	0
VW-210	1	B (66)	58	0	58	0
VW-211	2	B (66)	59	0	58	0
VW-212	1	B (66)	58	0	57	0
VW-213	1	B (66)	59	0	58	0
VW-214	1	B (66)	70	1	70	1
VW-215	1	B (66)	58	0	57	0
VW-216	1	B (66)	60	0	59	0
VW-217	1	B (66)	72	1	71	1
VW-218	1	B (66)	58	0	58	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-219	1	B (66)	61	0	60	0
VW-220	1	B (66)	71	1	71	1
VW-221	1	B (66)	59	0	59	0
VW-222	1	B (66)	59	0	58	0
VW-223	1	B (66)	60	0	60	0
VW-224	1	B (66)	72	1	71	1
VW-225	1	B (66)	60	0	59	0
VW-226	1	B (66)	72	1	71	1
VW-227	1	B (66)	61	0	61	0
VW-228	1	B (66)	68	1	67	1
VW-229	1	B (66)	72	1	71	1
VW-230	1	B (66)	69	1	69	1
VW-231	1	B (66)	63	0	62	0
VW-232	1	B (66)	70	1	70	1
VW-233	1	B (66)	55	0	55	0
VW-234	1	B (66)	56	0	56	0
VW-235	1	B (66)	71	1	70	1
VW-236	1	B (66)	59	0	58	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-237	1	B (66)	58	0	58	0
VW-238	1	B (66)	63	0	62	0
VW-239	1	B (66)	65	0	64	0
VW-240	6	B (66)	64	0	64	0
VW-241	6	B (66)	72	6	71	6
VW-242	1	B (66)	60	0	59	0
VW-243	1	E (71)	62	0	60	0
VW-244	1	B (66)	60	0	59	0
VW-245	1	E (71)	62	0	60	0
VW-246	1	B (66)	61	0	60	0
VW-247	2	B (66)	60	0	59	0
VW-248	1	B (66)	68	1	68	1
VW-249	1	B (66)	58	0	57	0
VW-250	1	B (66)	58	0	57	0
VW-251	1	B (66)	59	0	59	0
VW-252	1	B (66)	62	0	61	0
VW-253	1	B (66)	57	0	57	0
VW-254	1	B (66)	55	0	55	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-255	1	B (66)	58	0	57	0
VW-256	1	B (66)	60	0	60	0
VW-257	1	B (66)	63	0	62	0
VW-258	1	B (66)	64	0	64	0
VW-259	1	B (66)	70	1	70	1
VW-260	1	E (71)	53	0	53	0
VW-261	1	B (66)	58	0	58	0
VW-262	3	B (66)	60	0	59	0
VW-263	1	B (66)	57	0	57	0
VW-264	1	B (66)	58	0	58	0
VW-265	1	B (66)	66	1	66	1
VW-266	1	E (71)	70	0	70	0
VW-267	1	E (71)	57	0	58	0
VW-268	6	B (66)	49	0	48	0
VW-269	5	B (66)	60	0	60	0
VW-270	1	E (71)	61	0	60	0
VW-271	6	B (66)	51	0	51	0
VW-272	1	B (66)	62	0	62	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-273	1	B (66)	64	0	64	0
VW-274	6	B (66)	50	0	50	0
VW-275	1	E (71)	66	0	68	0
VW-276	1	E (71)	65	0	68	0
VW-277	1	E (71)	64	0	67	0
VW-278	6	B (66)	64	0	65	0
VW-279	1	B (66)	67	1	67	1
VW-280	4	B (66)	58	0	58	0
VW-281	4	B (66)	62	0	61	0
VW-282	1	C (66)	59	0	61	0
VW-283	1	C (66)	63	0	64	0
VW-284	1	C (66)	64	0	64	0
Impact Totals			88		83	

Notes
Build PM Peak resulted in the most impacts; therefore was used for future conditions modeling.
a Receivers shown on Exhibits 3-4, 3-5, and 3-6.
b Number of residences or residential equivalents.
c Traffic noise impact criteria (WSDOT Noise Abatement Criteria)

Table J-4. Comparison of Modeled Noise Levels- PM Peak Hour and AM Peak Truck Hour – Modified LPA Build Alternative – North Washington

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VE-001	1	B (66)	65	0	64	0
VE-002	1	B (66)	65	0	63	0
VE-003	1	B (66)	65	0	63	0
VE-004	1	B (66)	65	0	63	0
VE-005	6	B (66)/C (66)	65	0	64	0
VE-006	3	B (66)	64	0	63	0
VE-007	3	B (66)	64	0	63	0
VE-008	1	B (66)	65	0	64	0
VE-009	1	B (66)	64	0	63	0
VE-010	1	B (66)	64	0	63	0
VE-011	1	B (66)	64	0	62	0
VE-012	1	B (66)	64	0	63	0
VE-013	1	B (66)	65	0	63	0
VE-014	1	B (66)	64	0	63	0
VE-015	1	B (66)	64	0	62	0
VE-016	1	C (66)	61	0	61	0
VE-017	1	C (66)	61	0	61	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VE-018	1	C (66)	60	0	59	0
VE-019	1	C (66)	59	0	59	0
VE-020	1	C (66)	60	0	60	0
VE-021	1	C (66)	58	0	58	0
VE-022	1	C (66)	59	0	59	0
VE-023	1	C (66)	59	0	58	0
VE-024	1	B (66)	63	0	63	0
VE-025	1	B (66)	61	0	61	0
VE-026	1	B (66)	62	0	61	0
VE-027	1	B (66)	61	0	60	0
VE-028	1	B (66)	61	0	61	0
VE-029	1	B (66)	62	0	61	0
VE-030	1	B (66)	61	0	60	0
VE-031	1	B (66)	60	0	59	0
VE-032	1	B (66)	62	0	61	0
VE-033	1	B (66)	61	0	60	0
VE-034	2	B (66)	64	0	63	0
VE-035	1	B (66)	62	0	61	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VE-036	1	B (66)	62	0	61	0
VE-037	1	B (66)	60	0	59	0
VE-038	1	B (66)	57	0	56	0
VE-039	1	B (66)	61	0	60	0
VE-040	1	B (66)	60	0	59	0
VE-041	2	B (66)	66	2	64	0
VE-042	2	B (66)	63	0	61	0
VE-043	1	B (66)	60	0	60	0
VE-044	1	B (66)	55	0	54	0
VE-045	1	B (66)	55	0	55	0
VE-046	1	B (66)	53	0	52	0
VE-047	1	B (66)	67	1	66	1
VE-048	2	B (66)	61	0	60	0
VE-049	2	B (66)	59	0	58	0
VE-050	1	B (66)	58	0	57	0
VE-051	2	B (66)	60	0	59	0
VE-052	1	B (66)	63	0	62	0
VE-053	2	B (66)	53	0	52	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VE-054	1	B (66)	59	0	58	0
VE-055	1	B (66)	64	0	63	0
VE-056	1	B (66)	56	0	55	0
VE-057	1	B (66)	59	0	58	0
VE-058	1	B (66)	64	0	63	0
VE-059	1	B (66)	57	0	56	0
VE-060	1	B (66)	58	0	57	0
VE-061	1	B (66)	64	0	63	0
VE-062	1	B (66)	58	0	57	0
VE-063	1	B (66)	64	0	63	0
VE-064	2	B (66)	54	0	53	0
VE-065	1	B (66)	58	0	57	0
VE-066	1	B (66)	63	0	62	0
VE-067	1	B (66)	58	0	57	0
VE-068	2	B (66)	56	0	55	0
VE-069	1	B (66)	56	0	56	0
VE-070	2	B (66)	53	0	52	0
VE-071	2	B (66)	51	0	50	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VE-072	1	B (66)	63	0	62	0
VE-073	1	B (66)	56	0	55	0
VE-074	1	B (66)	55	0	54	0
VE-075	1	B (66)	63	0	62	0
VE-076	1	B (66)	56	0	55	0
VE-077	1	B (66)	53	0	53	0
VE-078	1	B (66)	63	0	62	0
VE-079	1	B (66)	55	0	54	0
VE-080	1	B (66)	52	0	51	0
VE-081	1	B (66)	63	0	62	0
VE-082	1	B (66)	54	0	54	0
VE-083	1	B (66)	52	0	51	0
VE-084	1	B (66)	63	0	62	0
VE-085	1	B (66)	52	0	51	0
VE-086	2	B (66)	52	0	51	0
VE-087	1	B (66)	62	0	61	0
VE-088	1	B (66)	52	0	51	0
VE-089	1	B (66)	52	0	51	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VE-090	1	B (66)	52	0	51	0
VE-091	1	C (66)	59	0	58	0
VE-092	1	B (66)	53	0	52	0
VE-093	2	B (66)	52	0	51	0
VE-094	1	B (66)	49	0	49	0
VE-095	1	B (66)	68	1	66	1
VE-096	1	B (66)	58	0	57	0
VE-097	1	B (66)	57	0	56	0
VE-098	1	B (66)	66	1	65	0
VE-099	1	B (66)	54	0	53	0
VE-100	1	B (66)	66	1	65	0
VE-101	1	B (66)	57	0	56	0
VE-102	1	B (66)	53	0	52	0
VE-103	1	B (66)	62	0	61	0
VE-104	2	B (66)	57	0	56	0
VE-105	1	B (66)	52	0	52	0
VE-106	1	B (66)	62	0	61	0
VE-107	2	B (66)	55	0	54	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VE-108	1	B (66)	63	0	62	0
VE-109	2	B (66)	56	0	55	0
VE-110	1	B (66)	53	0	52	0
VE-110B	1	B (66)	53	0	52	0
VE-111	1	B (66)	67	1	65	0
VE-112	2	B (66)	57	0	56	0
VE-113	1	B (66)	53	0	52	0
VE-114	1	B (66)	64	0	62	0
VE-115	1	B (66)	57	0	56	0
VE-116	1	B (66)	52	0	51	0
VE-117	1	B (66)	62	0	61	0
VE-118	1	B (66)	55	0	54	0
VE-119	1	B (66)	53	0	53	0
VE-120	1	B (66)	62	0	60	0
VE-121	1	B (66)	53	0	52	0
VE-122	1	B (66)	52	0	52	0
VE-123	3	B (66)	65	0	64	0
VE-124	1	B (66)	52	0	51	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VE-125	1	B (66)	52	0	52	0
VE-126	1	B (66)	67	1	66	1
VE-127	1	B (66)	55	0	54	0
VE-128	1	B (66)	52	0	52	0
VE-129	1	B (66)	66	1	65	0
VE-130	2	B (66)	58	0	57	0
VE-131	1	B (66)	66	1	65	0
VE-132	1	B (66)	57	0	56	0
VE-133	2	B (66)	52	0	51	0
VE-134	1	B (66)	67	1	66	1
VE-135	2	B (66)	57	0	56	0
VE-136	2	B (66)	52	0	51	0
VE-137	1	B (66)	68	1	66	1
VE-138	2	B (66)	58	0	57	0
VE-139	1	B (66)	53	0	52	0
VE-140	1	B (66)	65	0	64	0
VE-141	2	B (66)	59	0	58	0
VE-142	1	B (66)	54	0	53	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VE-143	2	B (66)	53	0	53	0
VE-144	1	B (66)	64	0	63	0
VE-145	2	B (66)	57	0	57	0
VE-146	1	B (66)	53	0	53	0
VE-147	1	B (66)	53	0	53	0
VE-148	1	B (66)	57	0	57	0
VE-149	2	B (66)	55	0	54	0
VE-150	1	B (66)	68	1	67	1
VE-151	1	B (66)	57	0	57	0
VE-152	1	B (66)	53	0	53	0
VE-153	1	B (66)	68	1	67	1
VE-154	2	B (66)	56	0	55	0
VE-155	1	B (66)	68	1	67	1
VE-155B	1	B (66)	66	1	65	0
VE-156	1	B (66)	55	0	55	0
VE-157	2	B (66)	51	0	50	0
VE-158	1	C (66)	58	0	58	0
VE-159	1	B (66)	56	0	56	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VE-160	1	B (66)	54	0	55	0
VE-161	1	B (66)	66	1	65	0
VE-162	1	B (66)	59	0	59	0
VE-163	2	B (66)	67	2	65	0
VE-164	1	B (66)	60	0	60	0
VE-165	1	B (66)	58	0	58	0
VE-166	1	B (66)	57	0	58	0
VE-167	1	B (66)	58	0	59	0
VE-168	1	B (66)	73	1	72	1
VE-169	2	B (66)	64	0	64	0
VE-170	2	C (66)	64	0	64	0
VE-171	2	C (66)	62	0	63	0
VE-172	2	C (66)	59	0	60	0
VW-001	2	C (66)	65	0	64	0
VW-002	2	C (66)	68	2	67	2
VW-003	4	C (66)	65	0	64	0
VW-004	1	C (66)	67	1	65	0
VW-005	1	C (66)	55	0	54	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-006	1	C (66)	59	0	58	0
VW-007	1	B (66)	58	0	57	0
VW-008	1	B (66)	59	0	58	0
VW-009	1	B (66)	62	0	60	0
VW-010	2	B (66)	68	2	66	2
VW-011	2	B (66)	76	2	74	2
VW-012	4	B (66)	56	0	54	0
VW-013	3	B (66)	54	0	52	0
VW-014	4	B (66)	54	0	53	0
VW-015	2	B (66)	53	0	52	0
VW-016	1	B (66)	61	0	60	0
VW-017	2	B (66)	71	2	69	2
VW-018	4	B (66)	55	0	54	0
VW-019	2	B (66)	51	0	50	0
VW-020	1	B (66)	62	0	61	0
VW-021	2	B (66)	58	0	57	0
VW-022	2	B (66)	62	0	60	0
VW-023	1	B (66)	65	0	63	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-024	2	B (66)	56	0	55	0
VW-025	2	B (66)	58	0	57	0
VW-026	2	B (66)	62	0	61	0
VW-027	1	B (66)	67	1	66	1
VW-028	2	B (66)	62	0	61	0
VW-029	2	B (66)	60	0	59	0
VW-029B	1	B (66)	64	0	63	0
VW-030	2	B (66)	63	0	61	0
VW-031	1	B (66)	62	0	61	0
VW-032	2	B (66)	66	2	66	2
VW-033	1	B (66)	64	0	64	0
VW-034	1	E (71)	63	0	62	0
VW-035	1	B (66)	57	0	56	0
VW-036	1	B (66)	55	0	55	0
VW-037	1	B (66)	66	1	65	0
VW-038	1	B (66)	65	0	64	0
VW-039	2	B (66)	54	0	53	0
VW-040	1	B (66)	55	0	54	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-041	1	B (66)	57	0	56	0
VW-042	1	B (66)	59	0	58	0
VW-043	1	B (66)	63	0	62	0
VW-044	1	B (66)	52	0	51	0
VW-045	2	B (66)	64	0	63	0
VW-046	1	B (66)	61	0	60	0
VW-047	1	B (66)	54	0	53	0
VW-048	1	B (66)	56	0	55	0
VW-049	1	B (66)	54	0	53	0
VW-050	1	B (66)	58	0	57	0
VW-051	1	B (66)	65	0	64	0
VW-052	2	B (66)	59	0	59	0
VW-053	1	B (66)	70	1	68	1
VW-054	1	B (66)	55	0	55	0
VW-055	1	B (66)	60	0	60	0
VW-056	1	B (66)	72	1	71	1
VW-057	1	B (66)	55	0	55	0
VW-058	1	B (66)	60	0	60	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-059	1	B (66)	71	1	70	1
VW-060	1	B (66)	56	0	56	0
VW-061	1	B (66)	59	0	59	0
VW-062	1	B (66)	73	1	73	1
VW-063	1	B (66)	56	0	56	0
VW-064	1	B (66)	61	0	60	0
VW-065	1	B (66)	72	1	73	1
VW-066	1	B (66)	55	0	55	0
VW-067	1	B (66)	57	0	57	0
VW-068	1	B (66)	68	1	69	1
VW-069	1	B (66)	53	0	53	0
VW-070	1	B (66)	55	0	54	0
VW-071	1	B (66)	65	0	66	1
VW-072	1	B (66)	57	0	56	0
VW-073	1	B (66)	54	0	53	0
VW-074	1	B (66)	59	0	58	0
VW-075	1	B (66)	61	0	60	0
VW-076	1	B (66)	69	1	69	1

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-077	1	B (66)	75	1	75	1
VW-078	1	B (66)	58	0	58	0
VW-079	1	B (66)	62	0	62	0
VW-079B	2	B (66)	61	0	60	0
VW-080	1	B (66)	74	1	73	1
VW-081	1	B (66)	57	0	56	0
VW-082	1	B (66)	74	1	73	1
VW-083	1	B (66)	57	0	56	0
VW-084	2	B (66)	72	2	72	2
VW-085	1	B (66)	56	0	56	0
VW-086	1	B (66)	58	0	57	0
VW-087	1	B (66)	60	0	59	0
VW-088	1	B (66)	70	1	69	1
VW-089	1	B (66)	56	0	55	0
VW-090	1	B (66)	59	0	57	0
VW-091	1	B (66)	52	0	51	0
VW-092	1	B (66)	55	0	54	0
VW-093	1	B (66)	58	0	57	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-094	1	B (66)	73	1	72	1
VW-095	1	B (66)	54	0	53	0
VW-096	1	B (66)	57	0	56	0
VW-097	1	B (66)	59	0	58	0
VW-098	1	B (66)	70	1	69	1
VW-099	1	B (66)	54	0	53	0
VW-100	1	B (66)	56	0	54	0
VW-101	1	B (66)	54	0	53	0
VW-102	1	B (66)	57	0	56	0
VW-103	1	B (66)	69	1	68	1
VW-104	1	B (66)	53	0	52	0
VW-105	1	B (66)	54	0	53	0
VW-106	1	B (66)	54	0	53	0
VW-107	1	B (66)	65	0	64	0
VW-108	1	B (66)	53	0	52	0
VW-109	1	B (66)	54	0	53	0
VW-110	1	B (66)	55	0	54	0
VW-111	2	B (66)	60	0	59	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-112	1	B (66)	54	0	53	0
VW-113	1	B (66)	54	0	53	0
VW-114	1	B (66)	57	0	56	0
VW-115	1	B (66)	53	0	52	0
VW-116	1	B (66)	57	0	56	0
VW-117	1	B (66)	59	0	57	0
VW-118	1	B (66)	65	0	64	0
VW-119	1	B (66)	52	0	51	0
VW-120	1	B (66)	54	0	53	0
VW-121	1	B (66)	55	0	54	0
VW-122	1	B (66)	58	0	56	0
VW-123	1	B (66)	61	0	60	0
VW-124	1	B (66)	64	0	62	0
VW-125	1	B (66)	58	0	57	0
VW-126	1	B (66)	56	0	55	0
VW-127	1	B (66)	57	0	55	0
VW-128	1	B (66)	52	0	51	0
VW-128B	1	B (66)	52	0	51	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-129	1	B (66)	53	0	52	0
VW-130	1	B (66)	54	0	53	0
VW-131	1	B (66)	65	0	64	0
VW-132	1	B (66)	61	0	60	0
VW-133	1	B (66)	53	0	52	0
VW-134	1	B (66)	53	0	52	0
VW-135	1	B (66)	57	0	56	0
VW-136	1	B (66)	52	0	52	0
VW-137	1	B (66)	52	0	51	0
VW-138	1	B (66)	67	1	66	1
VW-138B	1	B (66)	62	0	61	0
VW-139	2	B (66)	53	0	52	0
VW-140	1	B (66)	56	0	56	0
VW-141	1	B (66)	61	0	60	0
VW-142	1	B (66)	65	0	64	0
VW-143	1	C (66)	53	0	52	0
VW-144	1	B (66)	59	0	58	0
VW-145	1	B (66)	53	0	52	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-146	1	B (66)	53	0	52	0
VW-147	2	B (66)	59	0	58	0
VW-148	5	B (66)	52	0	51	0
VW-149	1	B (66)	54	0	53	0
VW-150	1	B (66)	53	0	52	0
VW-151	1	B (66)	59	0	58	0
VW-152	1	B (66)	66	1	65	0
VW-153	1	B (66)	63	0	62	0
VW-154	1	B (66)	53	0	52	0
VW-155	1	B (66)	58	0	57	0
VW-156	1	B (66)	65	0	64	0
VW-157	1	B (66)	53	0	53	0
VW-158	1	B (66)	58	0	58	0
VW-159	1	B (66)	64	0	64	0
VW-160	1	B (66)	53	0	53	0
VW-161	1	B (66)	59	0	58	0
VW-162	2	B (66)	63	0	62	0
VW-163	1	B (66)	55	0	55	0

Rec [a]	Res [b]	Criteria [c]	Build PM Peak dBA Leq(h) 2045	Build PM Peak 2045 Impacts	Build AM Peak Truck dBA Leq(h) 2045	Build AM Peak Truck 2045 Impacts
VW-164	1	B (66)	60	0	60	0
VW-165	1	B (66)	51	0	51	0
VW-166	1	B (66)	60	0	62	0
VW-167	1	B (66)	56	0	56	0
VW-168	1	B (66)	58	0	59	0
VW-169	1	B (66)	62	0	64	0
VW-170	1	B (66)	60	0	60	0
VW-171	1	B (66)	65	0	64	0
VW-172	1	B (66)	66	1	65	0
VW-173	1	B (66)	66	1	65	0
VW-174	1	B (66)	67	1	67	1
VW-175	2	B (66)	64	0	65	0
VW-176	1	B (66)	64	0	65	0
VW-177	1	B (66)	72	1	71	1
Impact Totals			55		40	

Notes

Build PM Peak resulted in the most impacts; therefore was used for future conditions modeling.

ACQ = sites that planned for acquisition under the Modified LPA Build Alternative and were not included modeling results.

a Receivers shown on Exhibits 3-4, 3-5, and 3-6.

b Number of residences or residential equivalents.

c Traffic noise impact criteria (WSDOT Noise Abatement Criteria)

Appendix K

MITIGATION TABLES

Mitigation tables that provide details of the feasibility and reasonableness evaluations for each noise wall will be provided electronically with the Traffic Noise Modeling files developed for the Interstate Bridge Replacement Program. Table K-1 provides the WSDOT Feasibility Analysis for the 16 noise walls (Noise Walls 1 to 15 and Noise Wall 11A) evaluated in Washington. Tables K-2 through K-15 provide WSDOT Reasonableness Evaluations for 14 of the 16 noise walls that meet WSDOT Feasibility Criteria.

Tables K-16 through K-18 provide ODOT Abatement Evaluations for the three noise walls (Noise Walls 16 to 18) evaluated in Oregon. Receiver and noise wall locations can be viewed in Figures 7-5 to 7-9 in the Noise and Vibration Technical Report. Table K-19 provides a summary of cost and benefit considerations for Noise Wall 18, which meets ODOT criteria for feasibility and reasonableness.

Table K-1. WSDOT Feasibility Analysis

Noise Wall	1st Row Receptors			Min. Design Goal NW		-10 dBA in 1st Row		Feasible? Yes / No
	Sites and (Land Use Category)	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Insertion Loss (dBA)	No. of 1st Row with Impacts ≥ 5 dBA (minimum 3)	Insertion Loss (dBA)	% 1st Row ≥ 10 dBA	
NW1	VW-011, VW-017, VW-027 (All B)	65-75	67-76	5-10	3 / 3	10	2 / 3 = 66%	Yes
NW2	VW-034,VW-037, VW-038, VW-043, VW-051, VW-053, VW-076, VW-080, VW-082, VW-084, VW-088, VW-094, VW-098 (All B)	60-66	63-74	6-10	10 / 10	10	4 / 10 = 40%	Yes
NW3	VE-034, VE-041, VE-047, VE-052, VE-055, VE-058, VE-061, VE-063, VE-066, VE-072, VE-075, VE-078, VE-081 (All B)	62-66	63-67	5-9	3 / 3	N/A	0 / 3 = 0%	Yes
NW4	VW-103, VW-107, VW-111, VW-118, VW-123, VW-124, VW-131, VW-132, VW-138, VW-141, VW-142 (All B)	59-67	60-69	5-11	9 / 11	10-11	2 / 11 = 40%	Yes

Noise Wall	1st Row Receptors			Min. Design Goal NW		-10 dBA in 1st Row		Feasible? Yes / No
	Sites and (Land Use Category)	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Insertion Loss (dBA)	No. of 1st Row with Impacts ≥ 5 dBA (minimum 3)	Insertion Loss (dBA)	% 1st Row ≥ 10 dBA	
NW5	VE-095, VE-098, VE-100, VE-103, VE-106, VE-108, VE-111, VE-114, VE-117, VE-120, VE-123, VE-126, VE-129, VE-131, VE-134, VE-137 (All B)	61-67	62-68	5-16	17 / 17	10-16	10 / 17 = 59%	Yes
NW6	VW-152, VW-153, VW-156, VW-159, VW-162, VW-172, VW-174, VW-177 (All B)	62-72	63-72	1-10	8 / 9	10	3 / 9 = 33%	Yes
NW7	VE-140, VE-144, VE-150, VE-153, VE-155, VE-161, VE-163, VE-168 (All B)	64-73	64-74	9-14	8 / 8	10-14	8 / 8 = 100%	Yes
NW8	VW-183, VW-186, VW-187, VW-190, VW-192, VW-195, VW-202, VW-209, VW-214, VW-217, VW-220, VW-224, VW-226, VW-229, VW-232, VW-235, VW-237, and VW-241, VW-259, VW-266 (All B), VW-248 and VW-279 (C)	58-75	59-76	1-13	14 / 15	10-13	10 / 15 = 67%	Yes
NW9	VW-248, VW-259, VW-279 (All B), VW-266 (E)	69-72	67-70	5-9	4 / 4	N/A	N/A	Yes

Noise Wall	1st Row Receptors			Min. Design Goal NW		-10 dBA in 1st Row		Feasible? Yes / No
	Sites and (Land Use Category)	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Insertion Loss (dBA)	No. of 1st Row with Impacts ≥ 5 dBA (minimum 3)	Insertion Loss (dBA)	% 1st Row ≥ 10 dBA	
NW10	VE-181, VE-182, VE-184, VE-187 (All C)	64-70	66-70	1-3	0 / 4	N/A	0 / 4 = 0%	No
NW11	DT-002 (B), DT-004 (B), DT-006 (B), and DT-019 (E)	68-71	68-74	3-14	3 / 4	14	1 / 4 = 25%	Yes
NW11A	FV-002, FV-003, FV-004, and FV-005 (All C)	62-65	72	2-10	2 / 2	1	1 / 2 = 50%	Yes
NW12	DT-027 (B)	69	71	7	6 / 6	N/A	0 / 6 = 0%	Yes
NW13	DT-041, DT-042, DT-043, DT-044 (All B)	69-71	69-70	0-1	0 / 20	N/A	0 / 20 = 0%	No
NW14	FV-027G, FV-035, FV-036, FV-037, FV-038 (All C)	65-70	69-71	1-14	4 / 4	N/A	4 / 4 = 0%	Yes
NW15	FV-039, FV-040, FV-041, FV-042, FV-043, FV-044, FV-045, FV-046, FV-047, FV-048, FV-049, FV-050 (All C)	59-75	61-75	0-7	3 / 8	N/A	0 / 8 = 0%	Yes

See Table 2-8 in the Noise and Vibration Technical Report for definitions of Activity Categories.

Table K-2. WSDOT Reasonableness Evaluation for Cost – Noise Wall 1

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-001	C	2	64	65	$0	$664,736	$555,530	0	N/A	N/A
VW-002	C	2	**67**	**68**	$0			0		
VW-003	C	4	63	65	$0			0		
VW-004	C	1	**66**	**67**	$0			0		
VW-005	C	1	55	55	$0			1		
VW-006	C	1	58	59	$0			4		
VW-007	B	1	58	58	$0			4		
VW-008	B	1	59	59	$0			3		
VW-009	B	1	61	62	$36,127			6		
VW-010	B	2	**67**	**68**	$86,292			8		
VW-011	B	2	**75**	**76**	$142,444			10		
VW-012	B	4	55	56	$0			3		
VW-013	B	3	53	54	$0			1		
VW-014	B	4	53	54	$0			1		
VW-015	B	2	53	53	$0			1		
VW-016	B	1	61	61	$0			3		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-017	B	2	**71**	**71**	$107,348			10		
VW-018	B	4	54	55	$0			1		
VW-019	B	2	50	51	$0			1		
VW-020	B	1	62	62	$36,127			5		
VW-021	B	2	58	58	$0			1		
VW-022	B	2	61	62	$72,254			5		
VW-023	B	1	65	65	$36,127			9		
VW-024	B	2	56	56	$0			1		
VW-025	B	2	58	58	$0			2		
VW-026	B	2	62	62	$72,254			5		
VW-027	B	1	**67**	**67**	$39,636			9		
VW-028	B	2	62	62	$0			4		
VW-029	B	2	60	60	$0			1		
VW-029B	B	1	64	64	$36,127			6		
VW-030	B	2	62	63	$0			1		
VW-031	B	1	63	62	$0			-1		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
						Design Goal Achieved?	**Yes**		**No**	
						Cost Effective?	**Yes**		**No**	

Receivers and noise wall location shown on Figure 7-5 in the Noise and Vibration Technical Report.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values.

Reasonableness cost based on $51.61/ft^2

N/A = Noise reduction not achieved by evaluated noise barrier

See Table 2-8 in the Noise and Vibration Technical Report for definitions of Activity Categories.

Table K-3. WSDOT Reasonableness Evaluation for Cost – Noise Wall 2 (Replacement Wall)

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-034	E	1	63	63	63	$0	$717,379	$712,631	1		
VW-035	B	1	57	57	57	$0			0		
VW-036	B	1	55	55	55	$0			0		
VW-037	B	1	**66**	**66**	**66**	$36,127			7		
VW-038	B	1	65	65	65	$36,127			7		
VW-039	B	2	54	54	54	$0			0		
VW-040	B	1	54	55	55	$0			2		
VW-041	B	1	56	57	57	$0			3		
VW-042	B	1	59	59	59	$0			4		
VW-043	B	1	63	63	63	$36,127			6		
VW-044	B	1	52	52	52	$0			0		
VW-045	B	2	64	64	64	$72,254			5		
VW-046	B	1	60	61	61	$0			4		
VW-047	B	1	54	54	54	$0			1		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-048	B	1	55	56	56	$0			1		
VW-049	B	1	53	54	54	$0			1		
VW-050	B	1	57	58	58	$0			2		
VW-051	B	1	61	65	65	$36,127			7		
VW-052	B	2	57	59	59	$0			2		
VW-053	B	1	65	**70**	**70**	$50,165			8		
VW-054	B	1	53	55	55	$0			1		
VW-055	B	1	57	60	60	$0			3		
VW-057	B	1	53	ACQ	ACQ	$0			1		
VW-058	B	1	57	60	60	$0			2		
VW-060	B	1	54	56	56	$0			1		
VW-061	B	1	57	ACQ	ACQ	$0			1		
VW-063	B	1	54	56	56	$0			1		
VW-064	B	1	57	61	61	$0			3		
VW-066	B	1	54	ACQ	ACQ	$0			0		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-067	B	1	55	57	57	$0			1		
VW-069	B	1	52	53	53	$0			0		
VW-070	B	1	53	ACQ	ACQ	$0			1		
VW-072	B	1	53	57	57	$0			3		
VW-073	B	1	53	54	54	$0			0		
VW-074	B	1	55	ACQ	ACQ	$0			2		
VW-075	B	1	57	61	60	$0			2		
VW-076	B	1	61	**69**	**69**	$46,655			7		
VW-078	B	1	54	ACQ	ACQ	$0			2		
VW-079	B	1	57	62	62	$0			4		
VW-079B	B	2	56	61	61	$0			3		
VW-080	B	1	63	**74**	**74**	$64,203			10		
VW-081	B	1	53	57	57	$0			2		
VW-082	B	1	63	**74**	**74**	$64,203			10		
VW-083	B	1	53	ACQ	ACQ	$0			2		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-084	B	2	62	**72**	**72**	$114,368			9		
VW-085	B	1	54	56	56	$0			1		
VW-086	B	1	55	58	58	$0			2		
VW-087	B	1	56	60	60	$0			2		
VW-088	B	1	61	**70**	**70**	$50,165			9		
VW-089	B	1	54	56	56	$0			1		
VW-090	B	1	55	59	59	$0			3		
VW-091	B	1	51	52	53	$0			1		
VW-092	B	1	54	55	55	$0			0		
VW-093	B	1	54	58	58	$0			2		
VW-094	B	1	61	**73**	**73**	$60,693			10		
VW-095	B	1	52	54	54	$0			0		
VW-096	B	1	54	57	57	$0			2		
VW-097	B	1	56	59	59	$0			2		
VW-098	B	1	60	**70**	**70**	$50,165			10		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-099	B	1	53	54	55	$0			1		
VW-100	B	1	54	56	56	$0			0		
VW-101	B	1	53	54	55	$0			1		
							Design Goal Achieved?	**Yes**		**No**	
							Cost Effective?	**Yes**		**No**	

Receivers and noise wall location shown on Figure 7-6 in the Noise and Vibration Technical Report.

NAC Impacts and Substantial Increase Impacts resulting from Modified LPA Build Alternative as evaluation was performed without existing wall in place as described in the methodology.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values. Substantial impacts of 10 dBA or more shown in gray highlights

Reasonableness cost based on $51.61/ft^2

N/A = Noise reduction not achieved by evaluated noise barrier

ACQ = Modeled location is planned for acquisition with the Modified LPA and is not included in barrier evaluation.

See Table 2-8 in the Noise and Vibration Technical Report for definitions of Activity Categories.

Table K-4. WSDOT Reasonableness Evaluation for Cost – Noise Wall 3 (Short length wall removed at south end)

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VE-024	B	1	61	63	63	$0	$1,455,607	$1,333,086	1	N/A	N/A
VE-025	B	1	60	61	62	$36,127			5		
VE-026	B	1	60	62	62	$36,127			5		
VE-027	B	1	60	61	62	$36,127			6		
VE-028	B	1	60	61	62	$36,127			6		
VE-029	B	1	61	62	62	$36,127			7		
VE-030	B	1	60	61	62	$36,127			6		
VE-031	B	1	59	60	60	$36,127			5		
VE-032	B	1	61	62	64	$36,127			8		
VE-033	B	1	59	61	61	$36,127			5		
VE-034	B	2	62	64	64	$72,254			7		
VE-035	B	1	60	62	63	$36,127			7		
VE-036	B	1	60	62	63	$36,127			8		
VE-037	B	1	59	60	61	$36,127			6		
VE-038	B	1	56	57	58	$0			4		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VE-039	B	1	59	61	62	$36,127			7		
VE-040	B	1	58	60	61	$36,127			5		
VE-041	B	2	64	**66**	**67**	$79,272			9		
VE-042	B	2	61	63	63	$72,254			6		
VE-043	B	1	59	60	62	$36,127			8		
VE-044	B	1	54	55	56	$36,127			5		
VE-045	B	1	54	55	56	$0			4		
VE-046	B	1	52	53	53	$0			3		
VE-047	B	1	**66**	**67**	**67**	$39,636			7		
VE-048	B	2	60	61	61	$72,254			5		
VE-049	B	2	58	59	60	$72,254			6		
VE-050	B	1	57	58	58	$36,127			5		
VE-051	B	2	58	60	60	$0			4		
VE-052	B	1	62	63	63	$36,127			6		
VE-053	B	2	53	53	53	$0			3		
VE-054	B	1	58	59	60	$0			4		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VE-055	B	1	64	64	64	$36,127			5		
VE-056	B	1	56	56	56	$0			4		
VE-057	B	1	58	59	59	$0			3		
VE-058	B	1	63	64	64	$36,127			6		
VE-059	B	1	57	57	58	$0			4		
VE-060	B	1	57	58	58	$0			2		
VE-061	B	1	63	64	64	$36,127			6		
VE-062	B	1	57	58	58	$0			2		
VE-063	B	1	63	64	64	$36,127			6		
VE-064	B	2	54	54	54	$0			1		
VE-065	B	1	57	58	58	$0			3		
VE-066	B	1	63	63	63	$36,127			5		
VE-067	B	1	57	58	58	$36,127			5		
VE-068	B	2	55	56	56	$0			3		
VE-069	B	1	56	56	56	$0			2		
VE-070	B	2	53	53	53	$0			1		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VE-071	B	2	51	51	51	$0			1		
VE-072	B	1	63	63	63	$36,127			5		
VE-073	B	1	56	56	56	$0			2		
VE-074	B	1	54	55	55	$0			2		
VE-075	B	1	63	63	63	$36,127			5		
VE-076	B	1	56	56	56	$0			1		
VE-077	B	1	53	53	53	$0			1		
VE-078	B	1	63	63	63	$36,127			5		
VE-079	B	1	54	55	55	$0			2		
VE-080	B	1	51	52	52	$0			1		
VE-081	B	1	63	63	63	$36,127			5		
VE-082	B	1	54	54	54	$0			1		
VE-083	B	1	52	52	52	$0			1		
VE-084	B	1	63	63	63	$36,127			5		
VE-085	B	1	51	52	52	$0			1		
VE-086	B	2	51	52	52	$0			1		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VE-087	B	1	62	62	62	$0			3		
VE-088	B	1	52	52	53	$0			1		
VE-089	B	1	51	52	52	$0			1		
VE-090	B	1	51	52	52	$0			1		
VE-091	C	1	59	59	60	$0			3		
VE-092	B	1	53	53	54	$0			1		
VE-093	B	2	51	52	52	$0			1		
VE-094	B	1	49	49	50	$0			1		
VE-094	B	1	49	49	50	$0			1		
Design Goal Achieved?								**Yes**		**No**	
Cost Effective?								**Yes**		**No**	

Receivers and noise wall location shown on Figure 7-6 in the Noise and Vibration Technical Report.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values.

Reasonableness cost based on $51.61/ft^2

N/A = Noise reduction not achieved by evaluated noise barrier

See Table 2-8 in the Noise and Vibration Technical Report for definitions of Activity Categories.

Table K-5. WSDOT Reasonableness Evaluation for Cost – Noise Wall 4 (Replacement Wall)

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-102	B	1	56	57	58	$0	$794,174	$500,617	1	N/A	N/A
VW-103	B	1	**67**	**69**	**73**	$0			4		
VW-104	B	1	52	53	54	$0			1		
VW-105	B	1	53	54	55	$0			1		
VW-106	B	1	53	54	55	$0			1		
VW-107	B	1	63	65	**70**	$50,165			5		
VW-108	B	1	52	53	54	$0			1		
VW-109	B	1	54	54	55	$0			1		
VW-110	B	1	55	55	59	$0			4		
VW-111	B	2	59	60	**68**	$86,292			8		
VW-112	B	1	53	54	55	$0			1		
VW-113	B	1	53	54	56	$0			2		
VW-114	B	1	56	57	61	$36,127			5		
VW-115	B	1	52	53	55	$0			2		
VW-116	B	1	56	57	61	$36,127			5		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-117	B	1	58	59	62	$36,127			6		
VW-118	B	1	65	65	**74**	$64,203			11		
VW-119	B	1	51	52	54	$0			2		
VW-120	B	1	53	54	55	$0			2		
VW-121	B	1	54	55	58	$0			4		
VW-122	B	1	57	58	61	$36,127			5		
VW-123	B	1	60	61	**66**	$36,127			7		
VW-124	B	1	63	64	**70**	$50,165			9		
VW-125	B	1	57	58	62	$36,127			5		
VW-126	B	1	55	56	59	$0			4		
VW-127	B	1	56	57	61	$36,127			5		
VW-128	B	1	51	52	53	$0			1		
VW-128B	B	1	51	52	53	$0			2		
VW-129	B	1	52	53	54	$0			1		
VW-128B	B	1	51	52	53	$0			2		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-129	B	1	52	53	54	$0			1		
VW-130	B	1	54	54	57	$0			3		
VW-131	B	1	64	65	**73**	$60,693			9		
VW-132	B	1	61	61	**68**	$43,146			7		
VW-133	B	1	53	53	55	$0			2		
VW-134	B	1	53	53	55	$0			2		
VW-135	B	1	56	57	60	$0			4		
VW-136	B	1	52	52	54	$0			1		
VW-137	B	1	51	52	53	$0			1		
VW-138	B	1	**67**	**67**	**73**	$60,693			10		
VW-138B	B	1	62	62	65	$36,127			6		
VW-139	B	2	52	53	54	$0			1		
VW-138B	B	1	62	62	65	$36,127			6		
VW-139	B	2	52	53	54	$0			1		
VW-140	B	1	56	56	59	$0			2		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (without existing wall)	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-141	B	1	61	61	64	$36,127			5		
VW-142	B	1	65	65	**71**	$53,674			9		
VW-143	C	1	52	53	54	$0			1		
Design Goal Achieved?								**Yes**		**No**	
Cost Effective?								**Yes**		**No**	

Receivers and noise wall location shown on Figure 7-6 in the Noise and Vibration Technical Report.

NAC Impacts and Substantial Increase Impacts resulting from Modified LPA Build Alternative as evaluation was performed without existing wall in place as described in the methodology.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values.

Reasonableness cost based on $51.61/ft²

N/A = Noise reduction not achieved by evaluated noise barrier

See Table 2-8 in the Noise and Vibration Technical Report for definitions of Activity Categories.

Table K-6. WSDOT Reasonableness Evaluation for Cost – Noise Wall 5 (Replacement Wall)

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VE-095	B	1	**67**	**68**	**77**	$74,731	$1,053,875	$509,391	11	N/A	N/A
VE-096	B	1	58	58	59	$0			1		
VE-097	B	1	56	57	57	$0			0		
VE-098	B	1	65	**66**	**74**	$64,203			9		
VE-099	B	1	53	54	54	$0			0		
VE-100	B	1	**66**	**66**	**76**	$71,222			11		
VE-101	B	1	56	57	59	$0			2		
VE-102	B	1	52	53	53	$0			1		
VE-103	B	1	62	62	**69**	$46,655			8		
VE-104	B	2	56	57	60	$0			3		
VE-105	B	1	52	52	54	$0			2		
VE-106	B	1	62	62	**69**	$46,655			8		
VE-107	B	2	54	55	58	$0			3		
VE-108	B	1	62	63	**69**	$46,655			7		
VE-109	B	2	55	56	57	$0			2		
VE-110	B	1	52	53	54	$0			2		
VE-110B	B	1	53	53	55	$0			2		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VE-111	B	1	**66**	**67**	**75**	$67,712			10		
VE-112	B	2	56	57	58	$0			2		
VE-113	B	1	52	53	54	$0			2		
VE-114	B	1	63	64	70	$50,165			8		
VE-115	B	1	57	57	60	$0			4		
VE-116	B	1	51	52	53	$0			1		
VE-117	B	1	62	62	**68**	$43,146			7		
VE-118	B	1	54	55	58	$0			4		
VE-119	B	1	53	53	56	$0			3		
VE-120	B	1	61	62	65	$36,127			5		
VE-121	B	1	52	53	54	$0			2		
VE-122	B	1	52	52	54	$0			2		
VE-123	B	3	64	65	**72**	$171,552			10		
VE-124	B	1	51	52	52	$0			0		
VE-125	B	1	52	52	53	$0			1		
VE-126	B	1	**66**	**67**	**74**	$64,203			10		
VE-127	B	1	54	55	57	$0			3		
VE-128	B	1	52	52	54	$0			2		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VE-129	B	1	65	**66**	**73**	$60,693			10		
VE-130	B	2	57	58	60	$0			4		
VE-131	B	1	**66**	**66**	**72**	$57,184			9		
VE-132	B	1	57	57	60	$0			4		
VE-133	B	2	51	52	52	$0			1		
VE-134	B	1	**67**	**67**	**76**	$71,222			12		
VE-135	B	2	56	57	59	$0			3		
VE-136	B	2	51	52	53	$0			1		
VE-137	B	1	**66**	**68**	**79**	$81,750			16		
VE-138	B	2	58	58	59	$0			1		
VE-139	B	1	52	53	53	$0			0		
							Design Goal Achieved?	**Yes**		**No**	
							Cost Effective?	**Yes**		**No**	

Receivers and noise wall location shown on Figure 7-6 in the Noise and Vibration Technical Report.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values.

NAC Impacts and Substantial Increase Impacts resulting from Modified LPA Build Alternative as evaluation was performed without existing wall in place as described in the methodology.

Reasonableness cost based on $51.61/ft²

N/A = Noise reduction not achieved by evaluated noise barrier

See Table 2-8 in the Noise and Vibration Technical Report for definitions of Activity Categories.

Table K-7. WSDOT Reasonableness Evaluation for Cost – Noise Wall 6 (Replacement Wall)

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-144	B	1	59	59	60	$0	$579,889	$508,875	1	N/A	N/A
VW-145	B	1	52	53	54	$0			1		
VW-146	B	1	53	53	55	$0			2		
VW-147	B	2	59	59	64	$72,254			6		
VW-148	B	5	52	52	54	$0			2		
VW-149	B	1	53	54	55	$0			2		
VW-150	B	1	53	53	54	$0			1		
VW-151	B	1	59	59	64	$36,127			5		
VW-152	B	1	**66**	**66**	**75**	$67,712			10		
VW-153	B	1	62	63	70	$50,165			8		
VW-154	B	1	53	53	54	$0			1		
VW-155	B	1	56	58	61	$0			4		
VW-156	B	1	64	65	**74**	$64,203			10		
VW-157	B	1	52	53	53	$0			0		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-158	B	1	57	58	60	$0			2		
VW-159	B	1	64	64	**72**	$57,184			9		
VW-160	B	1	53	53	53	$0			0		
VW-161	B	1	57	59	60	$0			1		
VW-162	B	2	63	63	**71**	$107,348			9		
VW-163	B	1	54	55	55	$0			1		
VW-164	B	1	59	60	62	$0			2		
VW-170	B	1	60	60	60	$0			1		
VW-171	B	1	62	65	65	$0			1		
VW-172	B	1	**66**	**66**	**72**	$57,184			8		
VW-173	B	1	64	**66**	**66**	$0			1		
VW-174	B	1	**67**	**67**	**75**	$67,712			10		
VW-175	B	2	64	64	64	$0			1		
VW-176	B	1	63	64	64	$0			0		
VW-177	B	1	**72**	**72**	**72**	$0			1		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
							Design Goal Achieved?	**Yes**		**No**	
							Cost Effective?	**Yes**		**No**	

Receivers and noise wall location shown on Figure 7-7 in the Noise and Vibration Technical Report.

NAC Impacts and Substantial Increase Impacts resulting from Modified LPA Build Alternative as evaluation was performed without existing wall in place as described in the methodology.

Reasonableness cost based on $51.61/ft^2

N/A = Noise reduction not achieved by evaluated noise barrier

See Table 2-8 in the Noise and Vibration Technical Report for definitions of Activity Categories.

Table K-8. WSDOT Reasonableness Evaluation for Cost – Noise Wall 7 (Replacement Wall)

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VE-140	B	1	64	65	**73**	$60,693	$708,706	$570,291	9	N/A	N/A
VE-141	B	2	59	59	60	$0			1		
VE-142	B	1	53	54	55	$0			1		
VE-143	B	2	52	53	54	$0			1		
VE-144	B	1	64	64	**73**	$60,693			11		
VE-145	B	2	57	57	60	$0			3		
VE-146	B	1	53	53	54	$0			1		
VE-147	B	1	52	53	54	$0			1		
VE-148	B	1	57	57	61	$0			4		
VE-149	B	2	54	55	57	$0			3		
VE-150	B	1	**68**	**68**	**79**	$81,750			14		
VE-151	C	1	57	57	60	$0			4		
VE-152	B	1	53	53	55	$0			2		
VE-153	B	1	**68**	**68**	**79**	$81,750			14		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VE-154	B	2	55	56	58	$0			3		
VE-155	B	1	**68**	**68**	**77**	$74,731			12		
VE-155B	B	1	**66**	**66**	**76**	$71,222			12		
VE-156	B	1	54	55	56	$0			2		
VE-157	B	2	50	51	51	$0			1		
VE-158	C	1	57	58	61	$0			4		
VE-159	B	1	55	56	56	$0			2		
VE-160	B	1	53	54	55	$0			1		
VE-161	B	1	**66**	**66**	**75**	$67,712			11		
VE-162	B	1	58	59	61	$0			3		
VE-163	B	2	**66**	**67**	**77**	$149,462			12		
VE-164	B	1	60	60	62	$0			3		
VE-165	B	1	57	58	58	$0			1		
VE-166	B	1	56	57	57	$0			0		
VE-167	B	1	57	58	58	$0			1		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VE-168	B	1	**73**	**73**	**73**	$60,693			10		
VE-169	B	2	63	64	64	$0			3		
VE-170	C	2	63	64	64	$0			1		
VE-171	C	2	61	62	62	$0			0		
						Design Goal Achieved?		**Yes**		**No**	
						Cost Effective?		**Yes**		**No**	

Receivers and noise wall location shown on Figure 7-7 in the Noise and Vibration Technical Report.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values.

NAC Impacts and Substantial Increase Impacts resulting from Modified LPA Build Alternative as evaluation was performed without existing wall in place as described in the methodology.

Reasonableness cost based on $51.61/ft^2

N/A = Noise reduction not achieved by evaluated noise barrier.

See Table 2-8 in the Noise and Vibration Technical Report for definitions of Activity Categories.

Table K-9. WSDOT Reasonableness Evaluation for Cost – Noise Wall 8 (Replaces existing wall)

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-181	E	1	57	58	58	$0	$1,723,771	$1,235,337	1	N/A	N/A
VW-182	B	2	57	58	58	$0			2		
VW-183	B	1	**68**	**68**	**70**	$50,165			10		
VW-184	B	1	56	56	57	$0			1		
VW-185	B	1	58	59	59	$0			2		
VW-186	B	1	**68**	**68**	**71**	$53,674			10		
VW-187	B	1	**66**	**66**	**70**	$50,165			10		
VW-188	B	1	55	55	55	$0			0		
VW-189	B	1	56	57	57	$0			2		
VW-190	B	1	**66**	**66**	**70**	$50,165			9		
VW-191	B	1	56	57	57	$0			2		
VW-192	B	1	65	65	**69**	$46,655			8		
VW-193	B	1	55	56	56	$0			2		
VW-194	B	3	56	56	58	$108,381			5		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-195	B	1	64	64	**69**	$46,655			9		
VW-196	E	1	55	56	56	$0			1		
VW-197	B	2	53	53	55	$0			3		
VW-198	B	3	56	56	59	$108,381			5		
VW-199	B	1	58	58	60	$0			4		
VW-200	B	1	59	59	62	$36,127			5		
VW-201	B	1	62	62	**66**	$36,127			8		
VW-202	B	1	**68**	**68**	**75**	$67,712			13		
VW-203	B	4	58	59	61	$144,508			5		
VW-204	B	2	57	58	59	$0			4		
VW-205	B	1	56	57	57	$0			1		
VW-206	B	2	57	58	59	$0			3		
VW-207	B	1	57	57	59	$0			4		
VW-208	B	1	58	58	60	$0			4		
VW-209	B	1	64	64	**69**	$46,655			9		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-210	B	1	58	58	59	$0			3		
VW-211	B	2	59	59	60	$0			4		
VW-212	B	1	57	58	59	$0			3		
VW-213	B	1	59	59	61	$36,127			5		
VW-214	B	1	**71**	**70**	**75**	$67,712			12		
VW-215	B	1	57	58	58	$0			2		
VW-216	B	1	60	60	61	$36,127			5		
VW-217	B	1	**72**	**72**	**74**	$64,203			11		
VW-218	B	1	57	58	58	$0			2		
VW-219	B	1	61	61	62	$36,127			6		
VW-220	B	1	**72**	**71**	**74**	$64,203			11		
VW-221	B	1	59	59	60	$0			4		
VW-222	B	1	58	59	59	$0			3		
VW-223	B	1	62	60	62	$36,127			7		
VW-224	B	1	**73**	**72**	**74**	$64,203			12		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-225	B	1	59	60	60	$0			3		
VW-226	B	1	**73**	**72**	**74**	$64,203			11		
VW-227	B	1	60	61	61	$0			3		
VW-228	B	1	**68**	**68**	**69**	$46,655			8		
VW-229	B	1	**73**	**72**	**73**	$60,693			11		
VW-230	B	1	**69**	**69**	**69**	$46,655			7		
VW-231	B	1	62	63	63	$0			3		
VW-232	B	1	**69**	**70**	**71**	$53,674			9		
VW-233	B	1	55	55	55	$0			3		
VW-234	B	1	57	56	57	$0			4		
VW-235	B	1	**70**	**71**	**71**	$53,674			7		
VW-236	B	1	59	59	60	$0			2		
VW-237	B	1	58	58	58	$0			3		
VW-238	B	1	62	63	63	$0			0		
VW-239	B	1	65	65	65	$0			0		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA without existing wall	Reasonable Allowance (Based on 2045 Modified LPA Build (L_{eq}) dBA without existing wall)		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
						Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-240	B	6	65	64	65	$0			0		
VW-241	B	6	**71**	**72**	**72**	$0			2		
VW-280	B	4	59	59	58	$0			4		
VW-281	B	4	62	62	62	$144,508			6		
Design Goal Achieved?								**Yes**		**No**	
Cost Effective?								**Yes**		**No**	

Receivers and noise wall shown on Figure 7-7 in the Noise and Vibration Technical Report.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values.

Reasonableness cost based on $51.61/ft^2

NAC Impacts and Substantial Increase Impacts resulting from Modified LPA Build Alternative as evaluation was performed without existing wall in place as described in the methodology.

N/A = Noise reduction not achieved by evaluated noise barrier

See Table 2-8 in the Noise and Vibration Technical Report for definitions of Activity Categories.

Table K-10. WSDOT Reasonableness Evaluation for Cost – Noise Wall 9

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-242	B	1	58	60	$0	$327,620	$834,224	-1	N/A	N/A
VW-243	E	1	59	62	$0			0		
VW-244	B	1	59	60	$0			-1		
VW-245	E	1	60	62	$0			1		
VW-246	B	1	61	61	$0			3		
VW-247	B	2	60	60	$0			4		
VW-248	B	1	**70**	**68**	$43,146			5		
VW-249	B	1	58	58	$0			2		
VW-250	B	1	58	58	$0			3		
VW-251	B	1	59	59	$0			4		
VW-252	B	1	62	62	$36,127			5		
VW-253	B	1	58	57	$0			1		
VW-254	B	1	55	55	$0			2		
VW-255	B	1	57	58	$0			3		
VW-256	B	1	60	60	$0			4		
VW-257	B	1	63	63	$36,127			5		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-258	B	1	64	64	$36,127			7		
VW-259	B	1	**72**	**70**	$50,165			9		
VW-260	B	1	53	53	$0			1		
VW-261	B	1	58	58	$0			4		
VW-262	B	3	59	60	$0			4		
VW-263	B	1	58	57	$0			1		
VW-264	B	1	59	58	$0			1		
VW-265	B	1	**68**	**66**	$36,127			6		
VW-266	E	1	**72**	70	$50,165			9		
VW-268	B	6	49	49	$0			1		
VW-269	B	5	62	60	$0			0		
VW-270	E	1	62	61	$0			4		
VW-271	B	6	52	51	$0			1		
VW-272	B	1	64	62	$0			0		
VW-273	B	1	**66**	64	$0			3		
VW-274	B	6	51	50	$0			0		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
VW-278	C	6	65	64	$0			0		
VW-279	B	1	**69**	**67**	$39,636			6		
						Design Goal Achieved?	**Yes**		**No**	
						Cost Effective?	**No**		**No**	

Receivers and noise wall shown on Figure 7-8 in the Noise and Vibration Technical Report.

Impacts are noted by bolded values.

Reasonableness cost based on $51.61/ft^2$

N/A = Noise reduction not achieved by evaluated noise barrier

See Table 2-8 for definitions of Activity Categories.

Table K-11. WSDOT Reasonableness Evaluation for Cost – Noise Wall 11

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
DT-001	E	1	68	67	$0	$269,404	$1,088,765	1	N/A	N/A
DT-002	B	1	**70**	**69**	$46,655			5		
DT-003	B	1	**71**	**70**	$0			2		
DT-004	B	1	**70**	**68**	$43,146			5		
DT-005	B	1	**71**	**70**	$0			2		
DT-006	B	1	**71**	**69**	$0			3		
DT-007	B	1	**72**	**71**	$0			2		
DT-008	E	1	50	52	$0			4		
DT-009	B	1	58	58	$36,127			5		
DT-010	B	2	61	60	$0			3		
DT-011	B	1	62	62	$0			3		
DT-012	B	1	57	56	$0			4		
DT-013	B	1	62	62	$0			3		
DT-014	B	1	65	65	$0			2		
DT-015	B	1	**66**	**67**	$0			2		
DT-016	B	1	**68**	**68**	$0			2		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
DT-017	B	1	59	61	$0			4		
DT-018	C	1	63	65	$36,127			8		
DT-019	E	1	68	**74**	$64,203			14		
DT-020	C	1	58	62	$0			3		
DT-021	E	1	62	68	$43,146			6		
						Design Goal Achieved?	**Yes**		**No**	
						Cost Effective?	**No**		**No**	

Receivers and noise wall shown on Figure 7-8 in the Noise and Vibration Technical Report.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values.

Reasonableness cost based on $51.61/ft²

N/A = Noise reduction not achieved by evaluated noise barrier

See Table 2-8 for definitions of Activity Categories.

Table K-12. WSDOT Reasonableness Evaluation for Cost – Noise Wall 11A

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
FV-002	C	1	65	**72**	$57,184	$150,495	$143,682	7	N/A	N/A
FV-003	C	1	63	**66**	$0			2		
FV-004	C	1	62	**72**	$57,184			10		
FV-005	C	1	60	**66**	$36,127			5		
FV-006	C	1	56	60	$0			2		
FV-007	C	1	54	57	$0			0		
Design Goal Achieved?							**Yes**		**No**	
Cost Effective?							**Yes**		**No**	

Receivers and noise wall shown on Figure 7-8 in the Noise and Vibration Technical Report.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values.

Reasonableness cost based on $51.61/ft^2

N/A = Noise reduction not achieved by evaluated noise barrier

See Table 2-8 for definitions of Activity Categories.

Table K-13. WSDOT Reasonableness Evaluation for Cost – Noise Wall 12

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
DT-025	E	1	56	59	$0	$322,044	$316,782	0	N/A	N/A
DT-026	E	1	64	64	$0			1		
DT-027	B	6	**69**	**71**	$322,044			7		
DT-028	E	1	56	62	$0			0		
Design Goal Achieved?							**Yes**	**No**		
Cost Effective?							**Yes**	**No**		

Receivers and noise wall shown on Figure 7-9 in the Noise and Vibration Technical Report.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values.

Reasonableness cost based on $51.61/ft^2$

N/A = Noise reduction not achieved by evaluated noise barrier

See Table 2-8 for definitions of Activity Categories.

Table K-14. WSDOT Reasonableness Evaluation for Cost – Noise Wall 14

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
FV-027A	C	1	55	58	$0	$352,185	$1,062,702	0	N/A	N/A
FV-027B	C	1	55	59	$0			1		
FV-027C	C	1	58	62	$36,127			5		
FV-027D	C	1	57	60	$0			2		
FV-027E	C	1	60	65	$36,127			8		
FV-027F	C	1	58	61	$0			3		
FV-027G	C	1	65	71	$53,674			14		
FV-027H	C	1	63	65	$36,127			6		
FV-028	C	1	54	58	$0			0		
FV-029	C	1	55	59	$0			1		
FV-030	C	1	55	59	$0			1		
FV-031	C	1	56	60	$0			2		
FV-032	C	1	57	60	$0			1		
FV-033	C	1	59	61	$0			2		
FV-034	C	1	60	62	$0			3		
FV-035	C	1	64	65	$36,127			6		
FV-036	C	1	**69**	**71**	$53,674			9		

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
FV-037	C	1	**68**	**69**	$46,655			6		
FV-038	C	1	**70**	**71**	$53,674			5		
						Design Goal Achieved?	**Yes**		**No**	
						Cost Effective?	**No**		**No**	

Receivers and noise wall shown on Figure 7-9 in the Noise and Vibration Technical Report.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values.

Reasonableness cost based on $51.61/$ft^2$

N/A = Noise reduction not achieved by evaluated noise barrier

See Table 2-8 for definitions of Activity Categories.

Table K-15. WSDOT Reasonableness Evaluation for Cost – Noise Wall 15

Site ID	Land Use Category	Dwelling Units/ Residential Equivalency	2019 Existing (L_{eq}) dBA	2045 Modified LPA Build (L_{eq}) dBA (with and without existing wall)	Reasonable Allowance		Minimum Design Goal Noise Wall		-10 dBA in Majority of 1st Row	
					Per Modeled Receiver	Total Cost	Total Cost	Insertion Loss (dBA)	Total Cost	Insertion Loss (dBA)
FV-039	C	1	63	61	$0	$150,494	$719,185	0	N/A	N/A
FV-040	C	1	60	61	$0			1		
FV-041	C	1	59	63	$0			2		
FV-042	C	1	60	65	$0			3		
FV-043	C	1	65	**67**	$39,636			5		
FV-044	C	1	**66**	**70**	$50,165			7		
FV-045	C	1	65	**73**	$60,693			5		
FV-046	C	1	**66**	**74**	$0			2		
FV-047	C	1	**75**	**75**	$0			4		
FV-048	C	1	**69**	**68**	$0			3		
FV-049	C	1	**68**	**66**	$0			2		
FV-050	C	1	**66**	**66**	$0			2		
Design Goal Achieved?							**Yes**		**No**	
Cost Effective?							**No**		**No**	

Receivers and noise wall shown on Figure 7-9 in the Noise and Vibration Technical Report.

Existing and future modeled noise levels that approach or exceed the WSDOT NAC are noted by **bolded** values. Reasonableness cost based on $51.61/ft^2

N/A = Noise reduction not achieved by evaluated noise barrier. See Table 2-8 for definitions of Activity Categories.

Table K-16. ODOT Abatement Evaluation – Noise Wall 16

Site ID [a]	Dwelling Unit/ Residential Equivalency [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	Modified LPA [f] (dBA)	Modified LPA Impacts [g]	24-foot Height NW16	Insertion Loss
PD-001	1	Residential	B (65)	54	60	0	58	2
PD-002	1	Residential	B (65)	55	60	0	59	1
PD-003	1	Residential	B (65)	56	62	0	60	2
PD-004	1	Residential	B (65)	49	58	0	57	1
PD-005	1	Residential	B (65)	47	56	0	55	1
PD-006	1	Residential	B (65)	49	59	1	57	2
PD-007	1	Residential	B (65)	47	58	1	56	2
PD-008	1	Residential	B (65)	47	54	0	53	1
PD-009	1	Residential	B (65)	48	57	0	55	2
PD-010	1	Residential	B (65)	47	55	0	54	1
PD-011	1	Residential	B (65)	48	57	0	56	1
PD-012	1	Residential	B (65)	47	57	1	55	2
PD-013	1	Residential	B (65)	47	54	0	53	1
PD-014	1	Residential	B (65)	48	57	0	56	1
PD-015	1	Residential	B (65)	46	51	0	50	1
PD-016	1	Residential	B (65)	50	57	0	57	0

Site ID [a]	Dwelling Unit/ Residential Equivalency [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	Modified LPA [f] (dBA)	Modified LPA Impacts [g]	24-foot Height NW16	Insertion Loss
PD-017	1	Residential	B (65)	47	56	0	54	2
PD-018	1	Residential	B (65)	46	52	0	50	2
PD-019	1	Residential	B (65)	49	57	0	55	2
PD-020	1	Residential	B (65)	47	56	0	54	2
PD-021	1	Residential	B (65)	46	51	0	50	1
PD-022	1	Residential	B (65)	48	54	0	52	2
PD-023	1	Residential	B (65)	49	56	0	54	2
PD-024	1	Residential	B (65)	47	56	0	55	1
PD-025	1	Residential	B (65)	49	57	0	55	2
PD-026	1	Residential	B (65)	51	56	0	54	2
PD-027	1	Residential	B (65)	49	58	0	56	2
PD-028	1	Residential	B (65)	52	56	0	55	1
PD-029	1	Residential	B (65)	52	59	0	57	2
PD-030	1	Residential	B (65)	49	58	0	57	1
PD-031	1	Residential	B (65)	52	58	0	56	2
PD-032	1	Hotel	E (70)	60	67	0	66	1
PD-034	1	Restaurant	E (70)	60	65	0	64	1

Site ID [a]	Dwelling Unit/ Residential Equivalency [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	Modified LPA [f] (dBA)	Modified LPA Impacts [g]	24-foot Height NW16	Insertion Loss
PD-035	1	Restaurant	E (70)	70	67	0	66	1
	Total DU: 34				Total Impacts: 3		Benefit 5 or 6 dBA:	0
					Insertion Loss of 7 dBA or more:			0
					No Impact with Benefit:			0
					Total Impact Benefited:			0
					% Benefited:			0%
					Total Benefit:			0
					Acoustic Feasibility: simple majority of receiving 5 dBA reduction of impacted receptors:			No
					7 dBA Design Goal:			No
					Wall Determination: Feasible Yes or No?			**No**

a Receivers and noise wall shown on Figure 7-10 in the Noise and Vibration Technical Report.

b Number of residences or residential equivalents.

c Land use: Residential = single or multi-family; Commercial = commercial/office; Hotel = hotel/motel; Recreation = athletic field or playfield; Park, Trail are lands that are not considered noise sensitive

d Traffic noise impact criteria (ODOT Noise Abatement Approach Criteria)

e Existing modeled noise levels from Traffic Noise Model version 2.5 using existing 2019 traffic volumes and speeds. Exceedances of the ODOT NAAC show in **bold**.

f Future Modified LPA noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds. Exceedances of the ODOT NAAC impacts in **bold**. Substantial impacts of 10 dBA or more shown in gray highlights

g Number of impacts under Modified LPA.

Table K-17. ODOT Abatement Evaluation – Noise Wall 17

Site ID [a]	Dwelling Unit/ Residential Equivalency [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	Modified LPA [f] (dBA)	Modified LPA Impacts [g]	24-foot Height NW17	Insertion Loss
PD-060	1	Residential	B (65)	55	61	0	59	2
PD-061	1	Residential	B (65)	56	61	0	60	1
PD-062	1	Residential	B (65)	57	62	0	60	2
PD-063	1	Residential	B (65)	58	62	0	61	1
PD-064	1	Residential	B (65)	58	62	0	61	1
PD-065	1	Residential	B (65)	58	63	0	61	2
PD-066	1	Residential	B (65)	58	63	0	61	2
PD-067	1	Residential	B (65)	58	63	0	62	1
PD-067B	1	Residential	B (65)	57	60	0	59	1
PD-068	1	Residential	B (65)	56	62	0	60	2
PD-069	1	Residential	B (65)	56	62	0	60	2
PD-070	1	Residential	B (65)	59	63	0	62	1
PD-071	1	Residential	B (65)	59	64	0	62	2
PD-072	1	Residential	B (65)	59	64	0	62	2
PD-073	1	Residential	B (65)	59	64	0	62	2
PD-074	1	Residential	B (65)	60	64	0	62	2
PD-075	1	Residential	B (65)	60	64	0	63	1
PD-076	1	Residential	B (65)	58	63	0	61	2

Site ID [a]	Dwelling Unit/ Residential Equivalency [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	Modified LPA [f] (dBA)	Modified LPA Impacts [g]	24-foot Height NW17	Insertion Loss
PD-077	1	Residential	B (65)	61	**65**	1	63	2
PD-078	1	Residential	B (65)	61	**65**	1	63	2
PD-079	1	Residential	B (65)	61	**65**	1	63	2
PD-080	1	Residential	B (65)	61	**65**	1	64	1
PD-081	1	Residential	B (65)	61	**65**	1	64	1
PD-082	1	Residential	B (65)	62	**66**	1	64	2
PD-083	1	Residential	B (65)	59	64	0	62	2
PD-084	1	Residential	B (65)	62	**67**	1	65	2
PD-085	1	Residential	B (65)	62	**66**	1	65	1
PD-086	1	Residential	B (65)	62	**66**	1	65	1
PD-087	1	Residential	B (65)	62	**66**	1	65	1
PD-088	1	Residential	B (65)	63	**67**	1	66	1
PD-089	1	Residential	B (65)	63	**67**	1	66	1
PD-090	1	Residential	B (65)	63	**68**	1	66	2
PD-091	1	Residential	B (65)	61	**70**	1	69	1
PD-092	1	Residential	B (65)	64	**70**	1	69	1
PD-093	1	Residential	B (65)	64	**70**	1	69	1
PD-094	1	Residential	B (65)	64	**70**	1	69	1
PD-095	1	Residential	B (65)	64	**70**	1	69	1

Site ID [a]	Dwelling Unit/ Residential Equivalency [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	Modified LPA [f] (dBA)	Modified LPA Impacts [g]	24-foot Height NW17	Insertion Loss
	Total DU: 37				Total Impacts: 18		Benefit 5 to 6 dBA:	0
					Insertion Loss of 7 dBA or more:			0
					No Impact with Benefit:			0
					Total Impact Benefited:			0
					% Benefited:			0%
					Total Benefit:			0
					Acoustic Feasibility: simple majority of receiving 5 dBA reduction of impacted receptors:			No
					7 dBA Design Goal:			No
					Wall Determination: Feasible Yes or No? No			

a Receivers and noise wall shown on Figure 7-10 in the Noise and Vibration Technical Report.

b Number of residences or residential equivalents.

c Land use: Residential = single or multi-family; Commercial = commercial/office; Hotel = hotel/motel; Recreation = athletic field or playfield; Park, Trail are lands that are not considered noise sensitive

d Traffic noise impact criteria (ODOT Noise Abatement Approach Criteria)

e Existing modeled noise levels from Traffic Noise Model version 2.5 using existing 2019 traffic volumes and speeds. Exceedances of the ODOT NAAC show in **bold**.

f Future Modified LPA noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds. Exceedances of the ODOT NAAC impacts in **bold**.

g Number of impacts under Modified LPA.

Table K-18. ODOT Abatement Evaluation – Noise Wall 18

Site ID [a]	Dwelling Unit/ Residential Equivalency [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	Modified LPA [f] (dBA)	Modified LPA Impacts [g]	12 to 16-foot-tall NW18 [h]	Insertion Loss
PD-144A	1	Multi-Family	B (65)	53	56	0	47	9
PD-144B	1	Multi-Family	B (65)	54	56	0	50	6
PD-144C	1	Multi-Family	B (65)	55	57	0	54	3
PD-147A	2	Multi-Family	B (65)	49	50	0	50	0
PD-147B	2	Multi-Family	B (65)	50	52	0	51	1
PD-147C	2	Multi-Family	B (65)	52	54	0	54	0
PD-148A	2	Multi-Family	B (65)	49	50	0	49	1
PD-148B	2	Multi-Family	B (65)	50	51	0	51	0
PD-148C	2	Multi-Family	B (65)	52	54	0	53	1
PD-149A	2	Multi-Family	B (65)	48	49	0	48	1
PD-149B	2	Multi-Family	B (65)	49	51	0	50	1
PD-149C	2	Multi-Family	B (65)	51	53	0	53	0
PD-155A	2	Multi-Family	B (65)	59	61	0	53	8
PD-155B	2	Multi-Family	B (65)	60	61	0	55	6
PD-155C	2	Multi-Family	B (65)	60	62	0	58	4
PD-156A	2	Multi-Family	B (65)	54	56	0	48	8

Site ID [a]	Dwelling Unit/ Residential Equivalency [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	Modified LPA [f] (dBA)	Modified LPA Impacts [g]	12 to 16-foot-tall NW18 [h]	Insertion Loss
PD-156B	2	Multi-Family	B (65)	55	57	0	51	6
PD-156C	2	Multi-Family	B (65)	56	58	0	55	3
PD-157A*	1	Multi-Family	B (65)	**65**	**67**	1	60	7
PD-157B	1	Multi-Family	B (65)	**66**	**67**	1	65	2
PD-157C	1	Multi-Family	B (65)	**66**	**68**	1	66	2
PD-158A*	1	Multi-Family	B (65)	**65**	**67**	1	60	7
PD-158B	1	Multi-Family	B (65)	**66**	**68**	1	65	3
PD-158C	1	Multi-Family	B (65)	**66**	**68**	1	67	1
PD-159A*	1	Multi-Family	B (65)	**65**	**67**	1	60	7
PD-159B	1	Multi-Family	B (65)	**66**	**68**	1	66	2
PD-159C	1	Multi-Family	B (65)	**67**	**68**	1	67	1
PD-160A*	1	Multi-Family	B (65)	**66**	**68**	1	59	9
PD-160B	1	Multi-Family	B (65)	**66**	**68**	1	66	2
PD-160C	1	Multi-Family	B (65)	**67**	**69**	1	68	1
PD-161A*	1	Multi-Family	B (65)	**66**	**68**	1	59	9
PD-161B	1	Multi-Family	B (65)	**67**	**69**	1	66	3
PD-161C	1	Multi-Family	B (65)	**67**	**69**	1	68	1

Site ID [a]	Dwelling Unit/ Residential Equivalency [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	Modified LPA [f] (dBA)	Modified LPA Impacts [g]	12 to 16-foot-tall NW18 [h]	Insertion Loss
PD-162A	2	Multi-Family	B (65)	57	60	0	52	8
PD-162B	2	Multi-Family	B (65)	58	61	0	58	3
PD-162C	2	Multi-Family	B (65)	62	64	0	63	1
PD-163A	2	Multi-Family	B (65)	62	64	0	53	11
PD-163B	2	Multi-Family	B (65)	63	**65**	2	61	4
PD-163C	2	Multi-Family	B (65)	63	**65**	2	64	1
PD-164A	1	Multi-Family	B (65)	52	53	0	53	0
PD-164B	1	Multi-Family	B (65)	54	54	0	54	0
PD-164C	1	Multi-Family	B (65)	55	57	0	57	0
PD-165A	1	Multi-Family	B (65)	52	53	0	53	0
PD-165B	1	Multi-Family	B (65)	53	54	0	54	0
PD-165C	1	Multi-Family	B (65)	54	57	0	57	0
PD-166A	1	Multi-Family	B (65)	51	52	0	52	0
PD-166B	1	Multi-Family	B (65)	53	54	0	54	0
PD-166C	1	Multi-Family	B (65)	54	56	0	56	0
PD-167A	2	Multi-Family	B (65)	62	64	0	53	11
PD-167B	2	Multi-Family	B (65)	62	64	0	60	4

Site ID [a]	Dwelling Unit/ Residential Equivalency [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	Modified LPA [f] (dBA)	Modified LPA Impacts [g]	12 to 16-foot-tall NW18 [h]	Insertion Loss
PD-167C	2	Multi-Family	B (65)	63	**65**	2	63	2
PD-168A*	1	Multi-Family	B (65)	**68**	**70**	1	61	9
PD-168B	1	Multi-Family	B (65)	**68**	**70**	1	69	1
PD-168C	1	Multi-Family	B (65)	**68**	**70**	1	70	0
PD-169A*	1	Multi-Family	B (65)	**69**	**71**	1	61	10
PD-169B	1	Multi-Family	B (65)	**69**	**71**	1	70	1
PD-169C	1	Multi-Family	B (65)	**69**	**71**	1	70	1
PD-170A*	1	Multi-Family	B (65)	**69**	**71**	1	62	9
PD-170B	1	Multi-Family	B (65)	**69**	**71**	1	70	1
PD-170C	1	Multi-Family	B (65)	**69**	**71**	1	70	1
PD-171A*	1	Multi-Family	B (65)	**69**	**71**	1	61	10
PD-171B	1	Multi-Family	B (65)	**69**	**71**	1	70	1
PD-171C	1	Multi-Family	B (65)	**69**	**71**	1	71	0
PD-172A*	1	Multi-Family	B (65)	**69**	**71**	1	61	10
PD-172B	1	Multi-Family	B (65)	**69**	**71**	1	70	1
PD-172C	1	Multi-Family	B (65)	**69**	**71**	1	70	1
PD-173A*	2	Multi-Family	B (65)	64	**65**	2	55	10

Site ID [a]	Dwelling Unit/ Residential Equivalency [b]	Land Use [c]	Criteria [d]	Existing [e] (dBA)	Modified LPA [f] (dBA)	Modified LPA Impacts [g]	12 to 16-foot-tall NW18 [h]	Insertion Loss
PD-173B	2	Multi-Family	B (65)	63	**65**	2	61	4
PD-173C	2	Multi-Family	B (65)	64	**65**	2	63	2
	Total DU: 96				Total Impacts: 12		Benefit:	28
					Insertion Loss of 5 to 6 dBA:			5
					Insertion Loss of 7 dBA or more:			23
					No Impact with Benefit:			16
					Total Impact Benefited:			12
					% Benefited:			100%
					Total Benefit:			28
					Acoustic Feasibility: simple majority of receiving 5 dBA reduction of impacted receptors:			Yes
					7 dBA Design Goal:			Yes
					Wall Determination: Feasible Yes or No?			**Yes**

(*) denotes first row impacted receiver in noise wall evaluation.

a Receivers and noise wall shown on Figure 7-11 in the Noise and Vibration Technical Report.

b Number of residences or residential equivalents.

c Land use: Residential = single or multi-family; Commercial = commercial/office; Hotel = hotel/motel; Recreation = athletic field or playfield; Park, Trail are lands that are not considered noise sensitive

d Traffic noise impact criteria (ODOT Noise Abatement Approach Criteria)

e Existing modeled noise levels from Traffic Noise Model version 2.5 using existing 2019 traffic volumes and speeds. Exceedances of the ODOT NAAC show in **bold**.

f Future Modified LPA noise levels from FHWA Traffic Noise Model using future 2045 traffic volumes and speeds. Exceedances of the ODOT NAAC impacts in **bold**.

g Number of impacts under Modified LPA.

Table K-19. ODOT Reasonableness Evaluation – Noise Wall 18

Barrier Height (Feet)	Square Feet	Square Feet/Benefitted Rec	Total Wall Cost	Cost per Benefitted Rec	Acoustically Feasible?	Cost Reasonable?
12 to 16	14,559	520	$436,770	$15,599	Yes	Yes

Notes on ODOT Cost Effectiveness Criteria:

ODOT unit cost per square foot for noise walls up to 16 feet tall = $30.00.

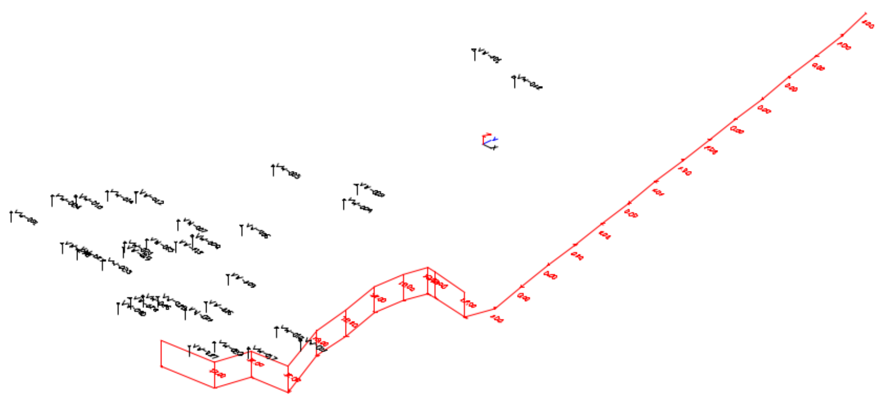
ODOT maximum cost per benefitted residence, $37,500.

Appendix L

TRAFFIC NOISE MODELING NOISE WALL GRAPHICS

Appendix L contains traffic noise modelling (TNM) noise wall graphics for the 15 locations evaluated for noise wall placement that met the criteria for a feasible noise wall.

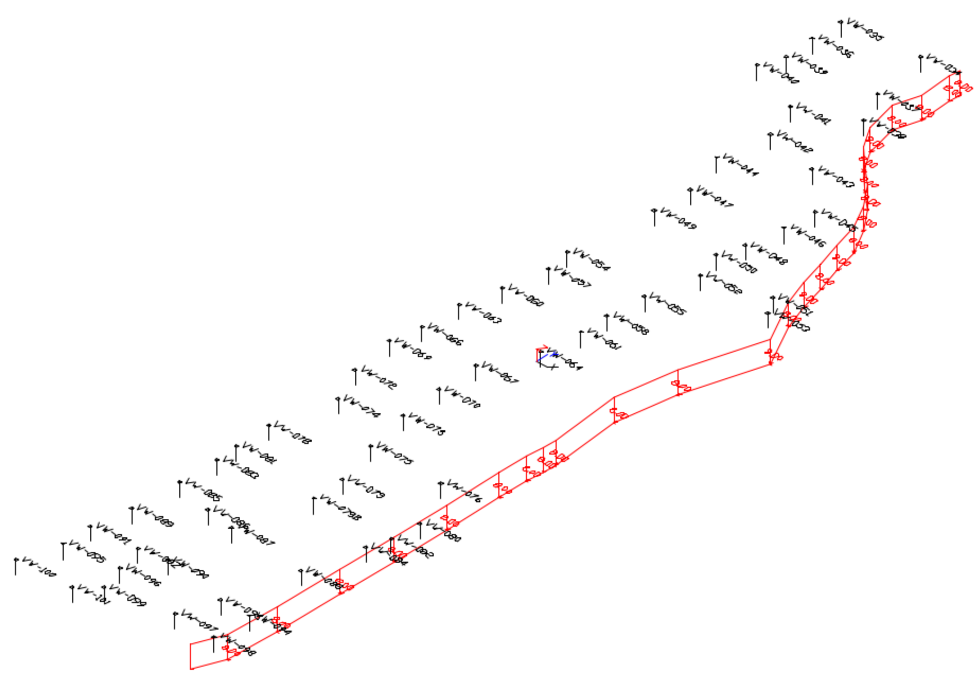
Figure L-1. TNM Noise Wall Graphic – Noise Wall 1



North Wash PM Build V10_NW1	Sheet 1 of 1	29 Jun 2023
	WSP	
Barrier View-NW1 - 10ft x 897ft length	Project/Contract No. IBR	
Run name: N Wash PM Build V10_NW1 (D)	TNM Version 2.5, Feb 2004	
Scale: <DNA - due to perspective>	Analysis By: Snow Romero	

Roadway:	⟶	Ground Zone:	polygon
Receiver:	□	Tree Zone:	dashed polygon
Barrier:	├⟶	Contour Zone:	polygon
Building Row:	— —	Parallel Barrier:	═
Terrain Line:	——	Skew Section:	— ⟶

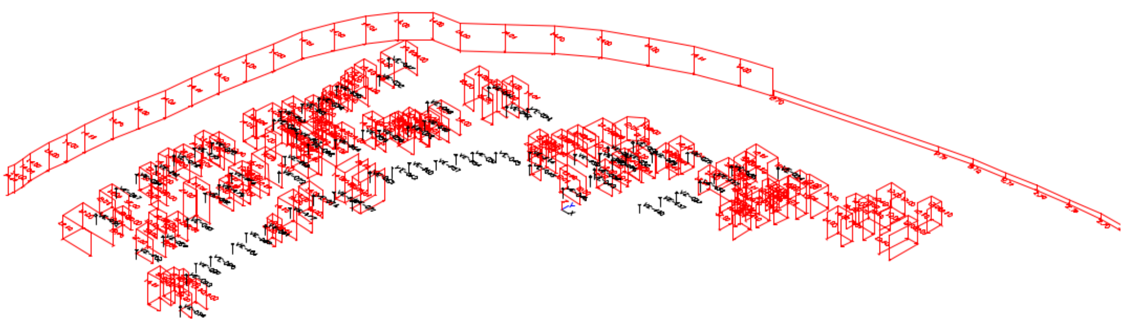
Figure L-2. TNM Noise Wall Graphic – Noise Wall 2 (labled Noise Wall 3 in TNM)



North Wash PM Build V10_NW3_5_7	Sheet 1 of 1	29 Jun 2023
	WSP	
Barrier View-NW3 - 8ft	Project/Contract No. IBR	
Run name: N Wash PM Build V10_NW3_5_7	TNM Version 2.5, Feb 2004	
Scale: <DNA - due to perspective>	Analysis By: Snow Romero	

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

Figure L-3. TNM Noise Wall Graphic – Noise Wall 3 (labeled Noise Wall 4 in TNM)



North Wash PM Build V10_NW4_6_8	Sheet 1 of 1	29 Jun 2023
	WSP	
Barrier View-Barrier 4-14ft	Project/Contract No. IBR	
Run name: N Wash PM Build V10_NW4_6_8	TNM Version 2.5, Feb 2004	
Scale: <DNA - due to perspective>	Analysis By: Snow Romero	

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

Figure L-4. TNM Noise Wall Graphic – Noise Wall 4 (labeled Noise Wall 5 in TNM)

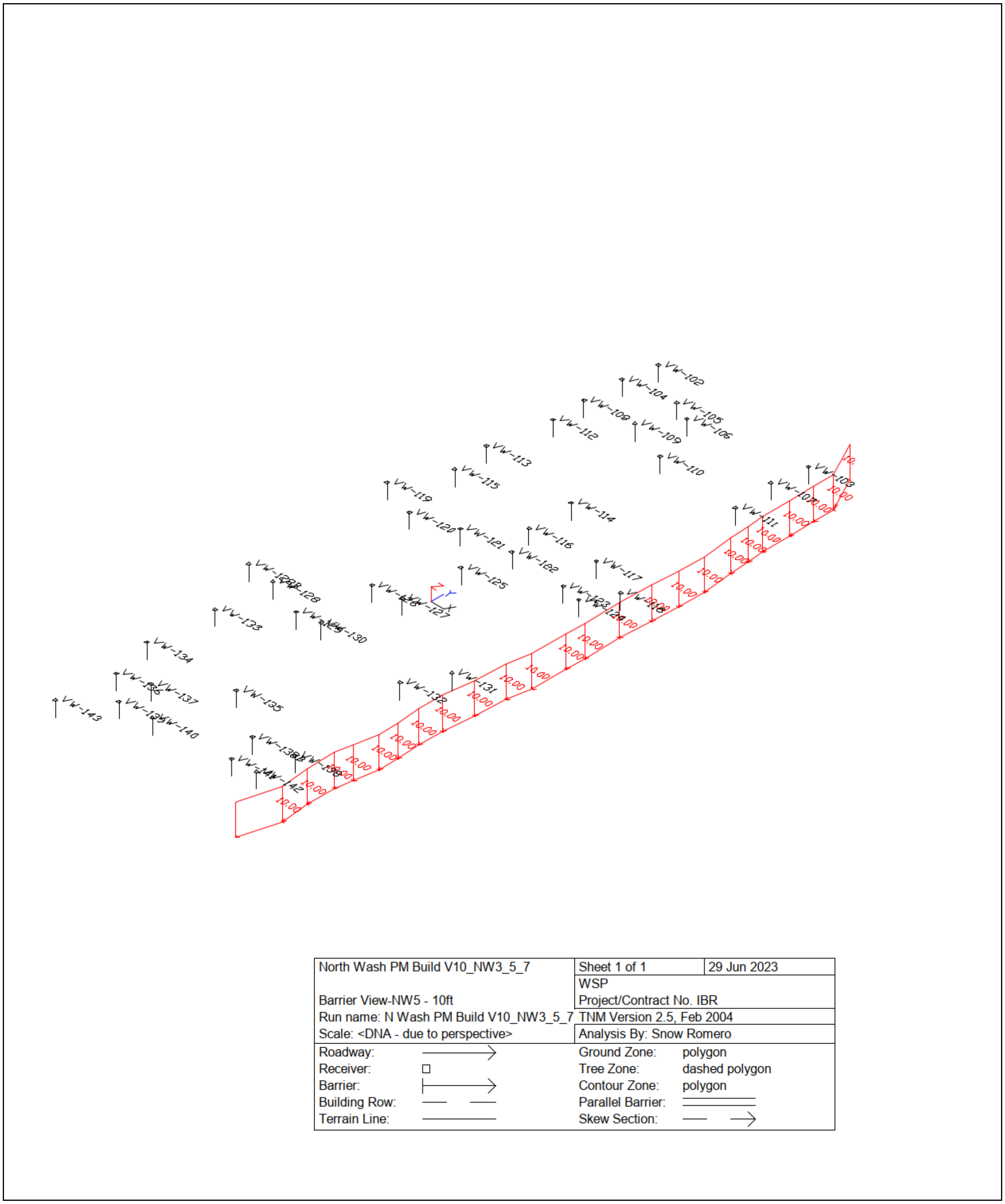


Figure L-5. TNM Noise Wall Graphic – Noise Wall 5 (labeled Noise Wall 6 in TNM)

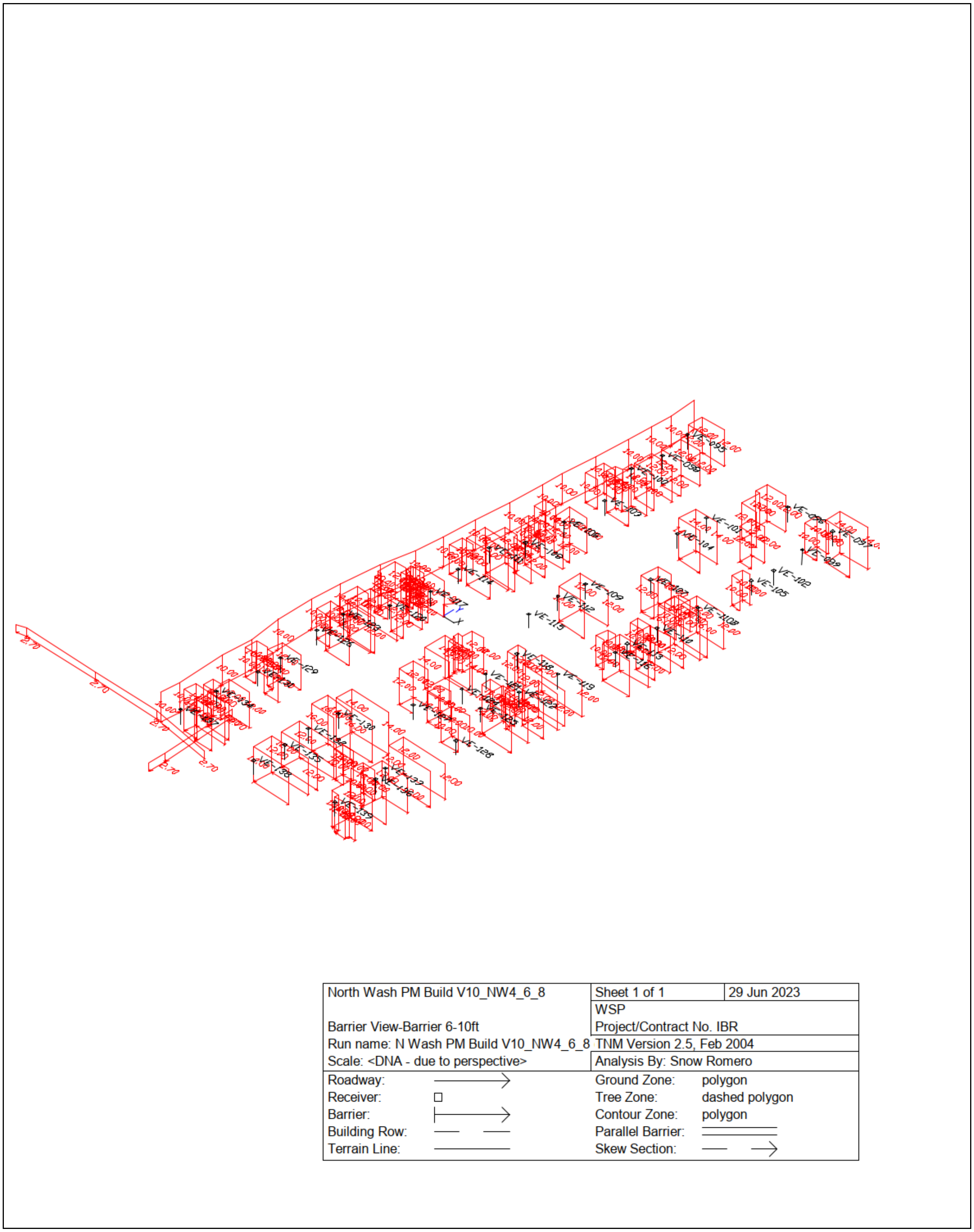


Figure L-6. TNM Noise Wall Graphic – Noise Wall 6 (labeled Noise Wall 7 in TNM)

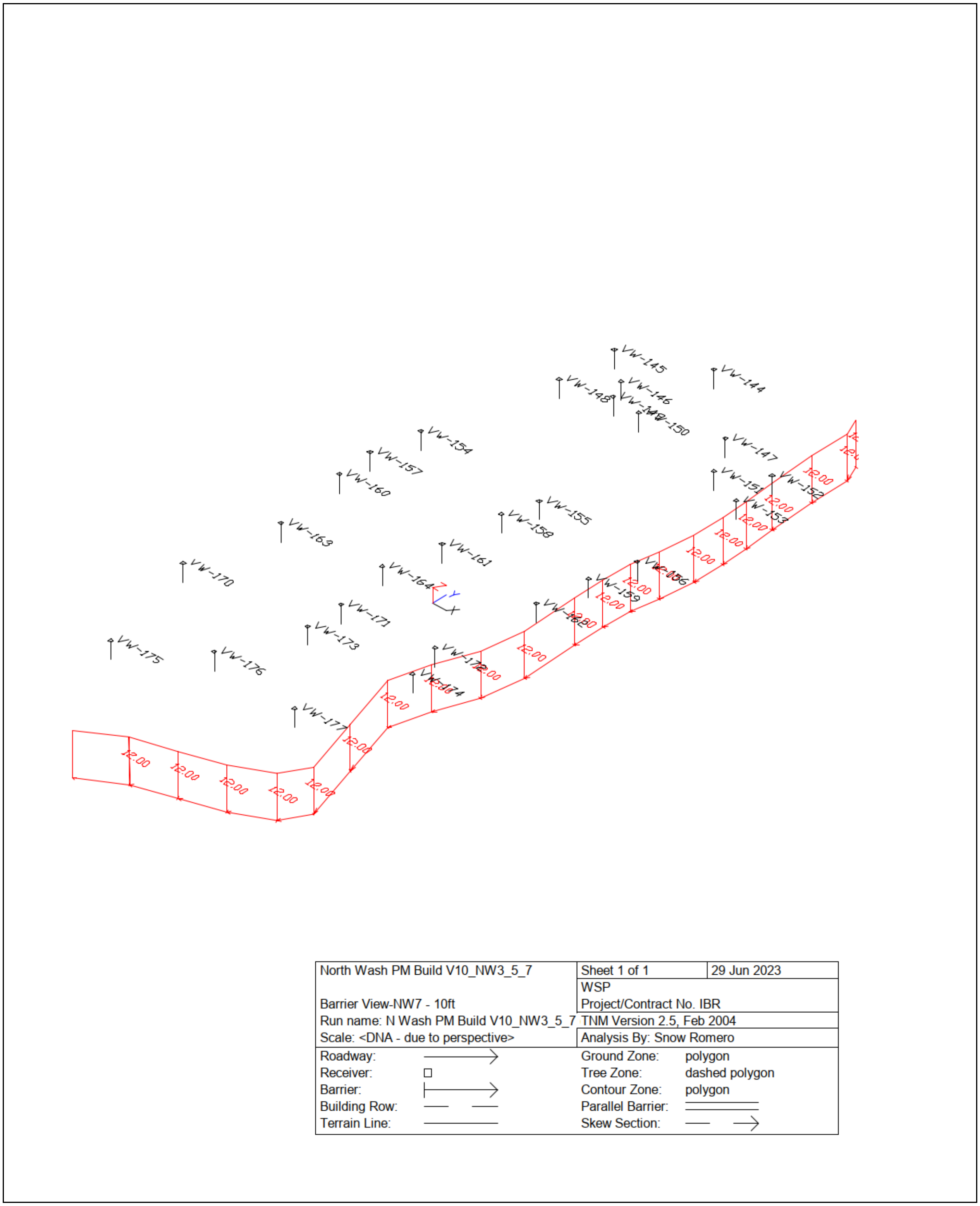
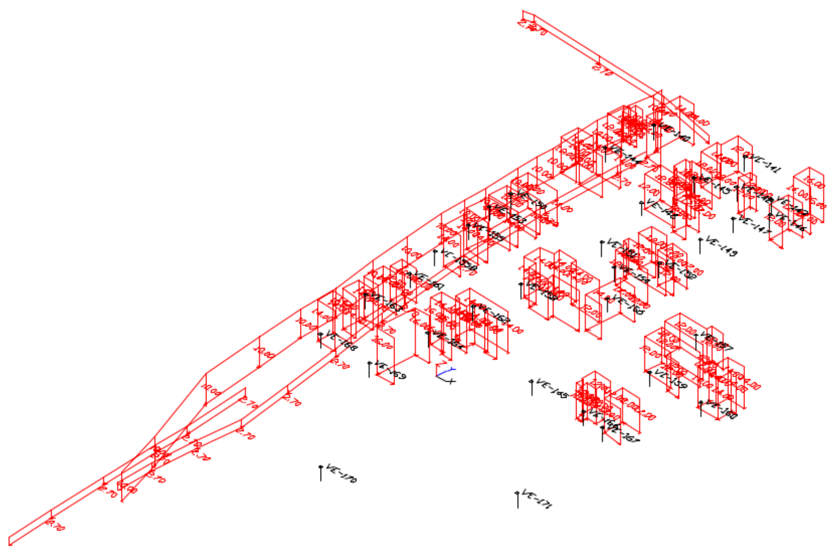
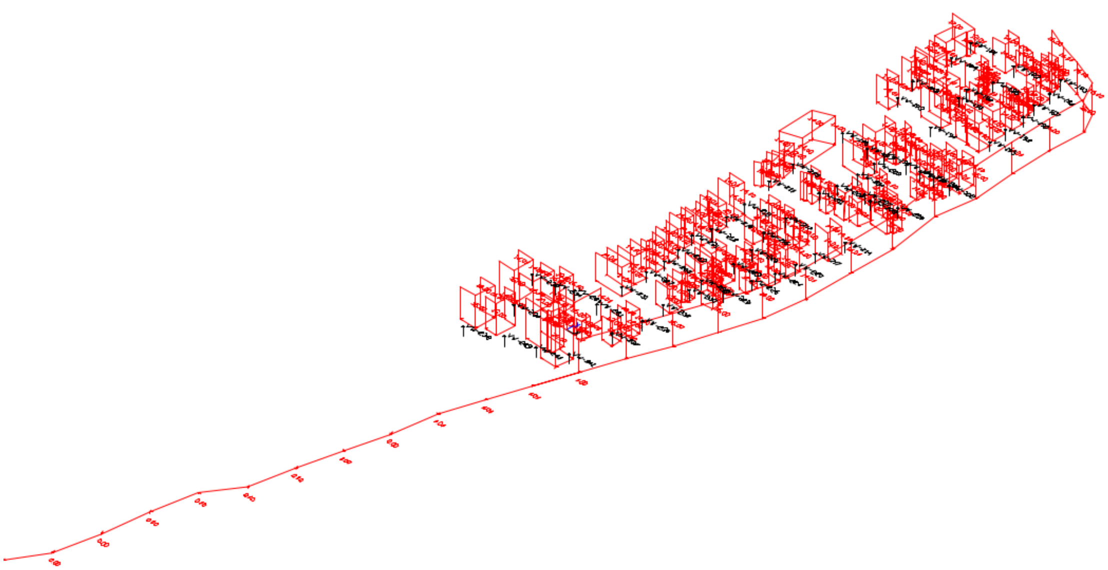


Figure L-7. TNM Noise Wall Graphic – Noise Wall 7 (labeled as Noise Wall 8 in TNM)



North Wash PM Build V10_NW4_6_8		Sheet 1 of 1	29 Jun 2023
		WSP	
Barrier View-Barrier 8-10ft		Project/Contract No. IBR	
Run name: N Wash PM Build V10_NW4_6_8		TNM Version 2.5, Feb 2004	
Scale: <DNA - due to perspective>		Analysis By: Snow Romero	
Roadway:	——→	Ground Zone:	polygon
Receiver:	□	Tree Zone:	dashed polygon
Barrier:	├——→	Contour Zone:	polygon
Building Row:	—— ——	Parallel Barrier:	═══
Terrain Line:	————	Skew Section:	—— ——→

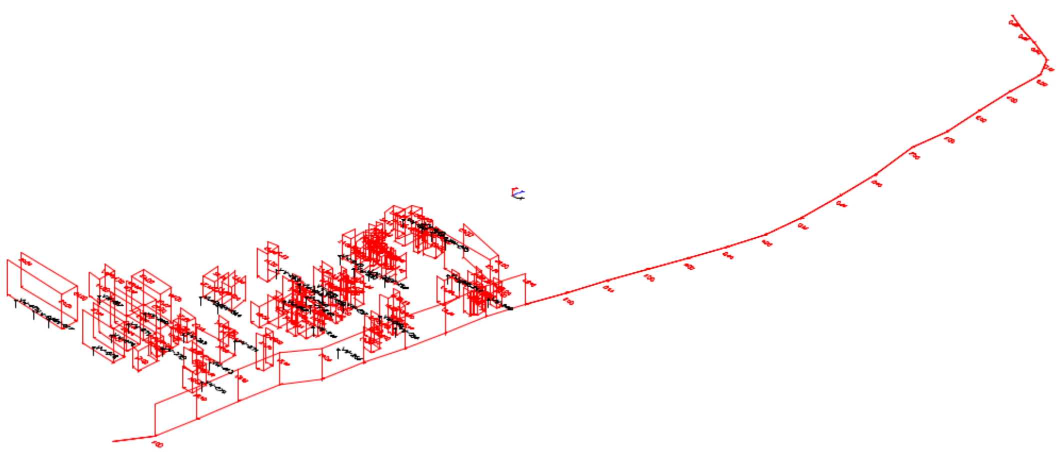
Figure L-8. TNM Noise Wall Graphic – Noise Wall 8 (North Half of Noise Wall 9 in TNM)



Wash South - Build PM - V6 - NW9_10	Sheet 1 of 1	29 Jun 2023
	WSP	
Barrier View-Bar9-North--16ft	Project/Contract No. IBR	
Run name: S Wash_Build PM_V6_NW9_10 (	TNM Version 2.5, Feb 2004	
Scale: <DNA - due to perspective>	Analysis By: KSnow Romero	

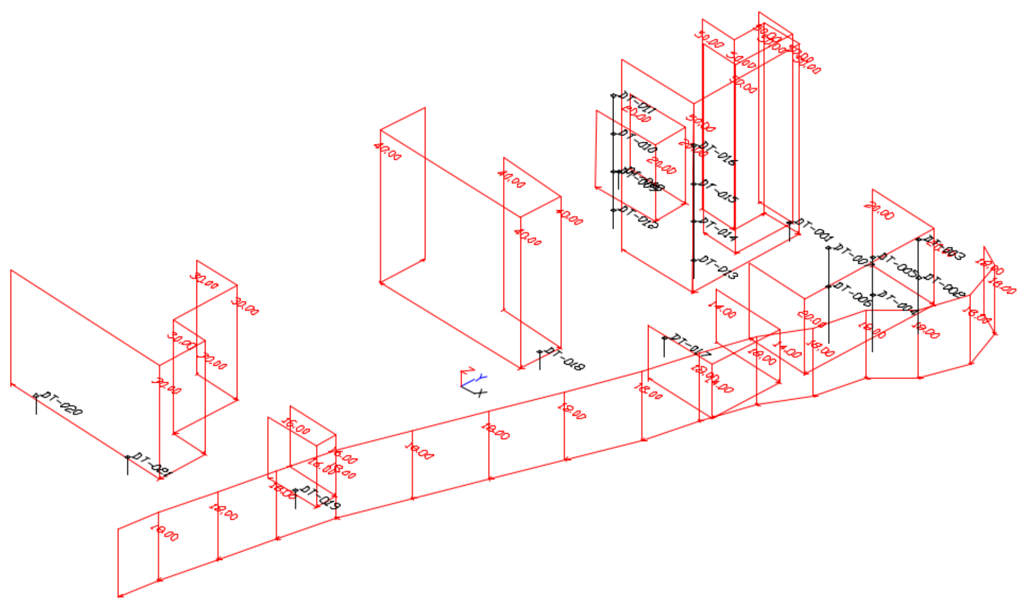
Roadway:	⟶	Ground Zone:	polygon
Receiver:	□	Tree Zone:	dashed polygon
Barrier:	├⟶	Contour Zone:	polygon
Building Row:	— —	Parallel Barrier:	═
Terrain Line:	——	Skew Section:	— ⟶

Figure L-9. TNM Noise Wall Graphic – Noise Wall 9



Wash South - Build PM - V6 - NW9_10	Sheet 1 of 1	29 Jun 2023
	WSP	
Barrier View-Bar9-South-18ft	Project/Contract No. IBR	
Run name: S Wash_Build PM_V6_NW9_10 (	TNM Version 2.5, Feb 2004	
Scale: <DNA - due to perspective>	Analysis By: KSnow Romero	
Roadway:	Ground Zone:	polygon
Receiver:	Tree Zone:	dashed polygon
Barrier:	Contour Zone:	polygon
Building Row:	Parallel Barrier:	
Terrain Line:	Skew Section:	

Figure L-10. TNM Noise Wall Graphic – Noise Wall 11



S Wash_Build PM_V6_NW11	Sheet 1 of 1 — 29 Jun 2023
	WSP
Barrier View-NW11 - 18ft	Project/Contract No. IBR
Run name: S Wash_Build PM_V6_NW11 (D)	TNM Version 2.5, Feb 2004
Scale: <DNA - due to perspective>	Analysis By: KSnow
Roadway: →	Ground Zone: polygon
Receiver: □	Tree Zone: dashed polygon
Barrier: ├→	Contour Zone: polygon
Building Row: — —	Parallel Barrier: ═
Terrain Line: —	Skew Section: — →

Figure L-11. TNM Noise Wall Graphic – Noise Wall 11A

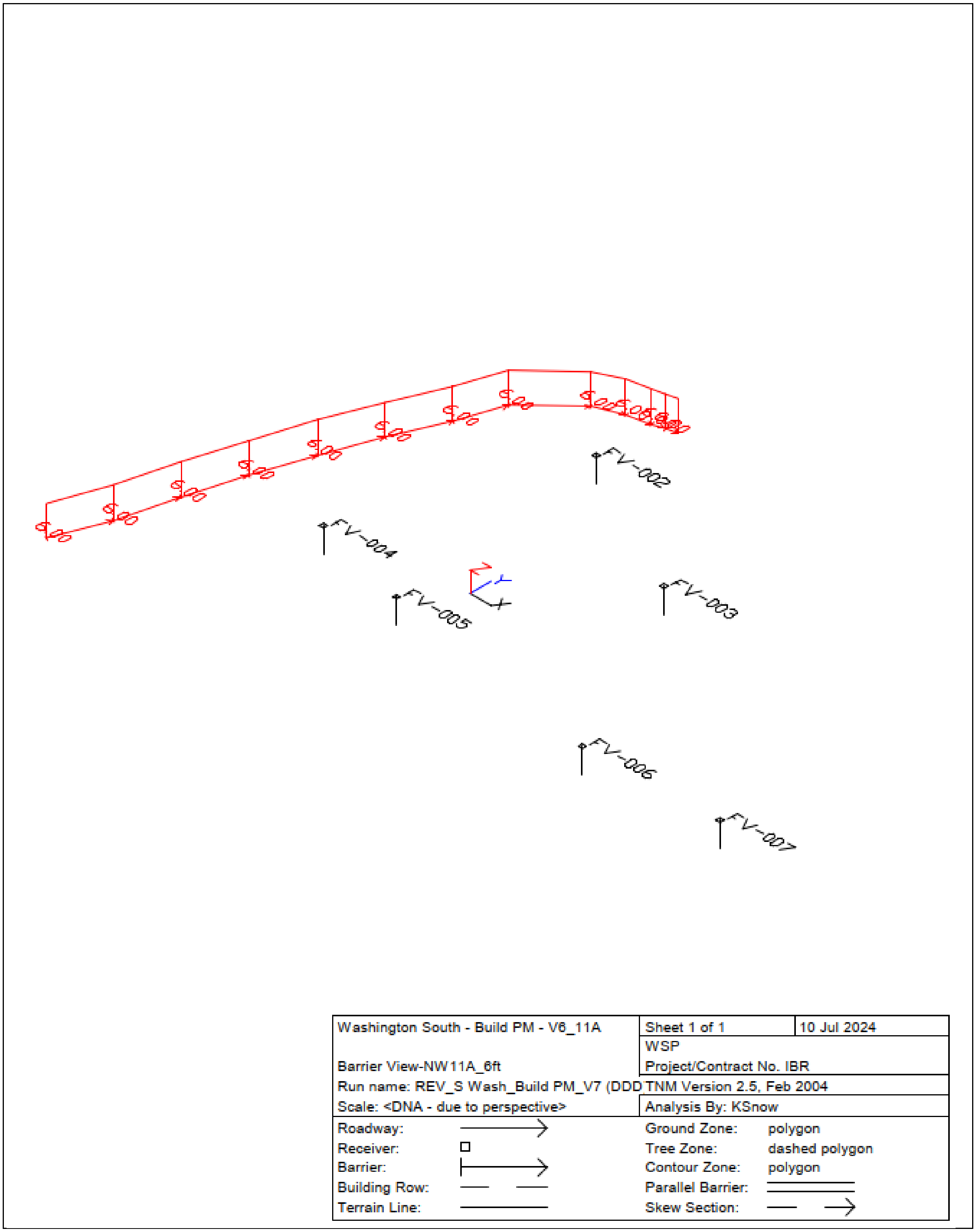


Figure L-12. TNM Noise Wall Graphic – Noise Wall 12

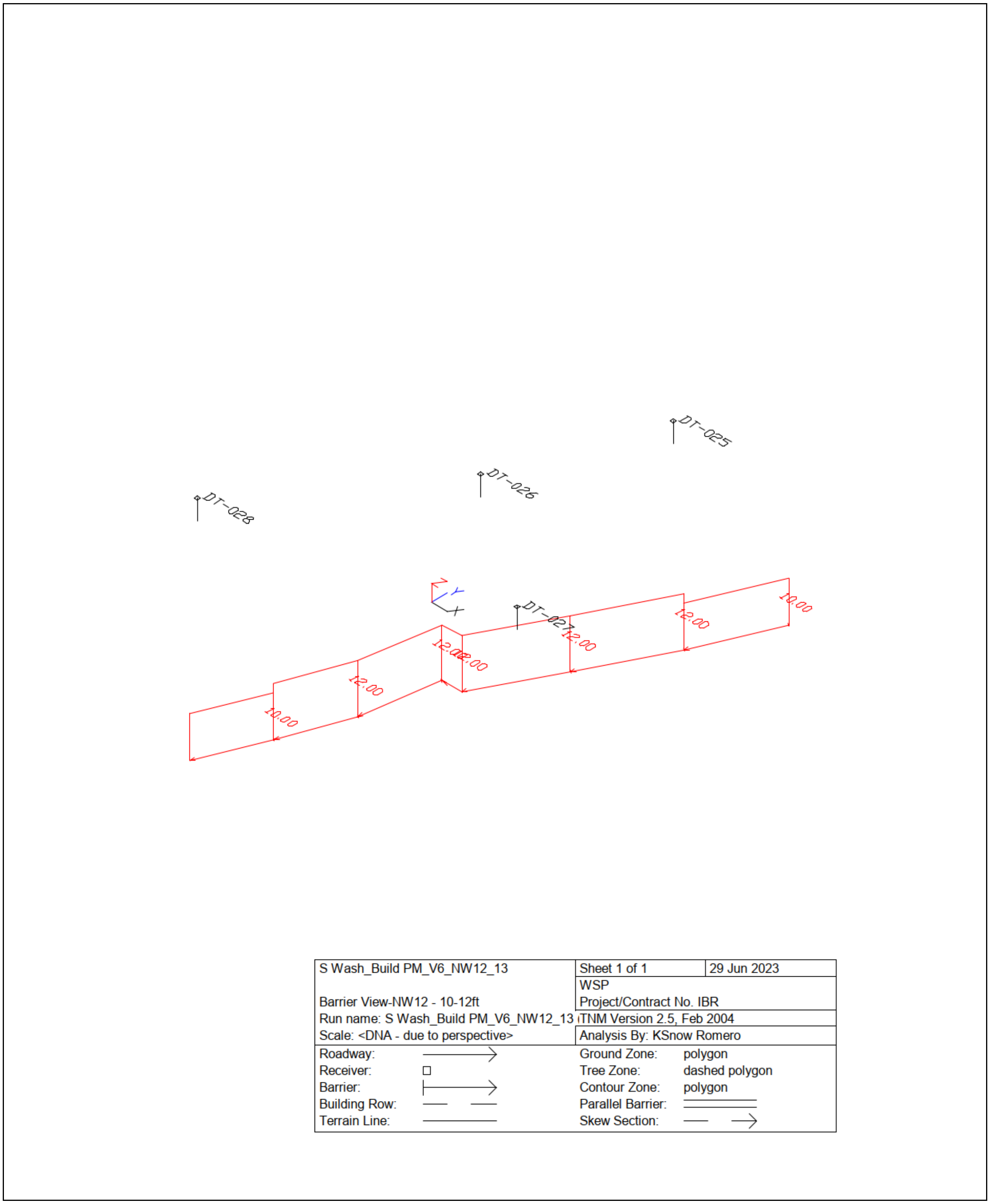


Figure L-13. TNM Noise Wall Graphic – Noise Wall 14

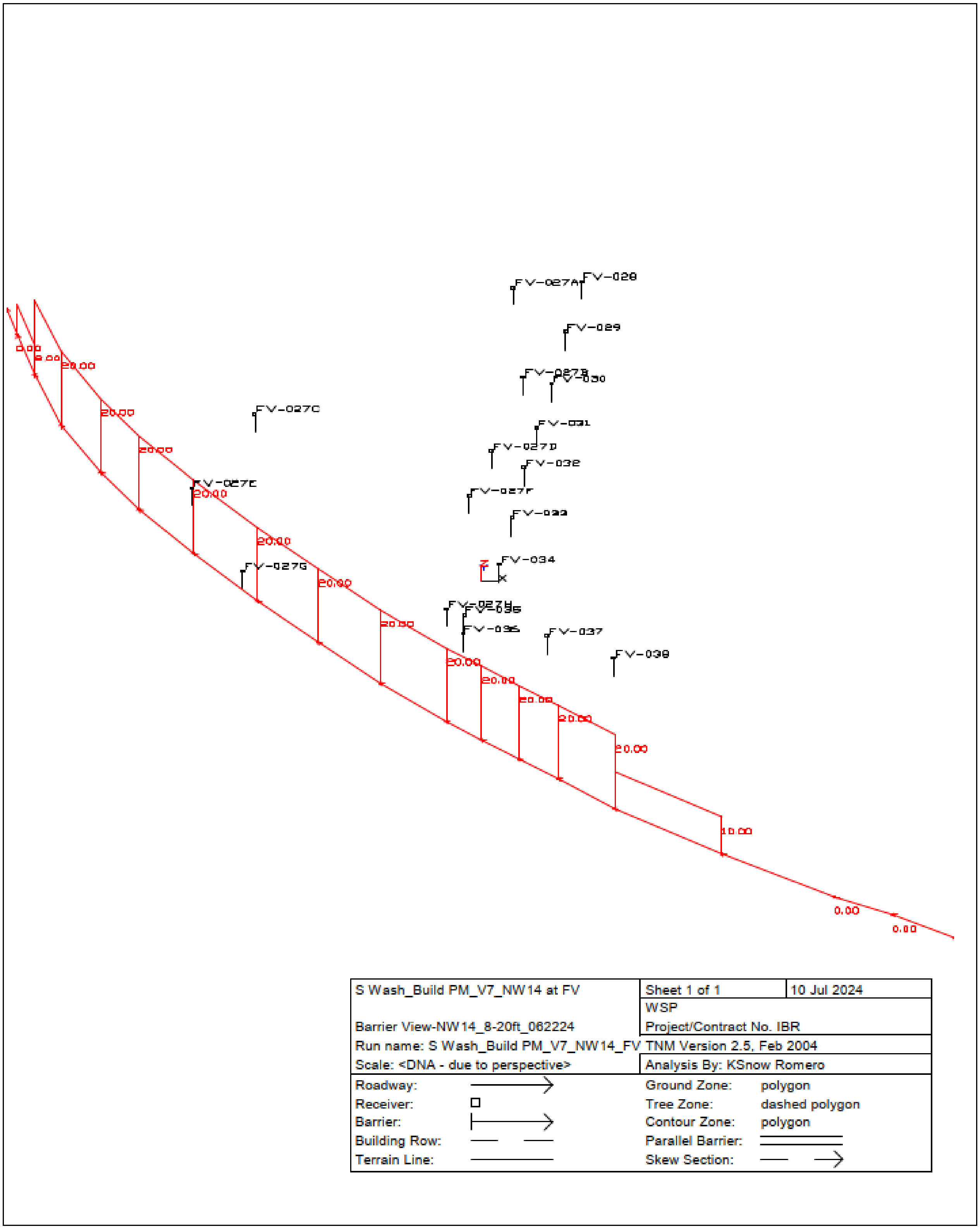
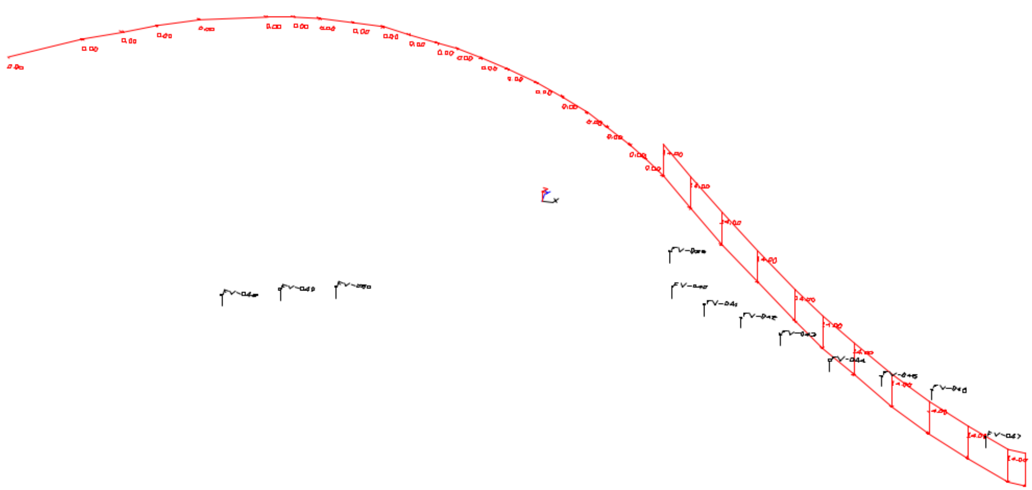
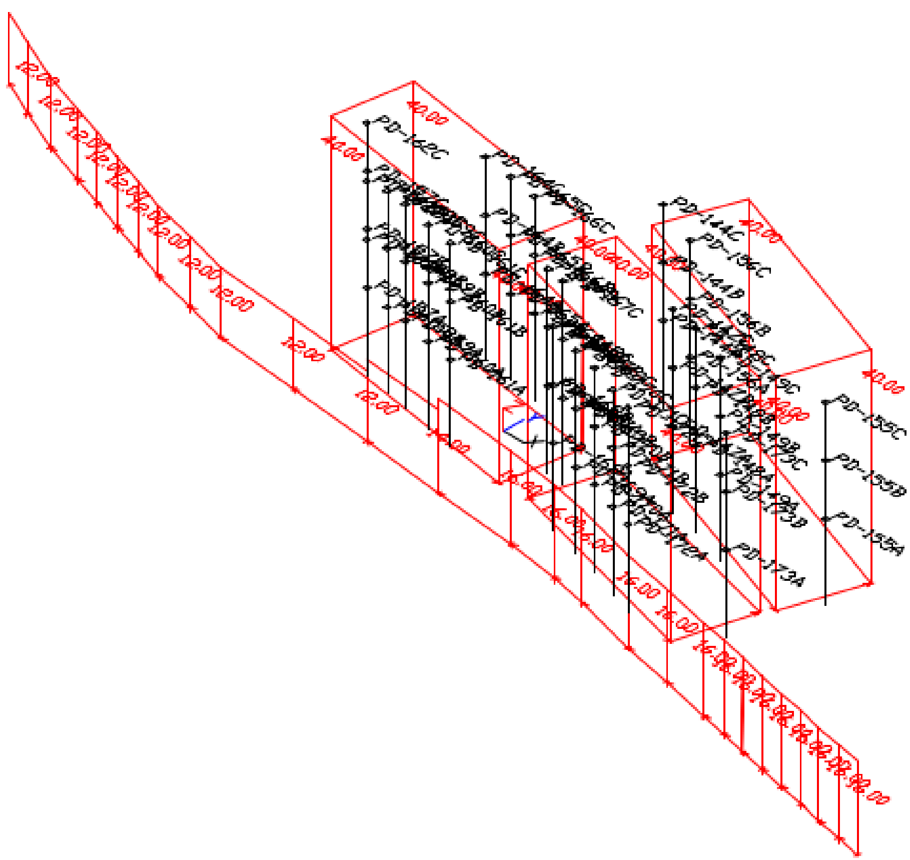


Figure L-14. TNM Noise Wall Graphic – Noise Wall 15



S Wash_Build PM_V6_NW14_15		Sheet 1 of 1	29 Jun 2023
		WSP	
Barrier View-NW15 - 14ft x 1,041ft		Project/Contract No. IBR	
Run name: S Wash_Build PM_V6_NW14_15		TNM Version 2.5, Feb 2004	
Scale: <DNA - due to perspective>		Analysis By: KSnow	
Roadway:	⟶	Ground Zone:	polygon
Receiver:	□	Tree Zone:	dashed polygon
Barrier:	├⟶	Contour Zone:	polygon
Building Row:	— —	Parallel Barrier:	═
Terrain Line:	—	Skew Section:	— ⟶

Figure L-15. TNM Noise Wall Graphic – Noise Wall 18



IBR Oregon Build PM_V6_NW18	Sheet 1 of 1 / 10 Jul 2024
	WSP
Barrier View-NW18 - 12-16ft GF only	Project/Contract No.
Run name: REV_Oregon_Build PM_V6_NW1	TNM Version 2.5, Feb 2004
Scale: <DNA - due to perspective>	Analysis By: Snow Romero
Roadway:	Ground Zone: polygon
Receiver:	Tree Zone: dashed polygon
Barrier:	Contour Zone: polygon
Building Row:	Parallel Barrier:
Terrain Line:	Skew Section:

Appendix M

FTA MODELING FILES

Appendix M contains Federal Transit Administration noise and vibration modeling files used to assess transit-related noise and vibration for the IBR Project. The IBR Transit Noise Assessment occurred on June 5, 2023.

Table M-1. Wayside Transit Noise Predictions – Light Rail Transit

Receiver #	Location of Receiver	Receiver Type	Address of Receiver	Transit Facility	Approximate Distance (ft)	Elevation of Receiver (ft)	Elevation of Transit Facility (ft)	Slant Distance	Speed (mph)	Existing Ldn	Passby Noise Level at Receiver	Project Ldn	Moderate Impact	Severe Impact	Impact (Y/N)	Type of Track (direct fixation, ballast & tie, embedded, other?)	Near Special Trackwork? (Yes/No)
LRT-1	E 7th St./E C St.	MFR	316 E 7th St Vancouver, WA 98660	Track	46	46	43	46.1	29	83	77	67	66	76	Y	Direct Fixation	Yes
LRT-2	E 7th St./E C St.	Commercial	601 Broadway St Vancouver, WA 98660	Track	60	85	57	66.2	29	80	75	65	66	76	N	Direct Fixation	Yes
LRT-3	Hayden Island Houseboats	SFR/5 house boats	1625 N. Jantzen Ave.	Track	40	3	65	73.8	23	77	73	65	66	75	N	Direct Fixation	No

Reference Passby Noise Level 79.1 dBA@40 mph @50 feet

Table M-2. Wayside Transit Noise Predictions – Park and Rides

Receiver #	Location of Receiver	Receiver Type	Address of Receiver	Transit Facility	Approximate Distance (ft)	Daytime Autos / hour	Nighttime Autos / hour	Daytime Buses	Nighttime Buses	Existing Ldn	Project Ldn	Moderate Impact	Severe Impact	Impact (Y/N)
PNR-1b	400 Washington St	MFR	400 Washington St	Park and Ride-1b	75	62	16	12	4	68	61	63	73	N
PNR-1c	400 Washington St	MFR	400 Washington St	Park and Ride-1c	75	62	16	12	4	68	61	63	73	N
PNR-2b	E 7th St./E C St.	MFR	E 7th St./E C St.	Park and Ride-2b	75	62	16	12	4	83	61	66	76	N
PNR-2b	E 6th St./E C St.	Hotel	E 6th St./E C St.	Park and Ride-2b	75	62	16	12	4	80	61	66	76	N

Table M-3. Wayside Transit Noise Predictions – Operations and Maintenance Facility

Receiver #	Location of Receiver	Receiver Type	Address of Receiver	Transit Facility	Approximate Distance (ft)	Existing Ldn	Project Ldn	Moderate Impact	Severe Impact	Impact (Y/N)
OMF-1	Gresham/Maintenance Facility	SFR	Southeast 202nd Ave (Gresham)	O&M Yard	250	61	56	59	64	N
OMF-2	Gresham/Maintenance Facility	SFR	Southeast 196th Ave (Portland)	O&M Yard	700 (beyond screening distance)	N/A	N/A	N/A	N/A	N/A
OMF-3	Gresham/Maintenance Facility	SFR	Mobile Park Plaza, 19776 Southeast Stark St (Portland)	O&M Yard	1200 (beyond screening distance)	N/A	N/A	N/A	N/A	N/A

Table M-4. Transit Vibration Predictions

Receiver						Distance to Track							Track Conditions												Vibration Predictions (No Mitigation)			
ID label	Location	FTA Category (drop-down menu)	Receiver Type	Address of Receiver	Transit Facility	Horiz. dist. Near track (ft)	Horiz. dist. between tracks (ft)	Horiz. Dist. Far Track (ft)	Lv @ 50 mph (13)	-106log (D)	-2.32log (D2)	-.87log (D3)	Crossover Type	Crossover Distance (ft)	Train Speed (mph)	Track Type	Track Adjustment from DF	Speed Adjustment (15)	Aerial Track Adjustment? (-5)	Structural Coupling Loss (-10)	Special Trackwork Adjustment (10)	Safety Factor (3)	Krad (0)	Building Coupling Loss	Overall Level (VdB)	Criteria	Exceeds?	Amt Exceeds
LRV-1	E 7th St./E C St.	2 - residential	MFR	316 E 7th St Vancouver, WA 98660	Track	46	15	61	74	-2	-6	-4	None located in area	None located in area	50	Direct Fixation	0	0.0	0.0	-10	0.0	3	0	0	77	72	Y	5
LRV-2	E 8th St/ E C St.	3-institutional	Mixed Use Building w/Theater and Café	801 C St Vancouver, WA 98660	Track	60	15	75	72	-2	-7	-5	Crossover	115	50	Direct Fixation	0	0.0	0.0	-10	6.4	3	0	0	81	75	Y	6
LRV-3	Hayden Island Houseboats	2 - residential	SFR	Hayden Island Houseboats	Track	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	72	N/A	N/A
LRV-4	601 Broadway, Vancouver	Hotel	Hotel	Econo Lodge 601 Broadway, Vancouver	Track	110	15	125	67	-2	-10	-7	None located in area	None located in area	50	Direct Fixation	0	0.0	0.0	-10	0.0	3	0	0	70	72	N/A	N/A

N/A = Because these SF residences are on water, minimal transmission of ground vibration occurs. There is no exceedance of the FTA Vibration Criteria.

LV = 73 VdB @ 50 ft