



Washington State
Department of Transportation

SR 520 Bridge Replacement and HOV Program



**City of Seattle
Major Public Project Construction Noise
Variance Application
Portage Bay Bridge and Roanoke Lid
Project**

Prepared for

Washington State Department of Transportation

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Acronyms and Abbreviations

ANSI	American National Standards Institute
dB	Decibels
dba	A-weighted decibels
HOV	High-occupancy vehicle
Hz	Hertz
INM	Independent Noise Monitor
L _{dn}	Day-night sound level
L _{eq}	Equivalent sound level
L _{max}	Maximum noise level
L _n	Sound level exceeded n percent of the time
MPPCNV	Major Public Project Construction Noise Variance
NMMP	Noise Management and Mitigation Plan
RCW	Revised Code of Washington
SDCI	Seattle Department of Construction and Inspections
SMC	Seattle Municipal Code
SR	State Route
TNV	Temporary Noise Variance
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

Introduction

The Washington State Department of Transportation (WSDOT) is submitting this application to the Seattle Department of Construction and Inspections (SDCI) to request a Major Public Project Construction Noise Variance (MPPCNV) for the State Route (SR) 520, Interstate 5 (I-5) to Montlake Interchange and Bridge Replacement Project (Portage Bay Bridge and Roanoke Lid Project or Project) per the Noise Control Ordinance (Seattle Municipal Code, Chapter 25.08 [SMC 25.08]) and City of Seattle's Director's Rule 3-2009. This noise variance will cover activities occurring as part of the Portage Bay Bridge and Roanoke Lid project.

The Portage Bay Bridge and Roanoke Lid Project is one phase of SR 520 Bridge Replacement and HOV Program and is scheduled to be in construction from 2024 to 2030. The project will replace the existing Portage Bay Bridge with a wider and taller structure that is designed to withstand possible seismic events. The Project includes the following elements:

- construct two independent fixed-span bridge-deck structures with three lanes in each direction,
- interchange improvements at I-5 and Montlake Boulevard,
- construct a landscaped lid between Seattle's Roanoke Park and North Capitol Hill neighborhoods (Roanoke Lid)
- continuation of the Regional Shared Use Path across Portage Bay,
- modular wetlands that treat to enhanced water quality standards,
- ADA-compliant multimodal connections across the Roanoke Lid connecting to Harvard Avenue East and crossing I-5 on a new structure adjacent to East Roanoke Street,
- pedestrian connections between Delmar Drive East and Boyer Avenue East, and
- Montlake Playfield trail improvements, including multimodal connection from the regional trail to Bill Dawson trail.

WSDOT requests a six-year nighttime noise variance for the proposed project to allow necessary construction work activities to occur during nighttime hours (between 10 p.m. and 7 a.m. on weekdays and between 10 p.m. and 9 a.m. on weekends and legal holidays). As part of the MPPCNV for the project, this application proposes nighttime construction noise limits for noise-sensitive receivers near construction sites.

WSDOT requests an MPPCNV pursuant to SMC 25.08.590 (Granting of Variance) and SMC 25.08.655 (MPPCNV) to allow construction noise generated on site to exceed the sound level limit as specified in SMC 25.08.410 and as modified by 25.08.420 and 25.08.425.

Completion of all construction activities during only daytime hours would be unreasonable in light of public and worker safety. It would require multiple significant closures of SR 520 and I-5, which would result in:

- Extensive delays to the traveling public.
- Increased traffic volumes on city streets and nearby highways.
- A potential increase in the number of accidents in the project work zone.

Completion of all construction activities during only daytime hours would substantially extend the construction period and increase the

Key Takeaway

Limiting construction activities to daytime only hours would result in:

- Travel delays
- Extended project schedule
- Worker safety concerns
- \$50 to \$80 million in direct increased project costs

economic cost to taxpayers. Increased direct project costs are estimated to be in the range of \$50 to \$80 million. Added indirect costs (associated with daytime traffic impacts) to the delivery of people, goods and services in the region are estimated to result in an economic impact to the region in the magnitude of \$500 million.

WSDOT has developed expected construction activities and an estimated schedule for the Project. The analysis demonstrates that means and methods are available to meet the noise limits requested in this noise variance application and noise management and mitigation plan. Construction activities and equipment used may not be specifically identical but are likely to be similar to those identified by WSDOT in the Proposed Construction Activities section.

This noise variance application includes the following:

- A Noise Management and Mitigation Plan to demonstrate that means and methods are available to meet the proposed noise limits (Attachment 1).
- A description of the proposed construction activities and staging areas including a description of the noisiest proposed activities.
- Existing baseline sound levels at noise-sensitive land uses within the project areas.
- Proposed sound-level limits for nighttime construction activities that would be unreasonable to limit to daytime construction in light of public and worker safety or render the project economically or functionally unreasonable.
- Calculated sound levels that may be expected at noise-sensitive land uses during the noisiest nighttime construction activities.
- Proposed noise-mitigation measures.
- Provisions for compliance tracking and actions taken to resolve public complaints.

Project Descriptions and Proposed Construction Activities

Portage Bay Bridge and Roanoke Lid Project Overview and Project Site Description

The Portage Bay Bridge and Roanoke Lid Project is one phase of SR 520 Bridge Replacement and HOV Program and scheduled to be in construction from 2024 to 2030. The project will replace the existing Portage Bay Bridge with a wider and taller structure that is designed to withstand possible seismic events. The Project includes the following elements:

- construct two independent fixed-span bridge-deck structures with three lanes in each direction,
- interchange improvements at I-5 and Montlake Boulevard,
- construct a landscaped lid between Seattle’s Roanoke Park and North Capitol Hill neighborhoods (Roanoke Lid)
- continuation of the Regional Shared Use Path across Portage Bay,
- ADA-compliant multimodal connections across the Roanoke Lid connecting to Harvard Avenue East and crossing I-5 on a new structure adjacent to East Roanoke Street,
- modular wetlands that treat to enhanced water quality standards,
- pedestrian connections between Delmar Drive East and Boyer Avenue East, and
- Montlake Playfield trail improvements, including multimodal connects from the regional trail to Bill Dawson trail.

Construction of these design elements is expected to last approximately 6 years.

The area of potential nighttime construction work for the Portage Bay Bridge and Roanoke Lid Project is shown in Exhibit 1 and includes two WSDOT-owned properties for staging. The areas for staging equipment and materials for the project are located under I-5 near the Ship Canal Bridge and southeast of the Montlake construction area. Construction of this Project (one of the “Rest of the West” projects) is scheduled to begin in 2024. More detailed maps are included in Attachment 2.

Land uses and zoning classifications are residential, commercial and institutional near the project area (Exhibit 2). The marinas in Portage Bay nearest to the construction work, the Queen City Yacht Club and the Seattle Yacht Club, do not have liveaboard moorage.

EXHIBIT 1. PORTAGE BAY BRIDGE AND ROANOKE LID PROJECT AREA

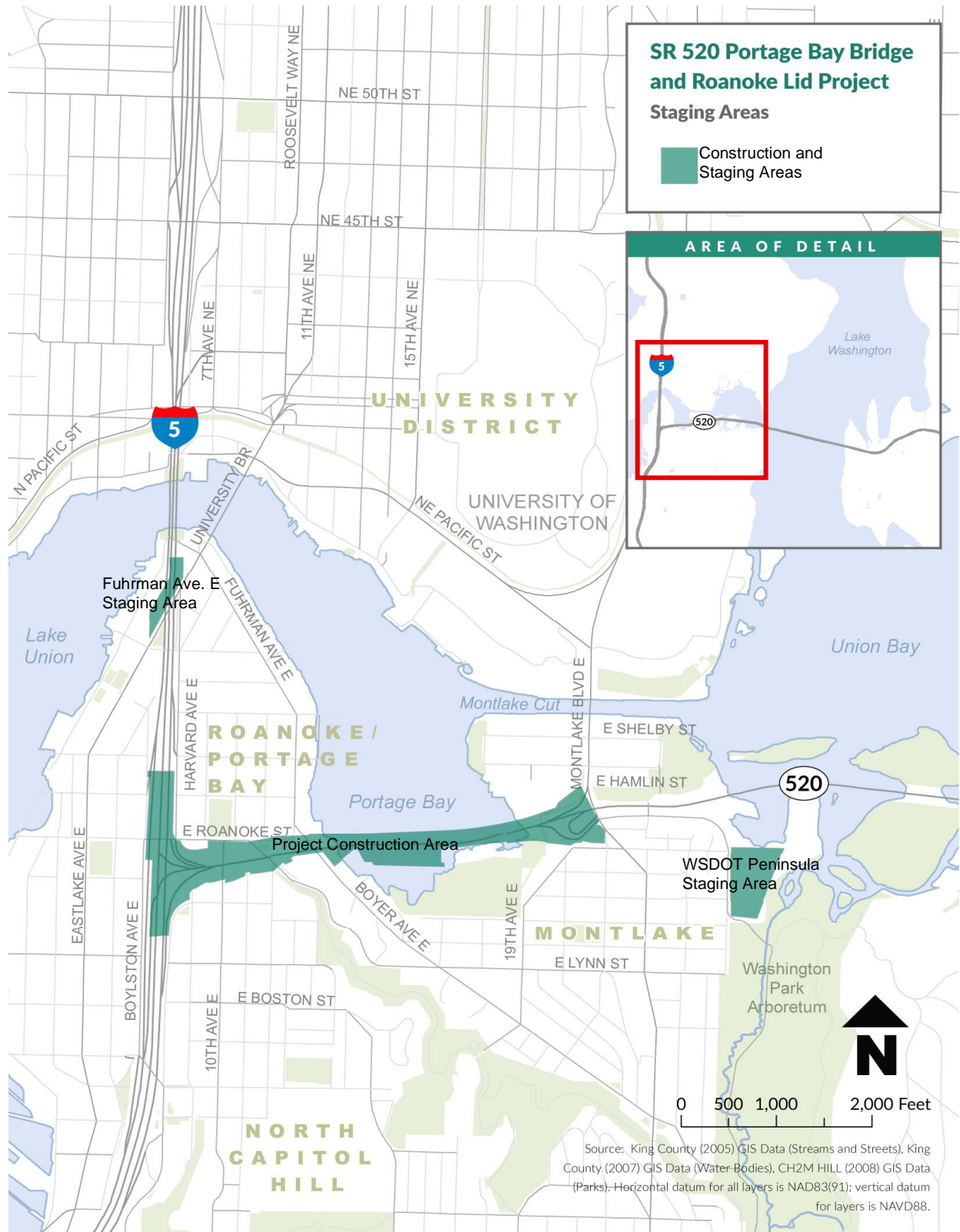
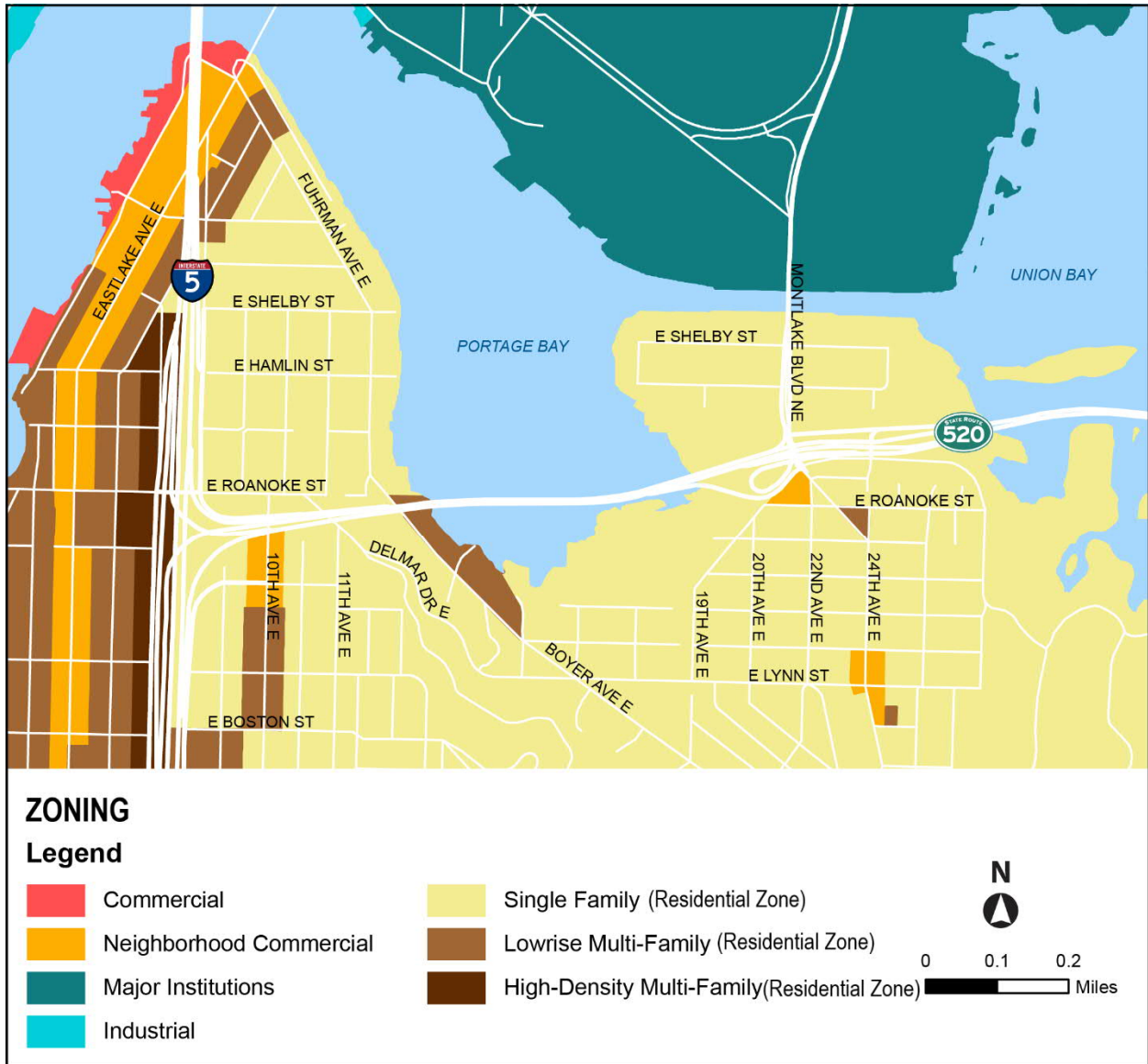


EXHIBIT 2. ZONING



Source: City of Seattle, 2022

Expected Construction Activities

The proposed Portage Bay Bridge and Roanoke Lid Project major construction phases, current estimated durations and schedule are as follows:

- Stage 1 - Retaining walls near Delmar and Portage Bay Bridge North work trestle & substructures (summer/fall 2024 through spring/summer 2025)
 - Create access and workspace at Roanoke Lid and Portage Bay Bridge Access Area
 - Work trestle installation at Portage Bay Bridge Access Area
 - Soldier pile installation and cast in place concrete at 10th and Delmar
 - Pier shafts installation
 - Temporary Eastbound off ramp
- Stage 2 - Retaining walls and Lid Construction at Roanoke Lid and Portage Bay Bridge North (summer/fall 2025 to spring/summer 2026)
 - Create access and work space at Roanoke Lid
 - Soldier pile installation, cast in place concrete, girder erection and lid deck construction at 10th and Delmar
 - Continue work trestle, cofferdam and shaft installation at Portage Bay Bridge North Piers
 - Bridge superstructure for Portage Bay Bridge North
 - Temporary mainline structure at the east end of Portage Bay
- Stage 3 – Demolition, retaining walls and Lid Construction at Roanoke Lid and Portage Bay Bridge North (spring/summer 2026 to summer/fall 2027)
 - Continue bridge superstructure construction for Portage Bay Bridge North
 - Drainage, grading, paving and cast in place concrete at approaches to Portage Bay Bridge
 - Demolition of existing 10th and Delmar structures and existing walls
 - Soldier pile installation, cast in place concrete, girder erection, drainage grading and paving at 10th and Delmar
- Stage 4 –Retaining walls and Lid Construction at Roanoke Lid and Portage Bay Bridge South (summer/fall 2027 to winter/spring 2028)
 - Demolition of existing Portage Bay Bridge
 - Cofferdam and shaft installation for the new Portage Bay Bridge South piers
 - Drainage, grading, and paving at approaches to Portage Bay Bridges
 - Construction of the multimodal (active transportation) connection across I-5
 - Demolition of existing walls, soldier pile installation, cast in place concrete, girder erection, drainage grading and paving at 10th and Delmar
- Stage 5 - Retaining walls and Lid Construction at Roanoke Lid and Portage Bay Bridge South (Fall 2027 to Fall 2030)
 - Continue shaft installation for Portage Bay Bridge South
 - Superstructure construction for Portage Bay Bridge South
 - Drainage, grading and paving at approaches to Portage Bay Bridge
 - Cast in place concrete, girder erection, drainage grading and paving at 10th and Delmar
 - Completion of active transportation facilities and landscaping
 - Final lighting, signing and striping

Expected nighttime construction activities, that require a noise variance, may be necessary for several or all phases described above. WSDOT has developed an expected schedule in Exhibit 3. The contractor will update the list of equipment and the order and timing of activities in the updated NMMP as necessary and discussed in the section titled “Noise Management and Mitigation Plan” of this report. All construction activities noted are not expected to occur continuously on all nights for consecutive weeks and it is likely that there will be breaks in the activities.

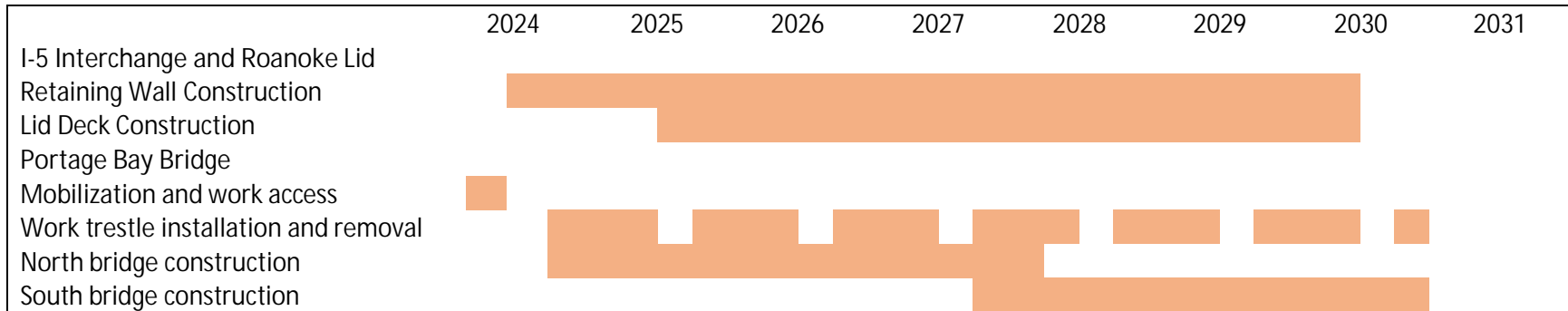
Noise-generating nighttime work will be concentrated in the Roanoke Lid vicinity because nighttime lane closures of SR 520 will be required to complete the work adjacent to and over SR 520 traffic lanes. Portage Bay Bridge construction will be largely completed offline from active traffic; therefore, most noise-generating work will be completed during daytime hours. Nighttime work on the Portage Bay Bridge will be largely limited to completing transitions for traffic shifts, delivery of materials, preparation for daytime shifts, and material movements that require crane swings near the in-use bridge. Nighttime work on the Portage Bay Bridge will not include pile installation, shaft auguring, or excavation for the on-land piers.

The following are construction activities and equipment that is likely used during nighttime construction under this MPPCNV:

- Excavation, embankment and paving (dozer, excavator, trucks, grader, vibratory rollers, asphalt roller, drill rig)
- Concrete sawing (concrete saw, compressors, dump trucks, loader, debris trucks, street sweeper)
- Place forms, rebar and concrete (hydraulic crane, crawler crane, concrete pump, compressors, trucks, concrete trucks)
- Paving, signing, and striping (roller, concrete truck, delivery truck, dump truck, loader, street sweeper, sign and stripe trucks)

All construction stages would include vehicles operating on public streets, including deliveries, traffic control, and street sweeping. Staging areas that are currently being used for other phases of the SR 520 Bridge Replacement and HOV Program will also be used during the Portage Bay Bridge and Roanoke Lid Project for staging equipment and materials for the project. The staging areas are on WSDOT-owned property under I-5 at Fuhrman Avenue near the Ship Canal Bridge and the WSDOT-owned peninsula near the Arboretum. These staging areas, along with a detailed outline of the work area are shown in Attachment 2.

EXHIBIT 3. ESTIMATED SCHEDULE OF PORTAGE BAY BRIDGE AND ROANOKE LID PROJECT NIGHTTIME CONSTRUCTION ACTIVITIES



All construction activities noted in Exhibit 3 are not expected to occur continuously on all nights for consecutive weeks and it is likely that there will be breaks in the activities. The Project contractor will update the nighttime activities schedule as necessary in the updated Nighttime Management and Mitigation Plan.

WSDOT Compliance with City of Seattle Criteria for a Major Public Project Construction Noise Variance

Definition of Major Public Project

SMC 25.08.168: The Definition of a Major Public Project

SMC 25.08.168 defines “major public project” as follows:

“Major public project” means a project for a public facility as defined in SMC Title 23, the construction of which the Administrator determines is likely to be of at least six months duration, and is likely to have a substantial impact on the public safety, health and welfare and the provision of public services, including transportation services. In making this determination the Administrator shall consider factors such as the expected size, complexity or cost of the proposed construction or reconstruction; the expected duration of the proposed construction or reconstruction; the magnitude of the expected impacts on traffic and transportation; and/or the degree of impact on the provision of public services during the proposed construction or reconstruction.

This section contains a detailed description of how this application meets the criteria for granting a MPPCNV.

SMC 23.84A.030 “P”: The Definition of Public Facility

SMC 23.84A.030 “P” defines “public facility” as follows:

“Public facility” means a public project or city facility.

The proposed Portage Bay Bridge and Roanoke Lid Project of the SR 520 Bridge Replacement and HOV Program is a “major public project” as defined in SMC 25.08.168 and is a “public facility” as defined in SMC 23.84.030. SR 520 plays a major role in sustaining the region’s economy and maintaining the ability to travel between Seattle and the Eastside. The SR 520 Bridge Replacement and HOV Program is making major enhancements to this vital urban highway. The program is improving traffic safety by replacing SR 520’s aging and vulnerable bridges, while making other key highway and multimodal improvements to enhance public mobility and transportation options throughout the corridor.

Criteria for Granting a Noise Variance

SMC 25.08.590.C: The Criteria for Granting a Noise Variance

SMC 25.08.590.C states:

- A. *The Administrator may grant a variance if the Administrator finds that:*
 1. *The noise occurring or proposed to occur does not endanger public health or safety;*
and
 2. *The applicant demonstrates that the criteria required for the variance are met.*

This noise variance application proposes nighttime construction noise limits for noise-sensitive receivers in proximity to construction areas. In keeping with previous SDCI-granted noise variances, WSDOT proposes a 6 dBA (A-weighted decibels) increase over existing hourly averaged noise levels measured between the quietest nighttime hours of 12 a.m. to 5 a.m., at periods when no substantial nearby nighttime construction activities were underway. The proposed descriptors and noise limits for the Portage Bay Bridge and Roanoke Lid Project are based a review of other SDCI decisions on MPPCNV applications for transportation agencies such as WSDOT, Sound Transit and the Seattle Department of Transportation. Prior variances have been granted an increase of hourly average noise level limits ranging from 6 dBA up to 15 dBA over measured existing baseline noise levels.

Key Takeaway

Consistent with other SDCI-granted variances, WSDOT proposes a 6 dBA increase over existing hourly averaged noise levels measured between the quietest nighttime hours of 12 a.m. to 5 a.m. SDCI decisions on prior noise variances range from granting an increase of 6 dBA up to 15 dBA over existing baseline noise levels (measured 12 a.m. to 5 a.m.).

Criteria for a Major Public Project Construction Noise Variance

SMC 25.08.655.A: The Criteria for an MPPCNV

The criteria for an MPPCNV are stated in SMC 25.08.655.A as follows:

- A. *The Administrator may grant a major public project construction variance to provide relief from the exterior sound level limits established by this chapter during the construction periods of major public projects. A major public project construction variance shall provide relief from the exterior sound level limits during the construction or reconstruction of a major public project only to the extent the applicant demonstrates that compliance with the levels would:*
1. *Be unreasonable in light of public or worker safety or cause the applicant to violate other applicable regulations, including but not limited to regulations that reduce impacts on transportation infrastructure or natural resources; or*
 2. *Render the project economically or functionally unreasonable due to factors such as the financial cost of compliance or the impact of complying for the duration of the construction or reconstruction of the major public project.*

How Does This Project Meet the Criteria for an MPPCNV?

Limiting Portage Bay Bridge and Roanoke Lid Project construction to daytime hours would be unreasonable in light of public and worker safety and would render the project economically and functionally unreasonable. Many work activities for this project cannot be completed over or adjacent to active traffic because they are too risky or dangerous to perform adjacent to or over traffic. Some activities require construction work zones to be closed off from traffic. Work zones requiring closure to live traffic will need either closures of all lanes, directional closures, or single lane closures of SR 520, I-5 and ramps during work hours to safely complete the work. These closures cannot occur during daytime due to high-traffic volumes.

Anticipated impacts of limiting construction to daytime hours

In preparation for submitting a noise variance application for Portage Bay Bridge and Roanoke Lid Project, WSDOT reviewed the analysis for the feasibility of conducting the construction work activities during daytime-hours only. The analysis indicated that a restriction of construction activities to daytime hours only would result in several key factors which would render the project unreasonable in light of public and worker safety, and economically and functionally unreasonable. Below is a summary of the anticipated impacts of daytime-only construction for the Portage Bay Bridge and Roanoke Lid Project.

Work zone safety

WSDOT evaluated the impact of daytime and nighttime hours on public and worker safety in construction work zones. A 2010 Federal Highway Administration evaluation of work zone safety reports that the highest numbers of work zone accidents occur on urban freeways and during daytime hours, when traffic volumes are greater (*What We Know about Work Zone Fatalities*, FHWA, 2010).

Key Takeaway

The highest numbers of work zone accidents occur on urban freeways and during daytime hours, when traffic volumes are greater.

Additionally, this study found an increase in collisions considered to be more dangerous within work zones, than outside of work zones. Examples include:

- An increase in rear-end collisions associated with congestion and traffic queues within work zones.
- Work zone collisions involving larger vehicles occur at about twice the rate as in general highway collisions due to the greater number of construction vehicles present.

WSDOT reviewed the 2008 National Cooperative Highway Research Program's evaluation of nighttime and daytime work zone safety. Limited data from the report indicates that the collision rate in work zones (number of collisions per million miles traveled) is over 60 percent greater than outside of work zones (page 30, NCHRP Report 627, 2008).

Restricting Portage Bay Bridge and Roanoke Lid Project work to daytime hours, when traffic volumes are high, would result in an increase in the expected number of collisions in and around the work zones.

Traffic operations

SR 520

SR 520 carries approximately 77,000 vehicles per weekday over Lake Washington with most of this volume occurring between 7 a.m. and 7 p.m. Daytime closures of SR 520 for construction work would require this volume of crosslake traffic to use other routes, adding to congestion on the alternative facilities. I-5, I-90, I-405 and SR 522 would carry this additional traffic on routes that are already heavily congested during the AM and PM peak travel times, resulting in greater overall impacts to more of the transportation network. SR 520 is also a critical route for transit throughout the area; an estimated 16,000 transit riders would need to take other routes that are currently filled during peak hour travel. Additional buses would need to be added to these alternate routes to handle the additional demand.

I-5 Mainline and Express Lanes

The I-5 mainline carries approximately 200,000 vehicles per weekday (over the Ship Canal Bridge) with most of this volume occurring between 7 a.m. and 7 p.m. The corridor operates with congestion during a significant portion of the day.

The I-5 express lanes/reversible lanes carry another 55,000 vehicles per day. The express lanes operate in the peak travel directions, which allows the overall I-5 corridor to increase the carrying capacity through the peak commutes. The I-5 express lanes operate southbound in the morning (5 to 11 a.m.) and northbound in the afternoon (11:15 a.m. to 11 p.m.). The express lanes are closed from 11 p.m. to 5 a.m. due to low use and to minimize noise at homes adjacent to the corridor.

Daytime lane closures or full closures for construction work would require this volume of traffic to use other routes. There are limited alternative north-south routes in the area (i.e. Montlake Boulevard, Aurora Avenue, or University Bridge). These alternative routes are congested as well during peak travel times. I-5 mainline and express lanes are critical transit and freight routes. Transit uses both the mainline and express lanes to serve regional transit trips to and from downtown Seattle. I-5 is a T-1 truck freight corridor and impacts or closures that increase congestion, will also decrease the reliability and increase the cost of both the movement of persons via transit and goods via freight.

Economic considerations

WSDOT evaluated the economic effects of requiring all construction activities of the SR 520 Portage Bay Bridge and Roanoke Lid Project to daytime hours that would otherwise exceed nighttime property-line noise limits. This restriction would affect the schedule and cost of constructing the project and have a substantial economic impact on the traveling public because of the significance of SR 520 and I-5 on the regional transportation network and local economy.

Expected SR 520 Portage Bay Bridge and Roanoke Lid Project construction schedule and costs
WSDOT completed a schedule analysis on the effect of shifting all activities from nighttime to daytime hours. This includes roadway, wall and bridge construction, and demolition operations.

Overall, limiting construction to daytime hours would have an estimated delay to project completion of two years or more. Contractor administrative overhead costs for a project of this scale would be on the order of \$100,000 per day. Using this value and a 5-day work week, the increased direct contract cost, as a result of limiting construction to daytime only, to WSDOT and Washington taxpayers would be \$26 million per year of contract extension. Direct project costs for an anticipated two- to three-year extension of construction from restricting construction to daytime hours would be between \$52 and \$78 million.

Regional costs

The societal economic impacts to the region result in a greater financial impact than the estimated direct, project costs. Daytime closure of lanes and ramps on SR 520, I-5 and local streets will cause delays to the traveling public, the delivery of goods and services, and hinder access by emergency vehicles.

WSDOT estimates the societal economic impact of lane closures for construction projects and captures them as Liquidated Damages (LD) in a contract to encourage contractors to maintain lane and ramp availability during peak travel periods. WSDOT may assess LDs for failure to have a lane, ramp, or roadway open to traffic, or an Intelligent Transportation System (ITS) fully operational by the specified time. The LD assessments are based on, and cannot exceed, the estimated cost to the traveling public incurred by the disruption.

WSDOT's Transportation Data, GIS, and Modeling Office (TDGMO) uses standardized methodology for calculating costs, based on roadway characteristics, hourly traffic data, and the specifics of the planned roadway or ITS disruption. To ensure uniformity, all LDs of this type for WSDOT projects statewide are calculated by engineers in the TDGMO. The methodology includes a software program called QUEWZ-

98 for freeway lane closures, and specialized spreadsheet templates for various other work zone strategies. WSDOT's Budget & Financial Analysis Office is consulted annually for changes to the appropriate consumer index and their input is used to periodically update costs within the LDs templates and QUEWZ-98 program. WSDOT recently calculated LDs for I-5 for a separate project, the I-5 NB Seneca Street to SR 520 Mobility Improvements. The cost range was between \$1,000 per hour for ramp closures and \$20,000 per hour for I-5 mainline closures. The SR 520 Montlake Phase calculated LDs at \$1,200 per hour for City of Seattle arterials and \$18,000 per lane per hour for SR 520.

For the Portage Bay Bridge and Roanoke Lid Project, the economic cost to the region of completing all work during daytime hours only is estimated to be approximately \$250 million dollars per year of facility closure, based on the LD values. Because not all facilities would need to be closed for the entire 6-year construction period, the regional economic cost can be estimated to be on the order of \$500 million based on two years of daytime facility closures over the 6-year construction period.

WSDOT Term of Proposed Variance

SMC 25.08.655.B: The Term of the Proposed Variance

SMC 25.08.655.B states:

- B. A major public project construction variance shall set forth the period or periods during which the variance is effective, which period or periods shall be the minimum reasonably necessary in light of the standard set forth in subsection A, and the exterior sound level limits that will be in effect during the period of the variance.*

Requested Period the Variance is Effective

WSDOT requests that construction noise generated on the site be allowed to exceed the noise level limits set by Seattle Noise Control Ordinance, SMC 25.08.410, during nighttime hours (between 10 p.m. and 7 a.m. on weekdays and between 10 p.m. and 9 a.m. on weekends and legal holidays).

The variance is requested for six years, which is the anticipated duration necessary to complete the major construction activities. Nighttime construction activities requiring a noise variance are expected to occur at various times throughout the project duration. Major construction is scheduled to begin in 2024, with an estimated completion date in 2030.

The contractor would be able to perform nighttime construction work if the work is performed within the Portage Bay Bridge and Roanoke Lid Project construction area as described below and covered by this MPPCNAV or any temporary noise variances granted by SDCI. The MPPCNAV is subject to review by SDCI after the first year of construction, as provided in SMC 25.08.655.D. Additional coordination with SDCI would continue throughout construction.

Construction Area and Exterior Nighttime Construction Noise-Level Limits

This noise variance application proposes nighttime construction noise limits for nighttime noise-sensitive receivers in proximity to the Portage Bay Bridge and Roanoke Lid Project construction area. Exhibit 1 shows the generalized construction area and Attachment 2 contains more detailed maps. Nighttime noise-sensitive receivers are generally properties where people are sleeping, such as a residence. The next section contains information on the characteristics of noise and sound.

The proposed descriptors and noise limits for the Portage Bay Bridge and Roanoke Lid Project are based on WSDOT and SDCI noise variance coordination efforts, which a review of prior SDCI decisions on MPPCNV applications from transportation agencies such as WSDOT, Sound Transit and the Seattle Department of Transportation. In each of these cases, SDCI granted variances with an increase of average hourly noise level limits ranging from 6 dBA up to 15 dBA over measured existing baseline noise levels.

The Portage Bay Bridge and Roanoke Lid Project noise variance application proposes a 6 dBA increase over existing hourly average noise levels (L_{eq}) measured during the quietest part of the nighttime hours (the five-hour period from 12 a.m. to 5 a.m.) (Exhibit 4). Noise level descriptors, such as L_{eq} , are further defined in the Characteristics of Sound and Noise section of this application. Although these proposed noise level limits are based on measurements during only the quietest nighttime hours, the proposed limits would apply to the operation of construction equipment during all nighttime hours, from 10 p.m. to 7 a.m. on weekdays and 10 p.m. and 9 a.m. on weekends and legal holidays. This noise variance application assumes that all equipment used for the project would meet the daytime noise level limits as described in Section 25.08.425 of the Seattle Municipal Code.

Measurements at sites M2, M3, M4, M8, and M9 were completed explicitly for this MPPCNV. Measurement M4 was taken on a second-floor balcony of the Portage Bayshore Condominium directly facing future construction. Measurements at sites M1, M5, and M6 were taken in preparation for the SR520/I-5 Express Lanes Connection Project and were used because those areas are currently under construction, which would affect nighttime noise measurements taken in those areas today. After completion of the SR520/I-5 Express Lanes Connection Project, traffic patterns and noise levels near these sites will return to the levels experienced at the time the baseline measurements were completed. Similarly, measurements at sites M7 and M10 were taken to support the Montlake Project, which is currently under construction in that vicinity. Continuing to use the established baseline levels will provide continuity of expectations for neighbors during the Roanoke Lid and Portage Bay Bridge Replacement Project.

The monitoring methodology follows industry accepted practices. Continuous monitoring and recording of sound levels was conducted at ten sites (Exhibit 4). Measurements were taken with calibrated Larson Davis Model 720 (Type 2) and 820 (Type 1) noise meters, which comply with American National Standards Institute S1.4 for instrument accuracy. All sound level monitoring equipment was calibrated before and after each measurement. In addition, the noise meters are calibrated annually by an accredited laboratory. Sound levels measured during the late-night hours (12 a.m. to 5 a.m.) provide the most conservative representation of the existing baseline condition. Noise measurement sites were selected based on their proximity to construction activities, with no obstructions between the monitoring location and the construction work area.

The measured existing nighttime sound levels at all monitoring locations exceed the City of Seattle nighttime noise control ordinance limits of 45 dBA (L_{eq}) for residentially zoned receivers. The existing sound levels, which are produced primarily by traffic on public roads, are not subject to the limits of the ordinance (SMC 25.08.410-425). The comparison is presented in Exhibit 5 as a baseline for evaluating potential noise impacts from proposed construction activities. Noise level descriptors are discussed in the next section titled “Characteristic of Sound and Noise”.

In addition to the hourly L_{eq} , this noise variance application proposes to monitor the one-second L_{eq} sound level at all monitoring locations, as an early indicator of potential non-compliance with the hourly L_{eq} noise limits.

EXHIBIT 4. CONSTRUCTION AREA AND NOISE MEASUREMENT AND MODELED LOCATIONS



EXHIBIT 5. MEASURED HOURLY AVERAGE BASELINE NOISE LEVELS AND PROPOSED EXTERIOR NIGHTTIME NOISE LEVEL LIMITS

Measured Site	Measured 12 to 5 AM Hourly Average L_{eq} (dBA)	Proposed Nighttime Noise Level Hourly Average Limit L_{eq} (dBA)
M1	65	71
M2	51	57
M3	56	62
M4	60	66
M5	64	70
M6	60	66
M7	72	78
M8	54	60
M9	54	60
M10	61	67

Measured hourly average L_{eq} noise levels between 12 a.m. and 5 a.m. exceed the City of Seattle Noise Control Ordinance.

Public health and safety

Per Section E of Director’s Rule 3-2009, Rule 1.e., SDCI is required to consider whether public health and safety is endangered by the variance decision. As explained the above sub-section Work zone safety, public and worker safety would be endangered by requiring all work during daytime hours. While the following analysis includes evidence that constant long-term exposure to the exterior sound levels already occurring in the project area may have negative health effects, there is no evidence of long-term health effects from an intermittent and short-term incremental increase of hourly-average sound levels by 6 dBA or less.

As shown in Exhibit 5, WSDOT is requesting nighttime construction noise limits of between 57 and 71 dBA $L_{eq}(h)$ at residences nearest to project construction. In all cases, these levels are between 9 and 23 dBA less than SDCI’s daytime construction noise limit of 80 dBA $L_{eq}(h)$ for residential areas.

The US Environmental Protection Agency developed *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (EPA, 1974). This research has not been updated since the 1970s, when the Office of Noise Abatement and Control was dissolved. For residential areas, the EPA established an annual-average outdoor day-night sound level (L_{dn}) of 55 dBA as protective of public health and welfare with an adequate margin of safety. The 55 dBA L_{dn} level was selected based on level of community annoyance and providing a 7 dBA margin of safety below the level above which widespread complaints were documented. The protective level considered that “the long-term health and welfare effects of noise on an individual are related to the cumulative noise exposure he receives over a lifetime” and acknowledges that “little is known concerning the total effect of such lifetime exposures”. The EPA estimated that approximately 37% of the population of the US at the time resided in areas with an L_{dn} of greater than 60 dBA, which it characterized as a typical sound level for urban residential neighborhoods.

All of the measured baseline nighttime sound levels in the vicinity of the Portage Bay Bridge and Roanoke Lid were greater than 50 dBA $L_{eq}(h)_{(night,outside)}$ and would correspond to L_{dn} levels greater than 60

dB(A). This sound environment is typical of urban residential areas and has characterized the neighborhoods since at least the opening of I-5 and SR 520 in the 1950s and 1960s.

Project construction would not occur constantly over nighttime hours every night of the year; therefore, the increase in annual-average $L_{(night,outside)}$ or L_{dn} levels would be substantially less than the 6 dBA L_{eq} (maximum nighttime hour) level requested for night work. While the EPA data notes that the incidence of community complaints increases as outdoor annual average levels increase above 62 dBA L_{dn} , they do not have an estimate of public health effects of an incremental increase in average community sound levels.

The Occupational Safety and Health Administration (OSHA) has established a sound level of 82 dBA as being protective of hearing for a continuous exposure of 24 hours (29 CFR 1910.95). The OSHA limit is based on a 40-year work lifetime. None of the measured sites approach the OSHA hearing protection thresholds and all of the requested nighttime noise limits are below the 82 dBA continuous 24-hour exposure limit and would be protective of hearing.

Although the 6 dBA increases requested in this variance, and the resulting noise levels, will likely be noticed by some residents, the noise levels would not cause a danger to public health or safety.

Characteristics of Sound and Noise

Definition of Sound

Sound is created when objects vibrate, resulting in a minute variation in surrounding atmospheric pressure, called sound pressure. The human response to sound depends on the magnitude of a sound as a function of its frequency and time pattern. Magnitude is a measure of the physical sound energy in the air. The range of magnitude the ear can hear, from the faintest to the loudest sound, is so large that sound pressure is expressed on a logarithmic scale in units called decibels (dB). Loudness refers to how people subjectively judge a sound and varies between people.

Sound is measured using the logarithmic decibel scale, so doubling the number of noise sources, such as the number of cars on a roadway, increases noise levels by 3 dBA. Therefore, when you combine two noise sources emitting 60 dBA, the combined noise level is 63 dBA, not 120 dBA. The human ear can barely perceive a 3 dBA increase, while a 5 dBA increase is about one and one-half times as loud. A 10-dBA increase appears to be a doubling in noise level to most listeners. A tenfold increase in the number of noise sources will add 10 dBA.

In addition to magnitude, humans also respond to a sound's frequency or pitch. The human ear is very effective at perceiving frequencies between 1,000 and 5,000 hertz (Hz), with less efficiency outside this range. Environmental noise is composed of many frequencies. A-weighting (dBA) of sound levels is applied electronically by a sound level meter and combines the many frequencies into one sound level that simulates how an average person hears sounds of low to moderate magnitude.

The smallest "just noticeable" increase in sound is about 3 dBA. A 6 dBA increase is clearly noticeable, and a 10 dBA increase causes a doubling of judged loudness. For example, 80 dBA is judged to be twice as loud as 70 dBA and four times as loud as 60 dBA. Exhibit 6 summarizes how increases in perceived loudness correlate with sound level increases.

EXHIBIT 6. PERCEIVED LOUDNESS INCREASES

Sound Level Increase (dBA)	Perceived Loudness Increase
0 to 2	Not noticeable
3	Just noticeable
6	Noticeable
10	Twice as loud
20	Four times as loud

Definition of Noise

Noise is unwanted or unpleasant sound. Noise is a subjective term because, as described above, sound levels are perceived differently by different people. Magnitudes of typical noise levels are presented in Exhibit 7.

EXHIBIT 7. TYPICAL NOISE LEVELS

NOISE SOURCE OR ACTIVITY		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-horsepower 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) Pneumatic drill (50 feet)	80	Moderately loud	Reference loudness
Vacuum cleaner (10 feet) Passenger car at 65 mph (25 feet)*	70		1/2 as loud
Typical office environment	60		1/4 as loud
Light auto traffic (100 feet)*	50	Quiet	1/8 as loud
Bedroom or quiet living room Bird calls	40		1/16 as loud
Quiet library, soft whisper (15 feet)	30	Very quiet	
High quality recording studio	20		
Acoustic test chamber	10	Just audible	
	0	Threshold of hearing	

Noise Level Descriptors

Because sound levels fluctuate over time, several A-weighted sound level descriptors are used to characterize the sound.

The L_{eq} is a measure of the average noise level during a specified period of time. A one-hour period, or hourly L_{eq} , is used to demonstrate compliance with construction noise. L_{eq} is a measure of total noise during a time period that places more emphasis on occasional high noise levels that accompany general background noise levels. For example, if you have two different sounds, and one contains twice as much energy, but lasts only half as long as the other, the two would have the same L_{eq} noise levels.

While the hourly L_{eq} ($L_{eq}[1 \text{ hour}]$) is used to demonstrate compliance, it is not an effective early-indicator to allow real-time changes to be made during construction. Shorter-duration measurements, specifically the $L_{eq}(1 \text{ second})$ are more effective at quickly indicating when there is an elevated noise level.

Either the total noise energy or the highest instantaneous noise level can describe short-term noise levels. L_{max} is the maximum sound level that occurs during a single event and is related to impacts on speech interference and sleep disruption.

The day-night sound level (L_{dn}) is an indicator of the average noise level over a 24-hour period with the noise level measurements between the hours of 10 p.m. and 7 a.m. mathematically increased by 10 dB before averaging. This places a penalty (increases the mathematical value of the average) of noise that occurs during the night to account for community reaction to nighttime noise.

With L_n , “n” is the percent of time that a sound level is exceeded and is used to describe the range and pattern of sound levels experienced during the measurement period. For example, the L_1 level is the noise level that is exceeded 1 percent of the time during a specified monitoring period.

Sound varies in the environment and people will generally find a higher, but constant, sound level more tolerable than a quiet background level interrupted by higher sound level events. For example, steady traffic noise from a highway is normally less bothersome than occasional aircraft flyovers in an otherwise quiet area if both environments have the same L_{eq} .

City of Seattle Noise Control Ordinance

The City of Seattle limits noise levels at property lines of neighboring properties (Seattle Noise Control Ordinance, SMC 25.08.410). The sound level limit depends on the land uses of both the noise source and the receiving property (Exhibit 8). The Portage Bay Bridge and Roanoke Lid Project area and the surrounding properties are zoned residential, residential commercial, institutional, and commercial (Exhibit 8). The City's sound level limits apply to construction activities occurring between 10 p.m. and 7 a.m. on weekdays or 10 p.m. and 9 a.m. on weekends and legal holidays. Legal holidays are defined in SMC 25.08.155 as New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and the day after, and Christmas Day. Construction activities during nighttime hours that would exceed these levels require a noise variance from the City.

EXHIBIT 8. SEATTLE NOISE CONTROL ORDINANCE – EXTERIOR SOUND LEVEL LIMITS

District of Sound Source	District of Receiving Property			
	Residential Daytime L _{eq} (dBA)	Residential Nighttime L _{eq} (dBA)	Commercial L _{eq} (dBA)	Industrial L _{eq} (dBA)
Residential	55	45	57	60
Commercial	57	47	60	65
Industrial	60	50	65	70

Nighttime hours are 10 p.m. to 7 a.m. during weekdays and 10 p.m. to 9 a.m. during weekends and legal holidays

dBA = A-weighted decibels

L_{eq} = equivalent sound level

During a measurement interval, L_{max} may exceed the exterior sound level limits shown by no more than 15 dBA.

Exceptions to the Seattle Noise Control Ordinance

Daytime noise

Noise levels shown in Exhibit 8 may be exceeded by construction equipment during the following times (SMC 25.08.425.A)

1. *Within Lowrise, Midrise, Highrise, Residential-Commercial, and Neighborhood Commercial zones, between 7 a.m. and 7 p.m. on weekdays and between 9 a.m. and 7 p.m. on weekends and legal holidays, except that for parking lot maintenance or if the equipment is being used for a public project, then between 7 a.m. and 10 p.m. on weekdays and between the hours of 9 a.m. and 10 p.m. on weekends and legal holidays.*
2. *Within all other zones, between 7 a.m. and 10 p.m. on weekdays and between 9 a.m. and 10 p.m. on weekends and legal holidays.*

Threshold levels for equipment are listed below (SMC 25.08.425.B):

1. *Twenty-five dB(A) for equipment on construction sites, including but not limited to crawlers, tractors, dozers, rotary drills and augers, loaders, power shovels, cranes, derricks, graders, off-highway trucks, ditchers, trenchers, compactors, compressors, and pneumatic-powered equipment;*
2. *Twenty dB(A) for portable powered equipment used in temporary locations in support of construction activities in any zone, maintenance activities on commercial property, or used in*

maintenance of public facilities, including but not limited to chainsaws, log chippers, lawn and garden maintenance equipment, and powered hand tools; or

3. *Fifteen dB(A) for powered equipment used in temporary or periodic maintenance or repair of the grounds and appurtenances of residential property, including but not limited to lawnmowers, powered hand tools, snow-removal equipment, and composters.*

These levels should be measured from the real property of another person or at a distance of 50 feet from the equipment, whichever is greater. Construction activities for the Portage Bay Bridge and Roanoke Lid Project would occur in residential, commercial, and industrial districts. The daytime construction activity associated with the Portage Bay Bridge and Roanoke Lid Project would be limited to 80 dBA (55 dBA + 25 dBA) in residential districts and 85 dBA (60 dBA + 25 dBA) in commercial districts.

Impact type noise

In addition, the Seattle Noise Control Ordinance (SMC 25.08.425) regulates sound created by impact types of construction equipment (e.g., pavement breakers, pile drivers, jackhammers, and sandblasting tools) or those that otherwise create impulse or impact noise (as measured at the property line or 50 feet from the equipment, whichever is greater). The equipment may exceed the sound level limits (equivalent sound level [L_{eq}] described in Exhibit 8) in any 1-hour period between 8 a.m. and 5 p.m. on weekdays and 9 a.m. and 5 p.m. on weekends and legal holidays. The sound level is in no event to exceed the following:

- L_{eq} = 90 dBA continuously
- L_{eq} = 93 dBA for 30 minutes
- L_{eq} = 96 dBA for 15 minutes
- L_{eq} = 99 dBA for 7.5 minutes

Sound levels in excess of L_{eq} = 99 dBA are prohibited unless authorized by variance. The standard of measurement is a 1-hour L_{eq} measured for time periods not less than 1 minute to project an hourly L_{eq} .

Proposed Nighttime Noise Level Limits

Noise level limits (Exhibit 5) were established in the previous section, WSDOT Compliance with City of Seattle Criteria for a Major Public Project Construction Noise Variance. The Portage Bay Bridge and Roanoke Lid Project noise variance application proposes a 6 dBA increase over existing hourly average noise levels (L_{eq}) measured during the quietest part of the nighttime hours (the five-hour period from 12 a.m. to 5 a.m.).

Noise Management and Mitigation Plan

The Noise Management and Mitigation Plan (NMMP) is included in Attachment 1 to meet the requirements of Section 25.08.655 of the Seattle Municipal Code and Director's Rule DR3-2009, both pertaining to Major Public Project Construction Noise Variances from the City of Seattle Noise Code.

The NMMP includes:

- Proposed Nighttime Noise Level Limits
- Expected Construction Activities and Types of Equipment
- Modeling of the expected noisiest nighttime construction period and a description of the exterior sound level limits expected to be exceeded.
- Proposed Mitigation Measures
- Compliance Monitoring and Reporting
- Public Outreach and Community Involvement

Proposed Noise Mitigation Measures

(Proposed Noise Mitigation Measures are included in this section to meet the requirements of Section 25.08.655 of the Seattle Municipal Code and Director's Rule DR3-2009 and is also included in the Noise Management and Mitigation Plan in Attachment 1)

Required Minimum Mitigation Measures

The contractor will perform the following minimum mitigation measures to minimize nighttime construction noise, except in the case of emergency, as defined by the Seattle Noise Control Ordinance (SMC 25.08.110), whenever the contractors work between 10 p.m. and 7 a.m. Monday through Friday, or between 10 p.m. and 9 a.m. Saturday through Sunday and legal holidays, and exceeds the local ordinance noise levels:

- The contractor will meet the noise level limits established in the noise variance.

The contractor will design and install a temporary noise-barrier fence around the Roanoke Lid construction area that is compatible with their final design and staging plan and that provides construction noise reduction to adjacent properties (Exhibit 9). The fence will be installed prior to nighttime demolition work and maintained for the duration of substantial nighttime construction of the Roanoke Lid. As shown in the example cross-section, the edge of right-of-way is substantially higher than SR 520 and a 12-foot noise-barrier fence would block line of sight from equipment working on SR 520 to residential properties to both the north and south.

- If the contractor installs shafts for the new Portage Bay Bridge at night, the contractor will use temporary noise shields around the equipment or install a temporary barrier during the shaft construction on the west side of Portage Bay.
- The contractor will use broadband or strobe backup warning devices or use backup observers in lieu of backup warning devices for all equipment, in compliance with Washington Administration Code, Sections 296-155-610 and 296-155-615. For dump trucks, if the surrounding noise level is so loud that broadband or strobe backup warning devices are not effective, then an observer must be used (WAC 296-155-610). This condition will apply to activity conducted between 10 p.m. and 7 a.m., Monday through Friday, and between 10 p.m. and 9 a.m. on Saturday, Sunday, and legal holidays. No pure-tone backup warning devices will be used after 10 p.m. and before 7 a.m. weekdays or 9 a.m. weekends and legal holidays.
- There will be no impact work undertaken under this MPPCNV, such as auger shaking, striking pavement with an excavator bucket, jack hammering, impact wrenches, and impact pile driving, during nighttime hours from 10 p.m. to 7 a.m. on weekdays and 10 p.m. to 9 a.m. on weekends and legal holidays.
- The contractor will securely fasten truck tailgates.
- The contractor will use sand, rubber or plastic lined truck beds for all haul-trucks to reduce noise, unless an exception is approved by WSDOT.
- The contractor will not use compression brakes.
- The contractor will not leave equipment to idle for longer than five minutes.

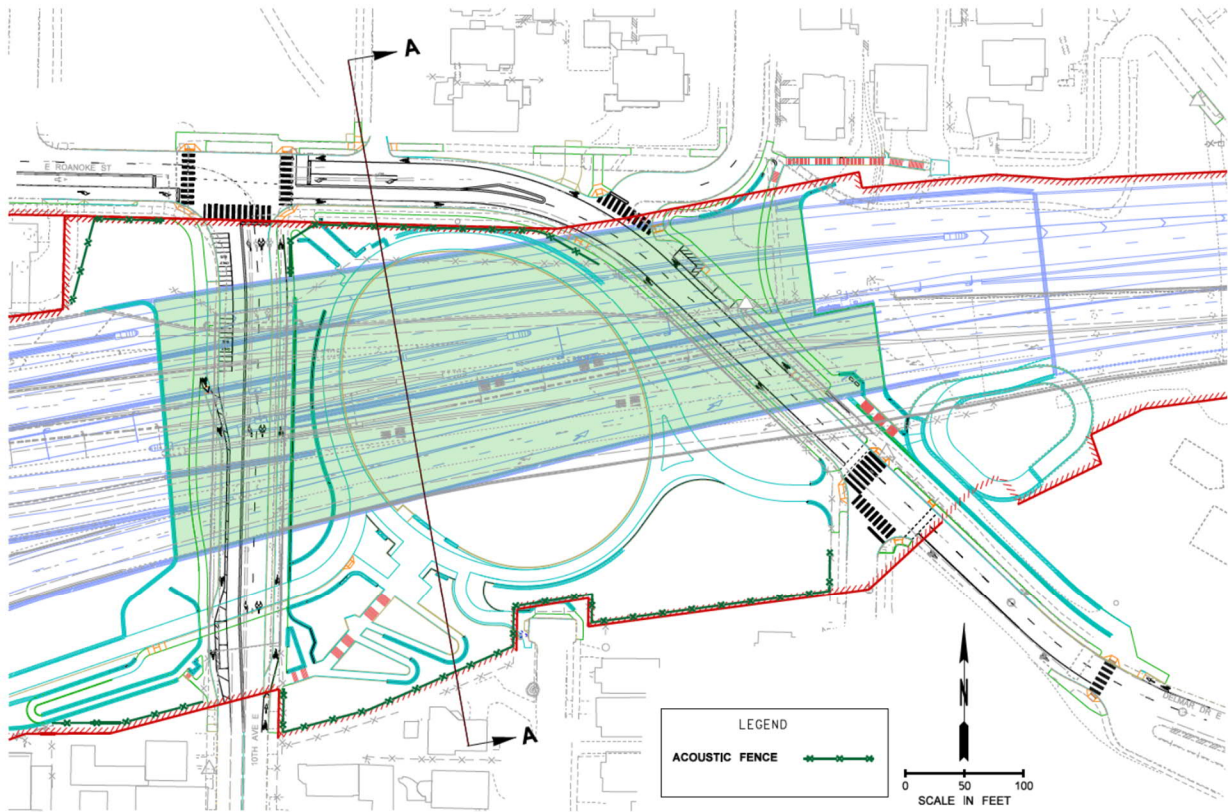
- The contractor will use temporary noise mitigation shields, enclose, or use low noise-generating stationary equipment, such as light plants, generators, pumps, and air compressors near residences where practical.

Additional Noise-Control Measures

The contractor will submit to WSDOT an updated NMMP to reflect changes to their specific construction means and methods and will detail any additional mitigation measures needed to meet the noise level limits established in the noise variance. Once WSDOT has reviewed and accepted the NMMP, the contractor will submit it to SDCI. Additional mitigation measures that the contractor could also use as necessary are listed below:

- Equip nighttime surface equipment with high-grade engine-exhaust silencers and engine-casing sound insulation.
- Use electric welders powered from utility main lines instead of gas, diesel, or internal combustion generators/welders.
- Use critical or double mufflers where practicable on machinery for off-road use, such as cranes.
- Use noise blankets, skirts, or other available means for mobile equipment to mitigate noise that does not unreasonably interfere with the operation of the equipment.
- Use temporary mobile noise barriers in the immediate vicinity of loud activities nearby residences.
- Provide earplugs and white noise machines to residents near the project area.
- Install temporary sound dampening drapes for residents.
- Offer hotel rooms to residents during extremely noisy operations.

EXHIBIT 9. CONCEPTUAL NOISE BARRIER FENCE LOCATION AND CROSS-SECTION

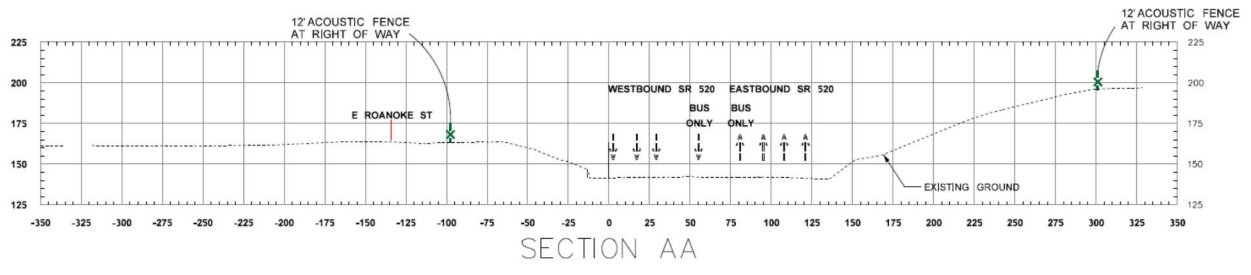


Washington State Department of Transportation
SR 520 Bridge Replacement and HOV Program **520**

U.S. Department of Transportation
Federal Highway Administration

PRELIMINARY
NOT FOR CONSTRUCTION
SUBJECT TO CHANGE WITHOUT NOTIFICATION

ACOUSTIC FENCE ROANOKE LID



Conclusion

WSDOT is completing the application process for a nighttime noise variance because construction crews will need to work at night within the City of Seattle limits during the Portage Bay Bridge and Roanoke Lid Project. Nighttime construction work is necessary to avoid disrupting weekday traffic and to provide a safe environment for construction crews and the traveling public. Since nighttime work will be required, WSDOT would receive this variance from SDCI to set limits for the noise levels of nighttime construction activities.

The noise limits proposed in this noise variance application for the Portage Bay Bridge and Roanoke Lid Project are based on WSDOT and SDCI noise variance coordination efforts and a review of prior SDCI decisions on MPPCNV applications, tailored specifically for major public construction projects, from transportation agencies including WSDOT, Sound Transit and the Seattle Department of Transportation. By applying for a nighttime noise variance, WSDOT is complying with City of Seattle noise code for major public projects.

The SR 520 program is enhancing safety by replacing the highway's aging bridges and keeping the region moving with vital highway and transit facility improvements throughout the corridor. WSDOT understands that constructing this project in a dense, urban environment has an effect on those who live, work, travel, and play in the area. This variance requires WSDOT to implement nighttime noise limits, requires our contractor to implement noise-control measures, and ensures appropriate monitoring and enforcement of our nighttime construction activities, while also ensuring the safety of the public and our crews.

Attachment 1 - Noise Mitigation and Management Plan

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Noise Management and Mitigation Plan

This Noise Management and Mitigation Plan (NMMP) summarizes a noise analysis for the expected construction activities of the Portage Bay Bridge and Roanoke Lid Project of the SR 520 Bridge Replacement and HOV Program. This section was prepared according to the requirements of Section 25.08.655 of the Seattle Municipal Code and Director's Rule DR3-2009, both pertaining to Major Public Project Construction Noise Variances from the City of Seattle Noise Code.

WSDOT has developed expected construction activities and an estimated schedule for the Portage Bay Bridge and Roanoke Lid Project. The analysis in this NMMP section demonstrates that means and methods are available to meet the noise limits requested in this MPPCNV. The contractor will propose their own construction activities and schedule and revise the conceptual NMMP that is included in this application with a detailed NMMP to meet the commitments WSDOT has made in this noise variance application and the MPPCNV issued by SDCI. Construction activities and equipment used may not be specifically identical but are likely to be similar to those identified by WSDOT.

Proposed Nighttime Noise Level Limits

Noise level limits (Exhibit 1-1) were established in the MPPCNV application, and WSDOT Compliance with City of Seattle Criteria for a Major Public Project Construction Noise Variance. The Portage Bay Bridge and Roanoke Lid Project noise variance application proposes a 6 dBA increase over existing hourly average noise levels (L_{eq}) between 10 p.m. and 7 a.m. on weekdays and between 10 p.m. and 9 a.m. on weekends and legal holidays. The noise levels were measured during the quietest part of the nighttime hours (the five-hour period from 12 a.m. to 5 a.m.).

EXHIBIT 1-1. MEASURED HOURLY AVERAGE BASELINE NOISE LEVELS AND PROPOSED EXTERIOR NIGHTTIME NOISE LEVEL LIMITS

Measured Site	Measured 12 to 5 AM Hourly Average L_{eq} (dBA)	Proposed Nighttime Noise Level Hourly Average Limit L_{eq} (dBA)
M1*	65	71
M2	51	57
M3	56	62
M4	60	66
M5*	64	70
M6*	60	66
M7*	72	78
M8	54	60
M9	54	60
M10*	61	67

Measured hourly average L_{eq} noise levels between 12 a.m. and 5 a.m. exceed the City of Seattle Noise Control Ordinance.

*M1, M5 and M6 were taken as part of the SR 520/I-5 Express Lanes Connection Project. M7 and M10 were taken as part of the Montlake Phase Project MPPCNV Applications

Expected Construction Activities

The proposed Portage Bay Bridge and Roanoke Lid Project major construction phases, current estimated durations and schedule are as follows:

- Stage 1 - Retaining walls near Delmar and Portage Bay Bridge North work trestle & substructures (summer/fall 2024 through spring/summer 2025)
 - Create access and work space at Roanoke Lid and Portage Bay Bridge Access Area
 - Work trestle installation at Portage Bay Bridge Access Area
 - Soldier pile installation and cast in place concrete at 10th and Delmar
 - Pier shafts installation
 - Temporary Eastbound off ramp
- Stage 2 - Retaining walls and Lid Construction at Roanoke Lid and Portage Bay Bridge North (summer/fall 2025 to spring/summer 2026)
 - Create access and work space at Roanoke Lid
 - Soldier pile installation, cast in place concrete, girder erection and lid deck construction at 10th and Delmar
 - Continue work trestle, cofferdam and shaft installation at Portage Bay Bridge North Piers
 - Bridge superstructure for Portage Bay Bridge North
 - Temporary mainline structure at the east end of Portage Bay
- Stage 3 – Demolition, retaining walls and Lid Construction at Roanoke Lid and Portage Bay Bridge North (spring/summer 2026 to summer/fall 2027)
 - Continue bridge superstructure construction for Portage Bay Bridge North
 - Drainage, grading, paving and cast in place concrete at approaches to Portage Bay Bridge
 - Demolition of existing 10th and Delmar structures and existing walls
 - Soldier pile installation, cast in place concrete, girder erection, drainage grading and paving at 10th and Delmar
- Stage 4 –Retaining walls and Lid Construction at Roanoke Lid and Portage Bay Bridge South (summer/fall 2027 to winter/spring 2028)
 - Demolition of existing Portage Bay Bridge
 - Cofferdam and shaft installation for the new Portage Bay Bridge South piers
 - Drainage, grading, and paving at approaches to Portage Bay Bridges
 - Demolition of existing walls, soldier pile installation, cast in place concrete, girder erection, drainage grading and paving at 10th and Delmar
- Stage 5 - Retaining walls and Lid Construction at Roanoke Lid and Portage Bay Bridge South (Fall 2027 to Fall 2030)
 - Continue shaft installation for Portage Bay Bridge South
 - Superstructure construction for Portage Bay Bridge South
 - Drainage, grading and paving at approaches to Portage Bay Bridge
 - Cast in place concrete, girder erection, drainage grading and paving at 10th and Delmar
 - Completion of active transportation facilities and landscaping
 - Final lighting, signing and striping

Expected nighttime construction activities, that require a noise variance, are part of some or all of the phases described above. WSDOT has developed an expected schedule in Exhibit 3. The contractor will update the list of equipment and the order and timing of activities in the updated NMMP as necessary and discussed in the section titled “Noise Management and Mitigation Plan” of this report. All construction activities noted are not expected to occur continuously on all nights for consecutive weeks and it is likely that there will be breaks in the activities.

The following are construction activities and equipment that is anticipated to be used during nighttime construction:

- Excavation, embankment and paving (dozer, excavator, trucks, grader, vibratory rollers, asphalt roller, drill rig)
- Concrete sawing (concrete saw, compressors, dump trucks, loader, debris trucks, street sweeper)
- Place forms, rebar and concrete (hydraulic crane, crawler crane, concrete pump, compressors, trucks, concrete trucks)
- Paving, signing, and striping (roller, concrete truck, delivery truck, dump truck, loader, street sweeper, sign and stripe trucks)

Staging areas that are currently being used for other phases of the SR 520 Bridge Replacement and HOV Program will also be used during the Portage Bay Bridge and Roanoke Lid Project for staging equipment and materials for the project. The staging areas are on WSDOT-owned property under I-5 at Fuhrman Avenue near the Ship Canal Bridge and the WSDOT-owned peninsula near the Arboretum. These staging areas, along with a detailed outline of the work area are shown in Attachment 2 to the MPPCNV Application.

Expected Noisiest Nighttime Construction Periods

Projected nighttime major construction L_{eq} noise levels were modeled for selected noise-sensitive receivers using SoundPLAN Version 7.4, a sophisticated three-dimensional graphics-oriented program for outdoor noise propagation. SoundPLAN calculates the L_{eq} by averaging the use of each individual piece of equipment and evenly distributes the activity over an hour. The model includes the effects of topography and intervening barriers in the noise path. For nighttime construction noise estimates, the noisiest nighttime construction activity that would occur at the surface of each construction site and the noisiest equipment during this activity was assumed.

The noisiest major construction activities were modeled to provide a conservative estimate of noise levels. A variety of construction activities are anticipated to occur within the footprint of the Portage Bay Bridge and Roanoke Lid Project, potentially using the equipment outlined in Exhibit 1-2. Construction noise includes truck operations within the construction site and not on haul routes. Haul routes are not regulated under the Seattle Noise Control Ordinance and therefore are not included in this application.

Major construction activities that are expected to be the loudest during the project were modeled for five construction periods to estimate the anticipated highest nighttime construction noise levels.

Construction may not occur on all nights, and construction during other phases of work would generate less noise than those selected for noise modeling. The modeled levels represent the loudest nighttime construction activities that are anticipated over the construction period.

EXHIBIT 1-2. NIGHTTIME CONSTRUCTION EQUIPMENT TYPICAL NOISE LEVELS

Equipment Type	Typical Noise Level (dBA) at 50 Feet
Asphalt roller	80
Bulldozer	82
Compressor without mitigation	81
Compressor with mitigation	71
Concrete pump	82
Concrete truck	88
Crawler crane	83
Delivery truck	88
Diesel generator	81
Drill rig	83
Dump or Debris truck	88
Excavator with crusher	96
Excavator with thumb	96
Forklift	80
Grader	85
Hydraulic crane	88
Loader	85
Street sweeper	80
Vactor Trucks	85
Vibratory roller	80
Vibratory pile hammer	96
Welder	82

Key Takeaway

WSDOT conducted noise modeling of the loudest expected construction activities to provide a conservative estimate of nighttime noise levels.

As a result, the modeled levels represent the loudest nights that are anticipated over the construction period.

Construction may not occur on all nights, and construction during some phases of work would generate less noise than those selected for noise modeling.

Source: August 2006 FHWA Construction Noise Handbook, Section 9:
https://www.fhwa.dot.gov/Environment/noise/construction_noise/handbook/

The construction equipment listed in Exhibit 1-2 is not expected to be used all together at the same time, or on all nights. The measurements are also taken at only 50 feet from the noise source, which is much closer than residences would be to the noise. The noise levels for the expected loudest construction periods and two additional staging areas outside of the immediate project area are described in the following subsections. The construction noise modeling includes activities in staging areas that is anticipated to occur during nighttime hours for each of the evaluated construction periods. Each subsection lists the number and type of construction equipment modeled to estimate the expected highest nighttime construction noise levels.

Construction during other phases of work would generate less noise than those selected for noise modeling. While other phases of work would occur at other locations within the Project Area (Exhibit 1), they would be required to meet the Proposed Nighttime Noise Level Limits at nearby residences, and they would generate similar or less noise than the modeled phases of work. In addition to monitoring stations, the Independent Noise Monitor (INM) will monitor and enforce the requirements of this variance at residences near all nighttime construction activities.

Nighttime Demolition and Impact Work

No nighttime impact work is requested under this MPPCNV. Impact work will be required during nighttime hours for activities adjacent to and over traffic lanes for SR 520 that require SR 520 ramp and mainline closures. These activities include demolition of retaining walls adjacent to SR 520, demolition of the 10th Avenue and Delmar Avenue bridges, and demolition of roadway and existing walls near the Montlake Interchange to shift traffic as the Portage Bay Bridge is constructed. These activities will require nighttime closures of SR 520 mainline, ramps and adjacent streets. Over the course of the 6-year construction period, up to 90 nights of impact work are anticipated. Because specifics on the schedule and equipment that would be used are not currently available, WSDOT has consulted with SDCI to determine that this work will be completed under Temporary Noise Variances (TNVs) that the Design-Build contractor will obtain from SDCI once the work is defined and scheduled. The Design-Build contractor will obtain up to 45 TNVs to conduct nighttime work that is not otherwise covered by this MPPCNV application and will abide by conditions placed by SDCI in their issuance of the TNVs.

WSDOT Noise Modeling Summary

Roanoke Lid – Wall Construction

Modeled nighttime exterior noise levels for wall construction are shown in Exhibit 1-3. These excavation, embankment and paving activities are expected to occur on non-consecutive nights. Equipment used for each activity was estimated to include a dozer, excavator, eight trucks, grader, two vibratory rollers, two asphalt roller, and a drill rig. Exhibit 1-4 shows the noise level contours for this stage of the project. Modeled equipment locations were selected to represent noise levels when equipment is located nearest noise-sensitive receivers.

As described under committed mitigation in the MPPCNV application, a 12-foot-tall temporary noise barrier fence is proposed around the Roanoke Lid construction area as shown conceptually in Exhibit 1-5. No nighttime exceedances are expected in this phase of construction with mitigation (Exhibit 1-3). With the barrier, construction noise levels greater than 65 dBA $L_{eq}(h)$ would not extend beyond the public right-of-way. The models below show that some noise would travel more across the water to the east of the construction areas, although these noise levels (less than 45 dBA) would be below the ambient noise levels and below the City of Seattle nighttime property line standards.

EXHIBIT 1-3. EXTERIOR NIGHTTIME NOISE LEVELS DURING ROANOKE LID RETAINING WALL CONSTRUCTION

Site	Unmitigated $L_{eq}(h)$ Modeled Noise Level (dBA)	Mitigated $L_{eq}(h)$ Modeled Noise Level (dBA)	$L_{eq}(h)$ Proposed Noise Level Limit (dBA)
M1	64	61	71
M2	38	38	57
M3	42	42	62
M4	51	51	66
M5	67	55	70

Note: Noise levels are hourly averages.

EXHIBIT 1-4. ROANOKE LID RETAINING WALL CONSTRUCTION UNMITIGATED

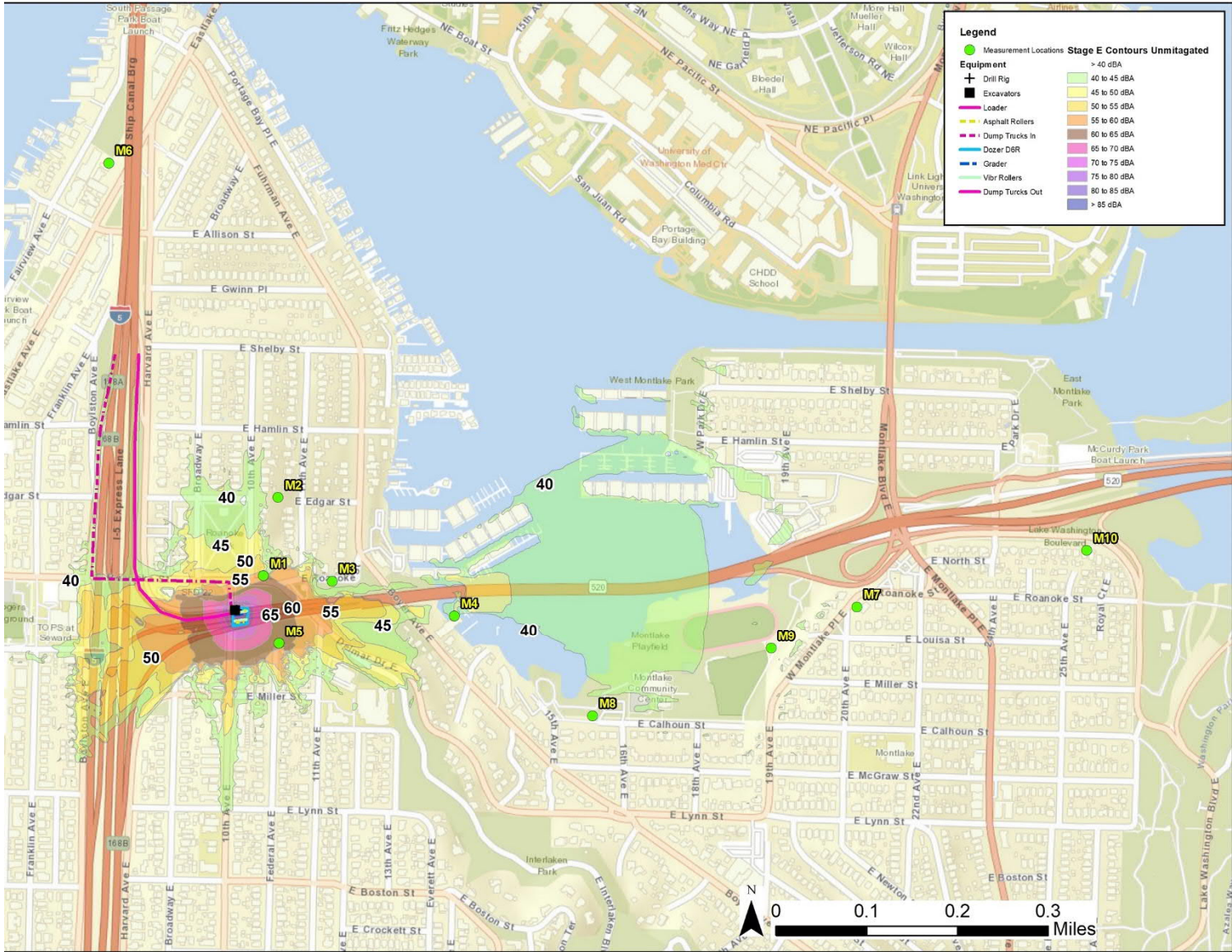
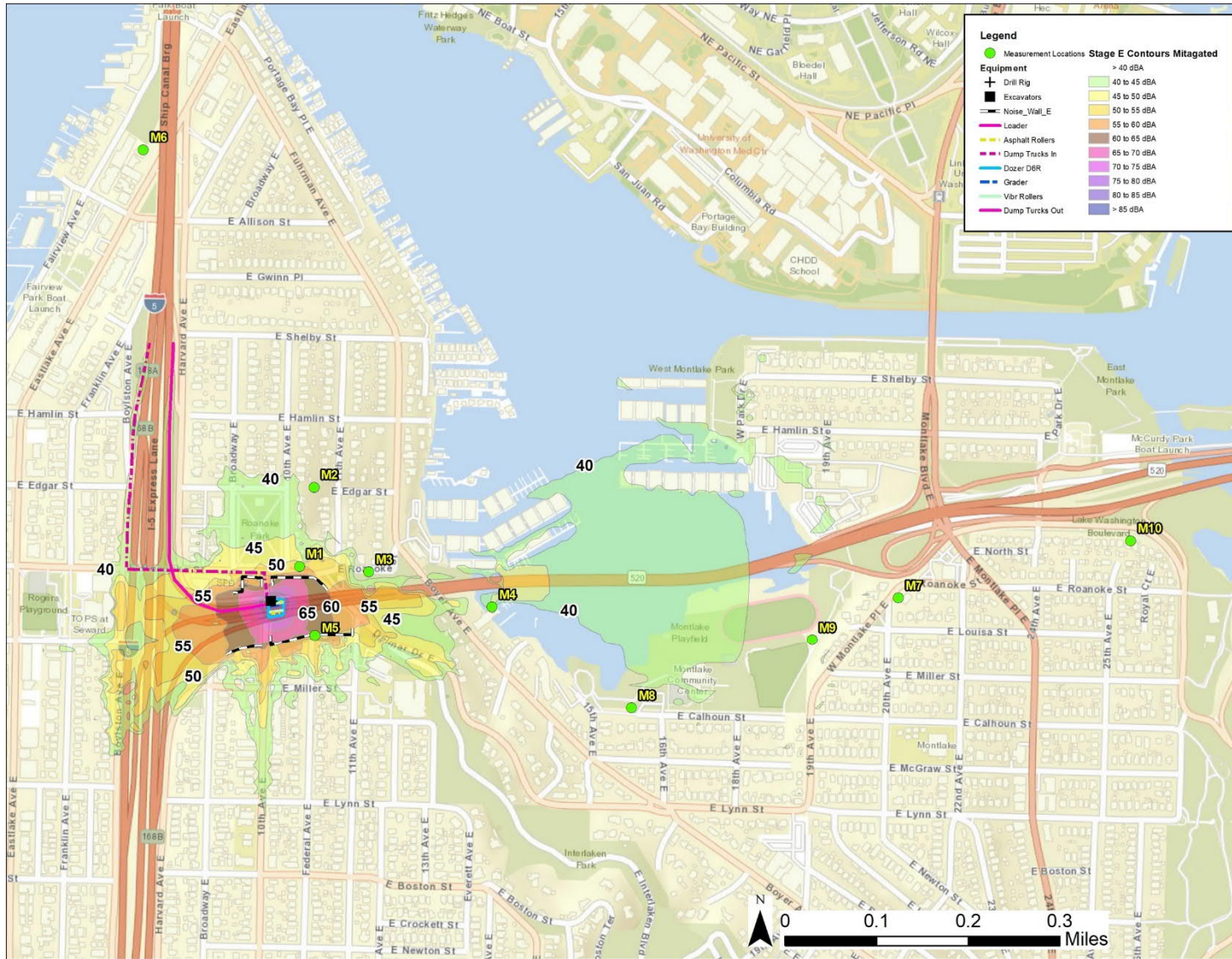


EXHIBIT 1-5. ROANOKE LID RETAINING WALL CONSTRUCTION MITIGATED



Portage Bay Bridge – Shaft Construction West

Modeled exterior nighttime noise levels for the construction of the shafts on the west side of the Portage Bay Bridge are shown in Exhibit 1-6. This stage represents the loudest activities that would occur in close proximity to residential uses at the west side of Portage Bay. The majority of this effort would occur during daytime hours. The shafts would be constructed by vibrating a casing into the ground, then auguring out the earth, a rebar cage would then be placed in the hole, and concrete would be pumped in. New casings would not be vibrated in if they could not be completed during daytime hours; however, some activity, such as completion of concrete pours could extend into nighttime hours. Impact activities required for demolition of the existing Portage Bay Bridge and construction of the replacement bridges would be limited to daytime hours only.

The modeled equipment for this activity includes, a crawler crane, a concrete pump, three compressors, and eight concrete trucks and eight hauling trucks. While the equipment was modeled to be operating at the same time to represent a loudest possible condition, not all of the equipment would operate at once.

If shaft construction is completed at night, noise levels without mitigation could exceed the $L_{eq}(h)$ noise level limit (Exhibit 1-7) at site M4. Temporary noise shields around the equipment would be required if shaft construction is completed at night (Exhibit 1-8). The models below show that some noise would travel across the water to the east of the construction areas, although these noise levels (less than 45 dBA) would be below the ambient noise levels and below the City of Seattle nighttime property line standards.

EXHIBIT 1-6. EXTERIOR NIGHTTIME SHAFT CONSTRUCTION

Site	Unmitigated $L_{eq}(h)$ Modeled Noise Level (dBA)	Mitigated $L_{eq}(h)$ Modeled Noise Level (dBA)	$L_{eq}(h)$ Proposed Noise Level Limit (dBA)
M1	45	44	71
M2	45	45	57
M3	54	54	62
M4	72	64	66
M5	45	44	70

Note: Noise levels are hourly averages.

EXHIBIT 1-7. SHAFT CONSTRUCTION WEST UNMITIGATED

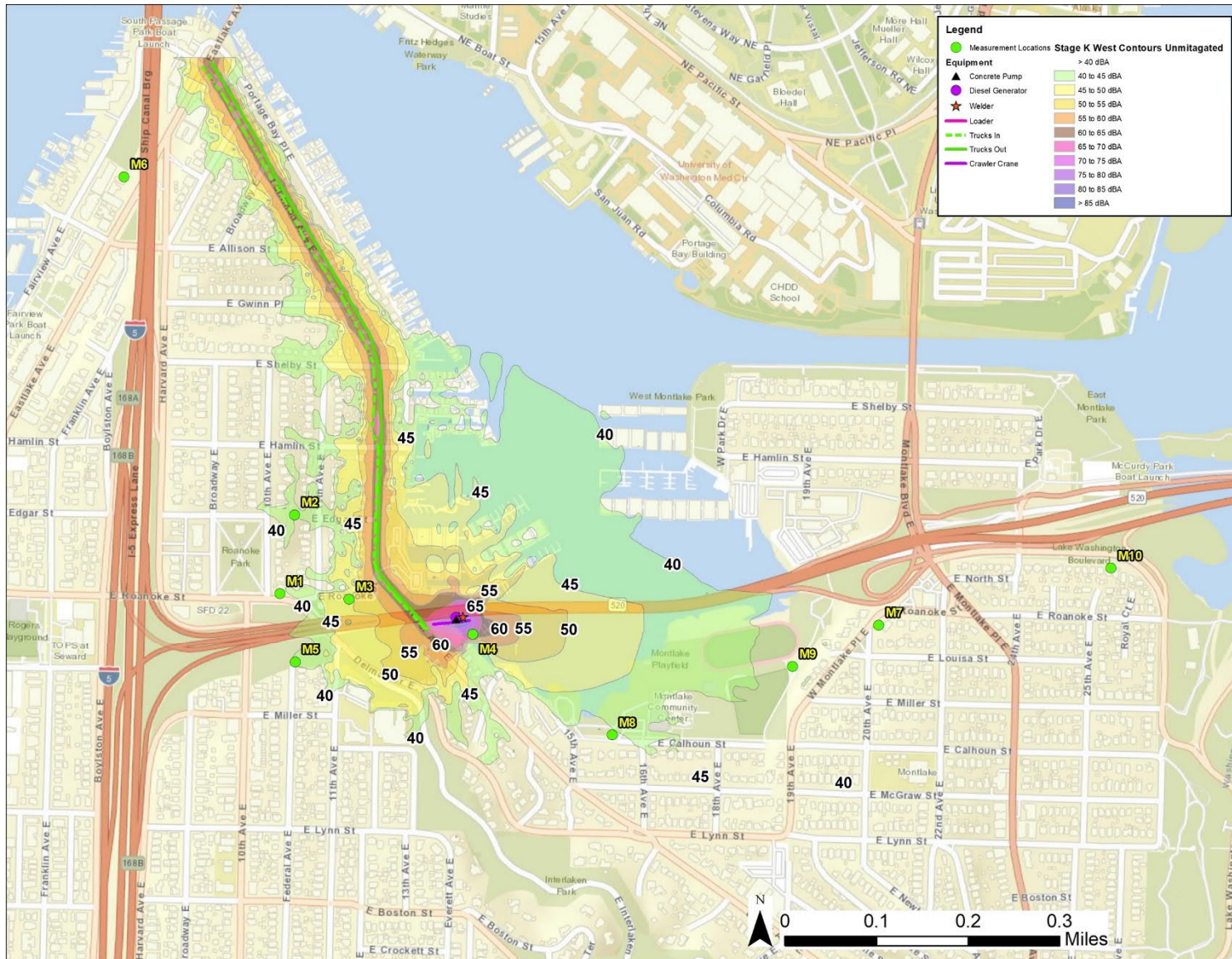
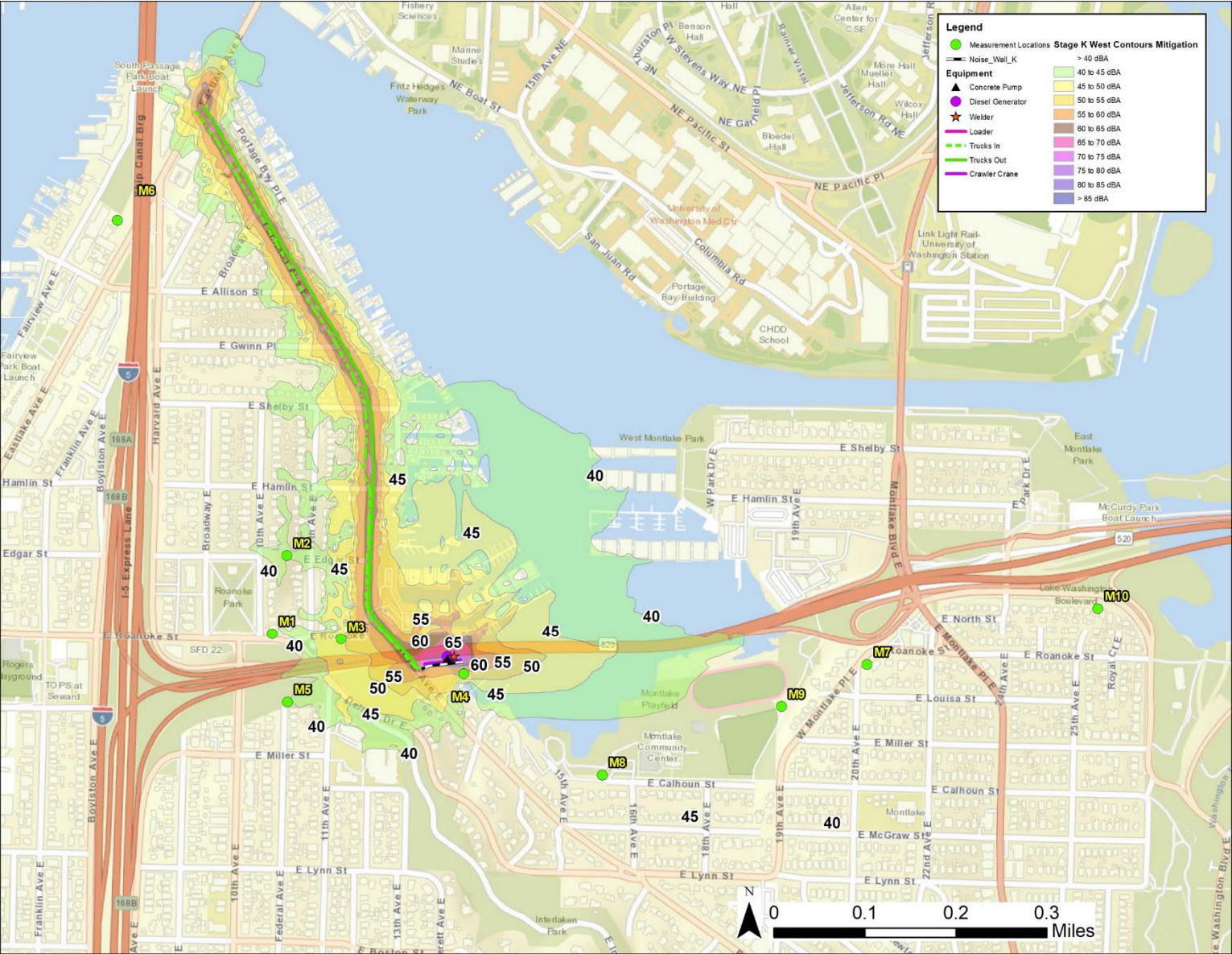


EXHIBIT 1-8. SHAFT CONSTRUCTION WEST MITIGATED



Portage Bay Bridge – Shaft Construction East

Modeled exterior nighttime noise levels for the construction of the shafts on the east side of the Portage Bay Bridge are shown in Exhibit 1-9. This stage, along with the demolition modeled above, represents the loudest activities that would occur in close proximity to residential uses at the east side of Portage Bay. The majority of this effort would occur during daytime hours. The shafts would be constructed by vibrating a casing into the ground, then auguring out the earth, a rebar cage would then be placed in the hole, and concrete would be pumped in. New casings would not be vibrated in if they could not be completed during daytime hours; however, some activity, such as completion of concrete pours could extend into nighttime hours.

The modeled equipment for this activity includes a crawler crane, a concrete pump, three compressors, and eight concrete trucks and eight hauling trucks. While the equipment was modeled to be operating at the same time to represent a loudest possible condition, not all equipment would operate at once.

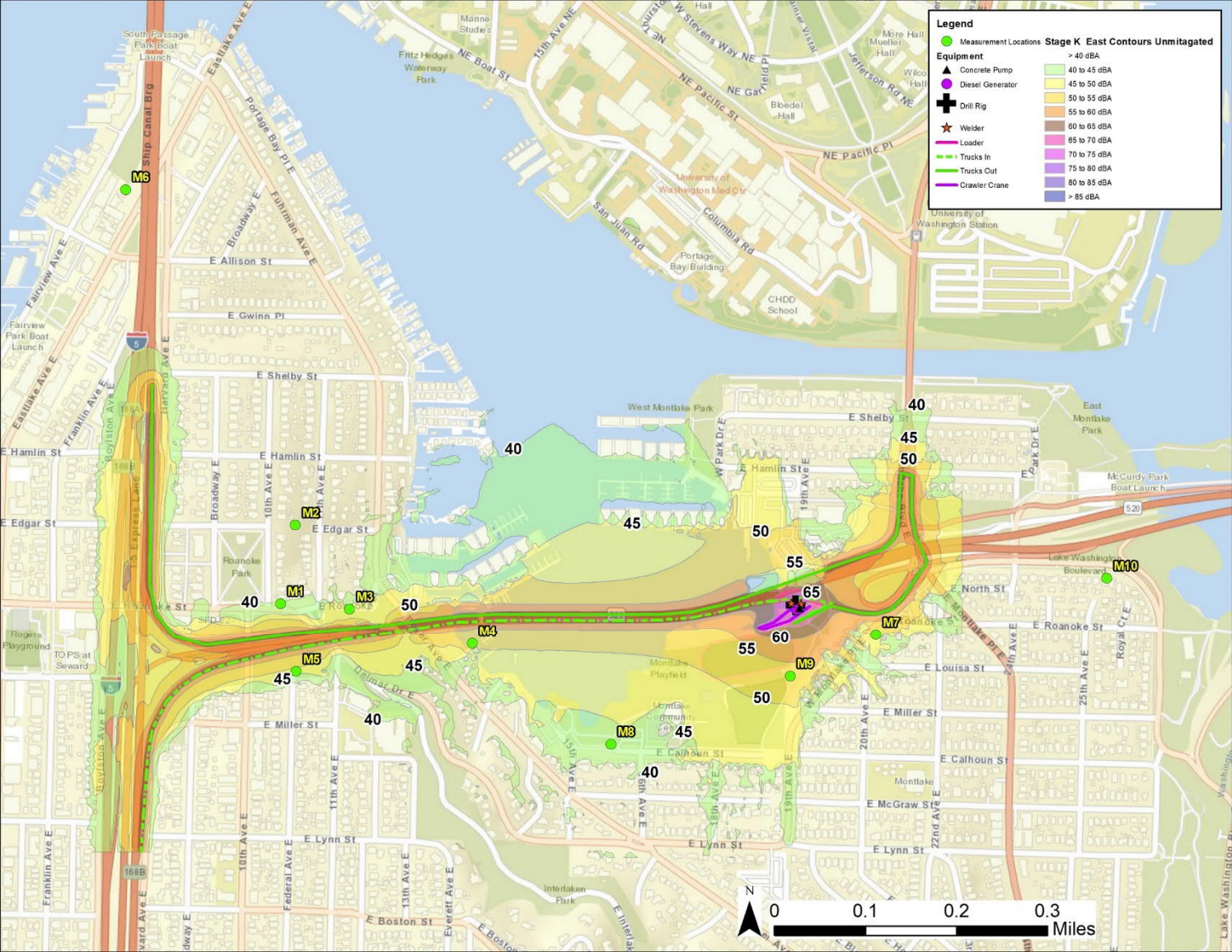
Noise levels would be below the $L_{eq}(h)$ noise level limits at the nearest residential locations (Exhibit 1-10). Noise experienced at Sites M1, M2, M3, and M5 would be a result of delivery trucks operating on public roadways, which is exempt from City of Seattle regulation and would be below ambient levels in those locations. The model results below show that some noise would travel across the water to the west of the construction areas; these noise levels would be below the ambient noise levels.

EXHIBIT 1-9. EXTERIOR NIGHTTIME SHAFT CONSTRUCTION

Site	Unmitigated $L_{eq}(h)$ Modeled Noise Level (dBA)	$L_{eq}(h)$ Proposed Noise Level Limit (dBA)
M1	47	71
M2	38	57
M3	50	62
M4	57	66
M5	52	70
M7	53	78
M8	46	60
M9	53	60

Note: Noise levels are hourly averages.

EXHIBIT 1-10. SHAFT CONSTRUCTION EAST



Portage Bay Bridge and Roanoke Lid Project – Additional Staging Areas

Two staging areas that are currently being used for other phases of the SR 520 Bridge Replacement and HOV Program will also be used for the Portage Bay Bridge and Roanoke Lid Project. They are both on WSDOT-owned property. The first one is under I-5 at Fuhrman Avenue near the Ship Canal Bridge and the second is the WSDOT-owned peninsula near the Arboretum. Modeled exterior nighttime noise levels in the vicinity of the off-site staging areas for the Portage Bay Bridge and Roanoke Lid Project are tabulated in Exhibit 1-11 and illustrated in Exhibit 1-12 and Exhibit 1-13. Equipment used for this activity was estimated to include trucks, cranes, and loaders operating within the staging areas. The material storage and handling would include nighttime deliveries and providing equipment and materials for nighttime construction. Near both the Fuhrman Avenue and WSDOT Peninsula sites, nighttime noise levels would generally be less than 55 dBA at nearby residences (Exhibit 1-12 and Exhibit 1-13).

EXHIBIT 1-11. EXTERIOR NIGHTTIME NOISE LEVELS AT ADDITIONAL STAGING AREAS

Site	Unmitigated $L_{eq}(h)$ Modeled Noise Level (dBA)	$L_{eq}(h)$ Proposed Noise Level Limit (dBA)
M6	53	66
M10	40	67

EXHIBIT 1-12. FUHRMAN AVENUE EAST STAGING AREA

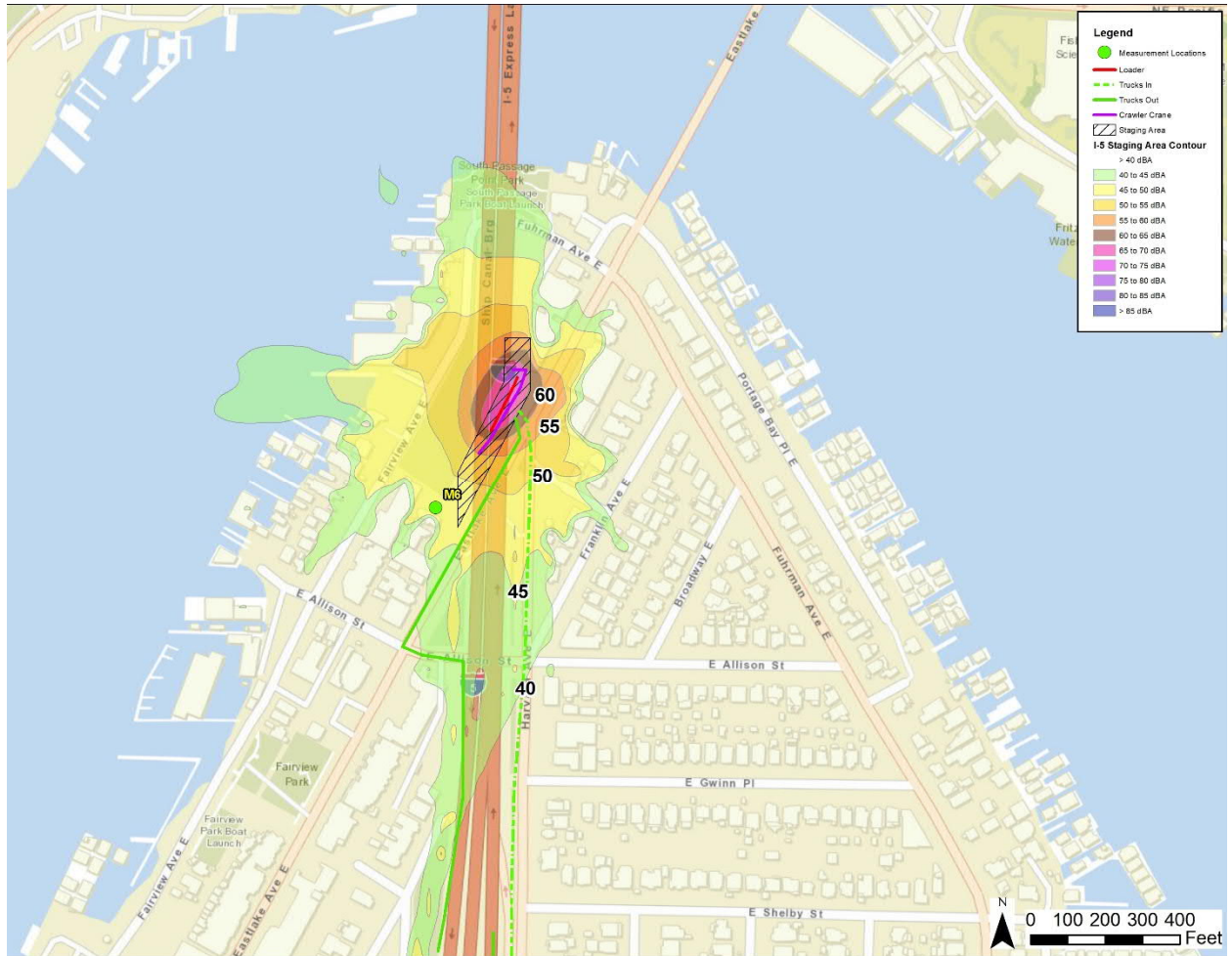
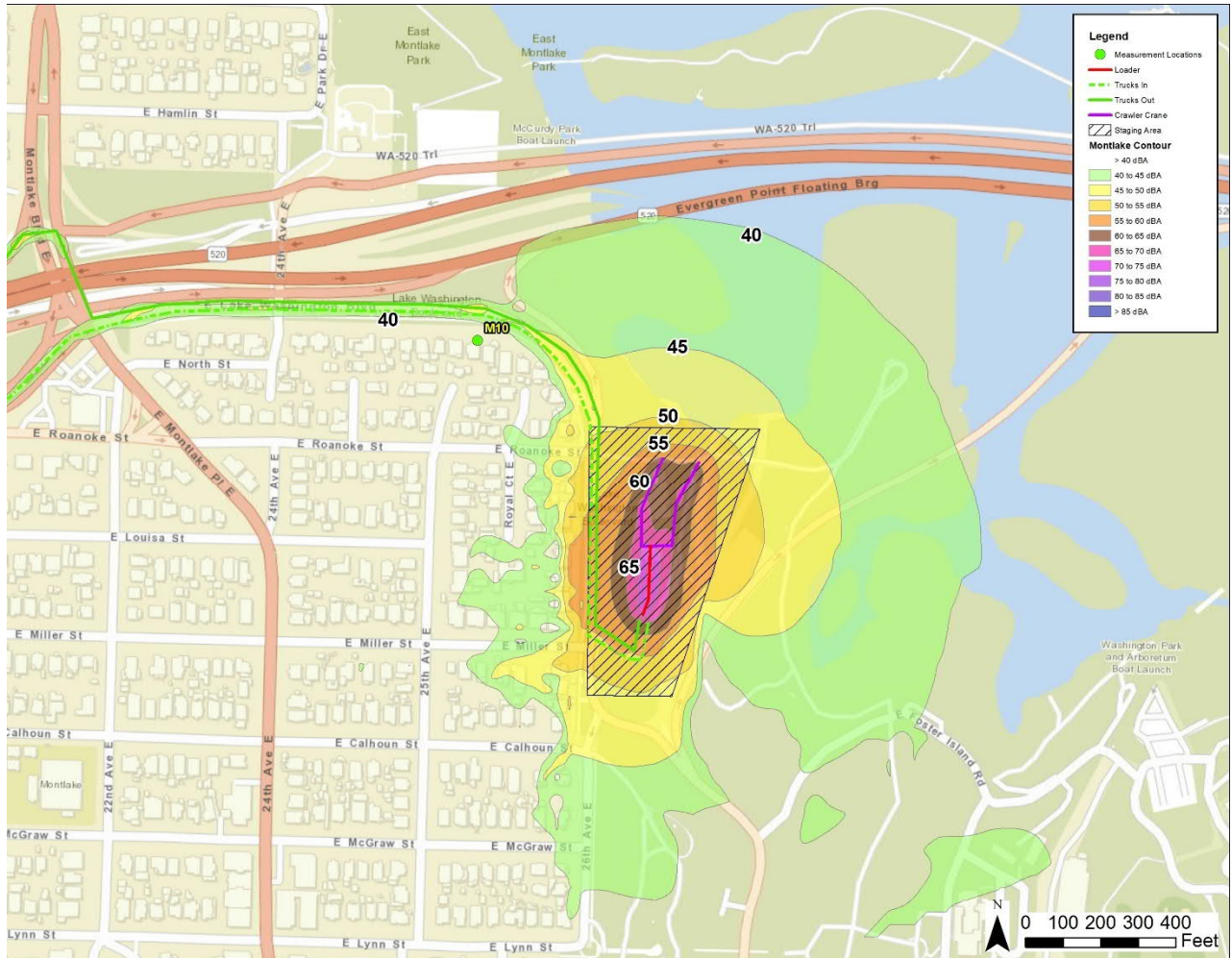


EXHIBIT 1-13. WSDOT PENINSULA STAGING AREA



Proposed Noise Mitigation Measures

Required Minimum Mitigation Measures

The contractor will perform the following minimum mitigation measures to minimize nighttime construction noise, except in the case of emergency, as defined by the Seattle Noise Control Ordinance (SMC 25.08.110), whenever the contractors work between 10 p.m. and 7 a.m. Monday through Friday, or between 10 p.m. and 9 a.m. Saturday through Sunday and legal holidays, and exceeds the local ordinance noise levels:

- The contractor will meet the noise level limits established in the noise variance.
- The contractor will design and install a temporary noise-barrier fence around the Roanoke Lid construction area that is compatible with their final design and staging plan and that provides construction noise reduction to adjacent properties. The fence will be installed prior to nighttime demolition work and maintained for the duration of substantial nighttime construction of the Roanoke Lid.
- If the contractor installs shafts for the new Portage Bay Bridge at night, the contractor will use temporary noise shields around the equipment or install a temporary barrier during the shaft construction on the west side of Portage Bay.
- The contractor will use broadband or strobe backup warning devices or use backup observers in lieu of backup warning devices for all equipment, in compliance with Washington Administration Code, Sections 296-155-610 and 296-155-615. For dump trucks, if the surrounding noise level is so loud that broadband or strobe backup warning devices are not effective, then an observer must be used (WAC 296-155-610). This condition will apply to activity conducted between 10 p.m. and 7 a.m., Monday through Friday, and between 10 p.m. and 9 a.m. on Saturday, Sunday, and legal holidays. No pure-tone backup warning devices will be used after 10 p.m. and before 7 a.m. weekdays or 9 a.m. weekends and legal holidays.
- There will be no impact work undertaken under this MPPCNPV such as auger shaking, striking pavement with an excavator bucket, jack hammering, impact wrenches, and impact pile driving, during nighttime hours from 10 p.m. to 7 a.m. on weekdays and 10 p.m. to 9 a.m. on weekends and legal holidays.
- The contractor will securely fasten truck tailgates.
- The contractor will use sand, rubber or plastic lined truck beds for all haul-trucks to reduce noise, unless an exception is approved by WSDOT.
- The contractor will not use compression brakes.
- The contractor will not leave equipment to idle for longer than five minutes.
- The contractor will use temporary noise mitigation shields, enclose, or use low noise-generating stationary equipment, such as light plants, generators, pumps, and air compressors near residences where practical.

Additional Noise-Control Measures

The contractor will submit to WSDOT an updated NMMP to reflect changes to their specific construction means and methods and will detail any additional mitigation measures needed to meet the noise level limits established in the noise variance. Once WSDOT has reviewed and accepted the NMMP, the contractor will submit it to SDCI. Additional mitigation measures that the contractor could also use as necessary are listed below:

- Equip nighttime surface equipment with high-grade engine-exhaust silencers and engine-casing sound insulation.
- Use electric welders powered from utility main lines instead of gas, diesel, or internal combustion generators/welders.
- Use critical or double mufflers where practicable on machinery for off-road use, such as cranes.
- Use noise blankets, skirts, or other available means for mobile equipment to mitigate noise that does not unreasonably interfere with the operation of the equipment.
- Use temporary mobile noise barriers in the immediate vicinity of loud activities nearby residences.
- Provide earplugs and white noise machines to residents near the project area.
- Install temporary sound dampening drapes for residents.
- Offer hotel rooms to residents during extremely noisy operations.

Compliance Monitoring and Reporting

Director's Rule 3-2009, Section C.2, requires that WSDOT provide for an onsite inspector to serve as an Independent Noise Monitor (INM). The INM may be an individual, firm, or contracted staff member within SDCI who is independent from the contractor and who will oversee the monitoring of sound levels from construction covered by the MPPCNV and report directly to the SDCI Coordinator for Noise Abatement. WSDOT plans to dedicate the resources needed to have a WSDOT-trained inspector on-site to perform the duties of the INM.

The contractor will create a Noise Monitoring Plan as part of the NMMP. The contractor will take noise measurements continuously during nighttime hours using automated noise monitoring equipment that is consistent with the American National Standards Institute Standards to Type 1 or Type 2 and that allows for remote access to real time results available to SDCI, WSDOT, and the contractor. Real time access is defined as no more than a 5-minute lag between the event in the field and being able to view the corresponding noise levels remotely. The noise monitoring equipment will have the capability to log continuous 1-second and hourly L_{eq} sound levels and hourly L_1 sound levels. The noise monitoring equipment will also have the capability to send an automated alert to the INM and initiate a 30 second recording of audio files when the 1-second L_{eq} sound-level exceeds a threshold of 5 dBA above the hourly L_{eq} noise level limit (Exhibit 1-14).

EXHIBIT 1-14. PROPOSED ALERT LEVELS FOR REAL-TIME MONITORING

Measured Site	Measured 12 to 5 AM Log Hourly Average L_{eq} (dBA)	Proposed Hourly Average Noise Level Limit L_{eq} (dBA)	One-second Alert and Audio recording Threshold L_{eq} (1-second) (dBA)
M1	65	71	76
M2	51	57	62
M3	56	62	67
M4	60	66	71
M5	64	70	75
M6	60	66	71
M7	72	78	83
M8	54	60	65
M9	54	60	65
M10	61	67	72

When any nighttime construction work is occurring in the areas identified in this MPPCNV application, the noise monitoring equipment will automatically, within 5 minutes of occurrence, send notification alerts to the INM:

- On the hour for when there was an actual 1-hour exceedance
- Anytime the one-second alert and audio recording thresholds.

The contractor's Noise Monitoring Plan will identify the type and location of monitoring equipment. There will be a minimum of two noise monitoring stations placed at or near the residences affected by the construction when construction is occurring during nighttime hours. Generally, a monitor will be placed in the vicinity of the ten monitoring locations (sites M1, M2, M3, M4, M5, M6, M7, M8, M9, and M10) at specific locations to be identified in the NMMP when construction or material handling is occurring within 500 feet of the monitoring site.

If the monitoring equipment detects an exceedance of any of the following the MPPCNV nighttime limits or thresholds:

- hourly noise level limits,
- one-second alert and audio recording threshold levels.

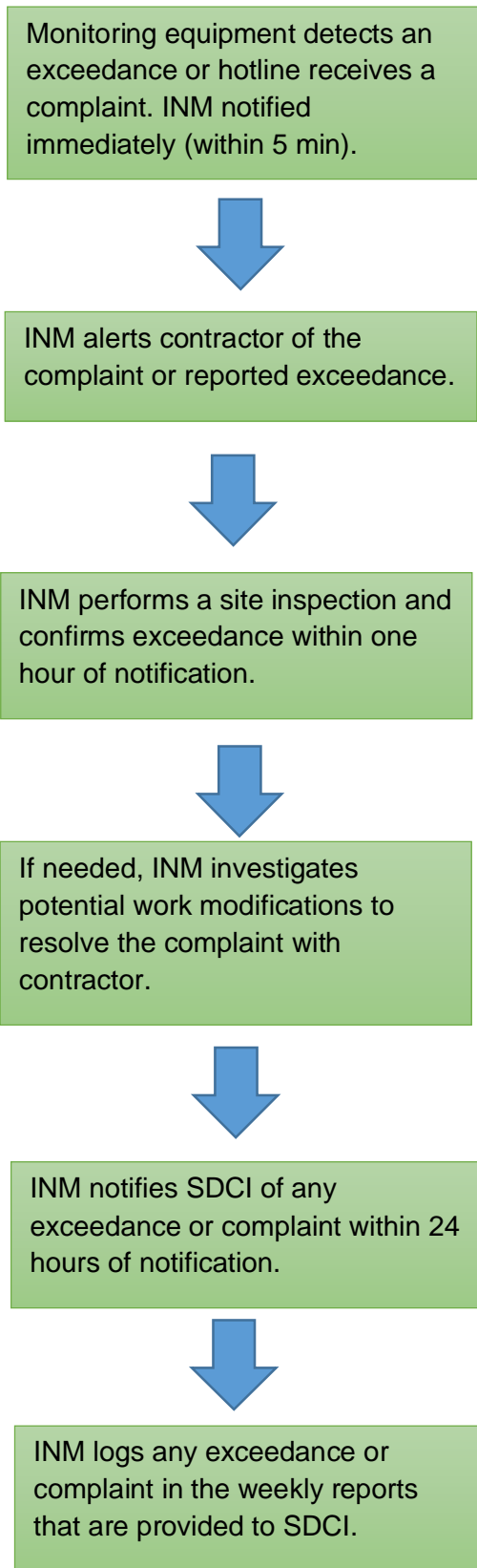
The INM will be notified automatically, within 5 minutes, by the monitoring system. If a caller to the hotline has a noise-related complaint the INM will be notified with the caller's complaint. The hotline staff will ask the caller if they would like to be called back within the hour or follow up the next day. The INM will be on-site during all periods of scheduled night work. If the INM receives a complaint call during nighttime work hours, the INM will notify the contractor and other WSDOT inspection staff on the job, perform a site inspection within 60 minutes of receiving the complaint, conduct short-term noise measurements (minimum 15 minutes per location) while on-site to confirm whether an exceedance of the MPPCNV sound-level limits is occurring, and investigate potential work modifications to resolve the complaint. INM's regular duties include, but are not limited to:

- Coordinating with WSDOT and contractor's nighttime crews about planned work operations.
- Coordinating with WSDOT Communications Team and Ombudsman on any updates or concerns from neighborhood and residents.
- Coordinating with SDCI on any questions or concerns from the City regarding project noise.
- Conducting nightly verification of fixed noise monitoring stations with hand-held noise monitor to validate noise monitoring results from the fixed locations.
- Conducting regular spot-check noise monitoring at various locations of the project site with hand-held monitor.
- Addressing noise exceedances and monitoring alarms in the field.

Audio files recordings generated when the 1-second L_{eq} sound-level exceeds the audio recording threshold will be stored and made available to SDCI for at least 1 year from the recording date.

The Noise Monitoring Plan will also include a provision to generate weekly and annual reports that are required as part of Director's Rule 3-2009. The Design-Build contractor will provide the INM with weekly monitoring data records and field logs. The data records will include both hourly L_{eq} and L_1 data for nighttime hours (between 10 p.m. and 7 a.m. on weekdays and between 10 p.m. and 9 a.m. on weekends and legal holidays). The INM will provide the reports to SDCI and will include any monitored $L_{eq}(h)$ exceedances, noise complaints logged in the program database, and work modifications completed to resolve complaints. The reporting structure for noncompliance or a noise complaint is detailed in Exhibit 1-15. The weekly reports will be publicly available.

EXHIBIT 1-15. REPORTING STRUCTURE FOR NON-COMPLIANCE



Public Outreach and Community Involvement

WSDOT believes public involvement is essential to a project's development and has implemented a comprehensive and ongoing public involvement program for the SR 520 Bridge Replacement and HOV Program. During construction of the Portage Bay Bridge and Roanoke Lid Project, WSDOT's communications team, in coordination with the City of Seattle and the selected contractor, will provide up-to-date information on construction activities and construction noise to neighbors and stakeholders.

WSDOT's approach to construction communications and descriptions of the various communications tools and activities are included below. WSDOT will keep the public informed of construction activities, promote two-way communication with the community, and work to minimize construction impacts.

The key elements of the Portage Bay Bridge and Roanoke Lid Project communications plan are outlined below.

Written Materials

WSDOT uses a variety of written materials to provide advance notification and keep people informed of construction activities. All written materials have program contact information, including the email address, website, and the 24-hour live telephone construction hotline number. Examples of these types of materials include:

- Fact sheets to provide background information for the type of work occurring.
- Fliers which are often delivered door-to-door when there are localized construction impacts.
- Mailers which are sent to neighbors in compliance with permitting requirements.

In-person Public Engagement Activities

WSDOT provides a wide range of opportunities for community members to connect face-to-face with SR 520 Program staff. These opportunities provide an additional opportunity for the public to voice questions and concerns regarding the SR 520 Program.

Recent In-person Events and Meetings

- In preparation for the Portage Bay Bridge and Roanoke Lid Project nighttime noise application, WSDOT hosted a public information session on 1/12/2022 to provide an opportunity for community members to learn about the application process and share concerns about construction noise for the Portage Bay Bridge and Roanoke Lid Project. Information collected at this meeting resulted in additional noise measurements and analysis and refining proposed mitigation approaches for the project.
- Meetings with University of Washington on 1/24/2022 and NOAA NW Fisheries Science Center on 3/16/2022 to discuss construction noise at their public institutions.
- WSDOT also recently held two frontline neighbor meetings on 4/14/2022 and 4/18/2022, noise was discussed as part of the overall impacts to the frontline neighbors.

Planned and Ongoing In-person Events and Meetings

- Pre-construction outreach with the future Design-Build contractor prior to the beginning of major construction activities.
- Regular public construction meetings provide timely updates on construction progress and upcoming activities throughout Portage Bay Bridge and Roanoke Lid Project construction.
- SR 520 Program briefings provided to community groups as requested.

Online and Electronic Communications

WSDOT uses a combination of the following online and electronic communications to keep community members informed of upcoming and ongoing construction activities:

- WSDOT maintains an electronic mailing list, and regular e-mail updates are sent to provide status updates and information on current activities.
- The project website is updated regularly and provides the latest design and construction information.
- WSDOT collaborates with other agencies and organizations to provide information in their respective e-mail updates or websites.
- SR 520 social media accounts are maintained on Twitter, Flickr, and YouTube.
- A 24-hour live telephone construction hotline will be maintained for the Portage Bay Bridge and Roanoke Lid Project. Real-time responses to immediate concerns and updates of the project status and current construction activities and impacts will be provided.
- During business hours, community members may contact the SR 520 Program Information Line for non-urgent, general project information.
- Detailed responses will be provided to emails received via the project e-mail address.
- Highway advisory radio, variable message signs, active traffic management signs, and project identification signs will be used as needed.




Media Relations and Social Media

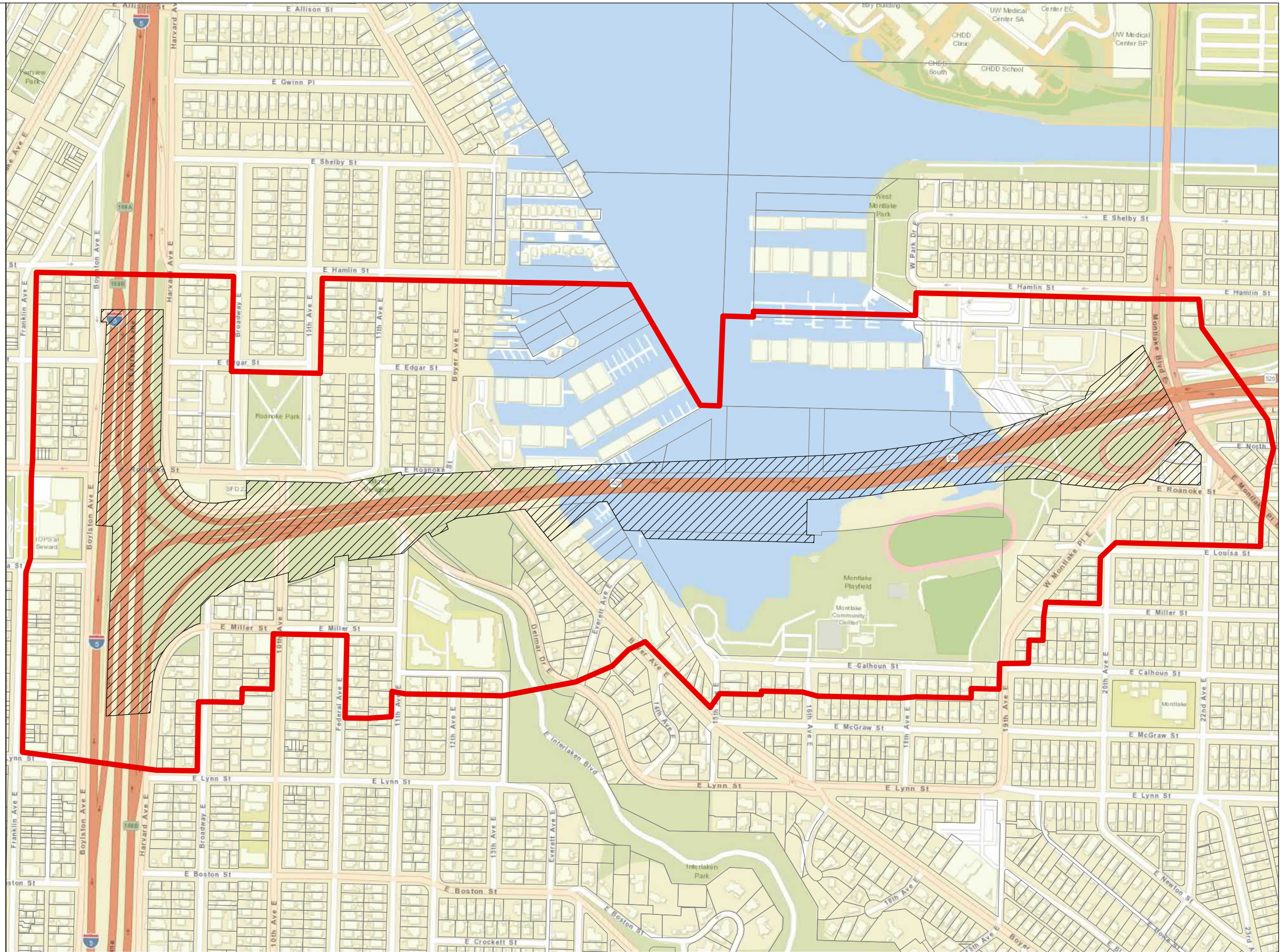
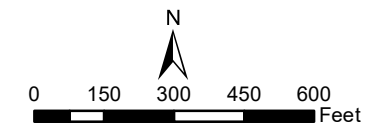
WSDOT is able to reach a wide range of public located along the SR 520 corridor through the following means of mass communication:

- Community blogs and newspapers
- Regional print and broadcast media outlets
- Regular use of Twitter and Flickr social media accounts




Attachment 2: Project Area and Notification Area

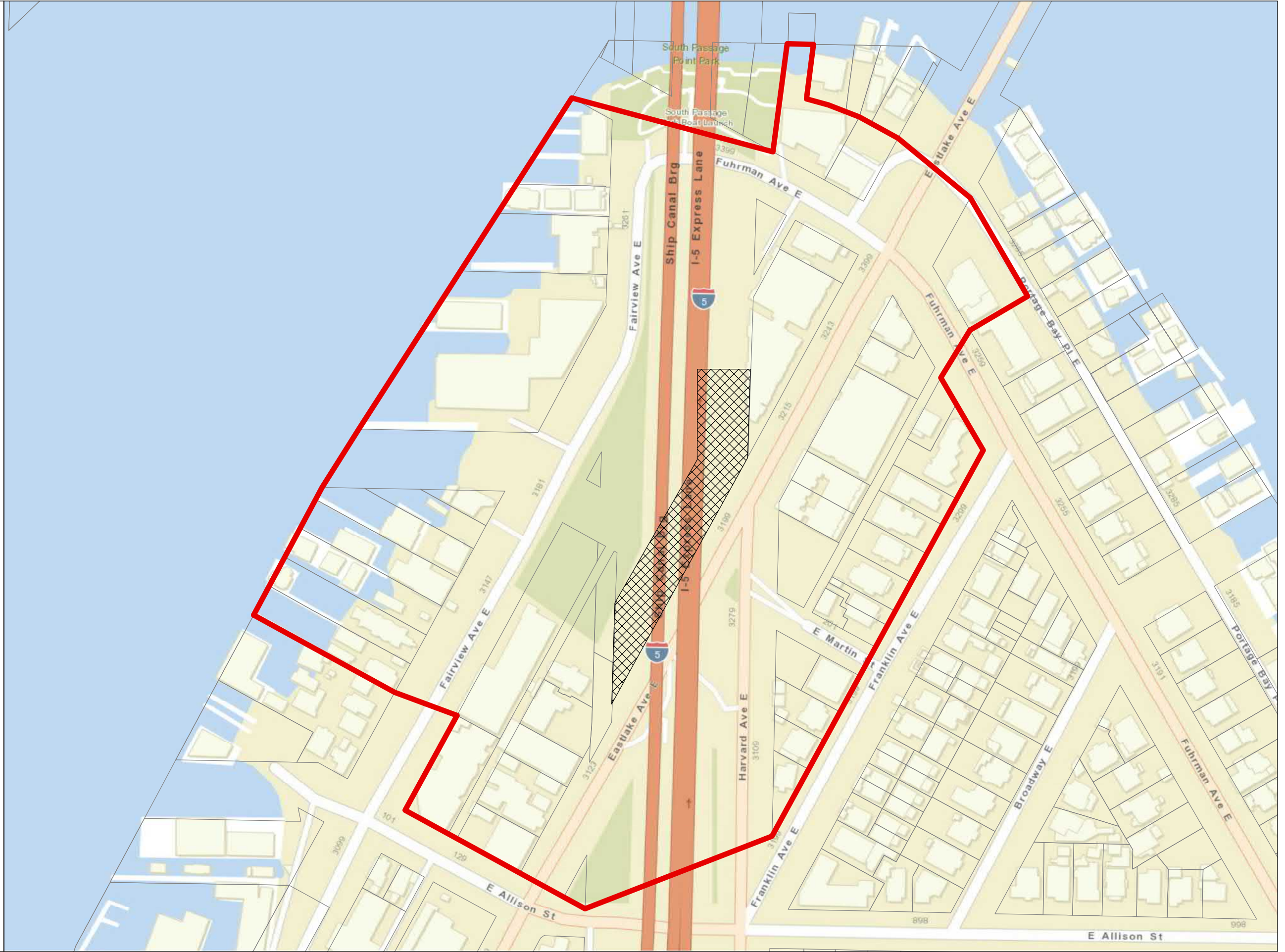
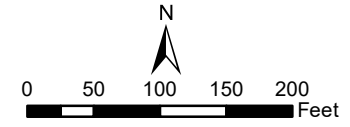
Legend

-  Outreach Area
-  Parcel Boundary
-  Proposed Work Area






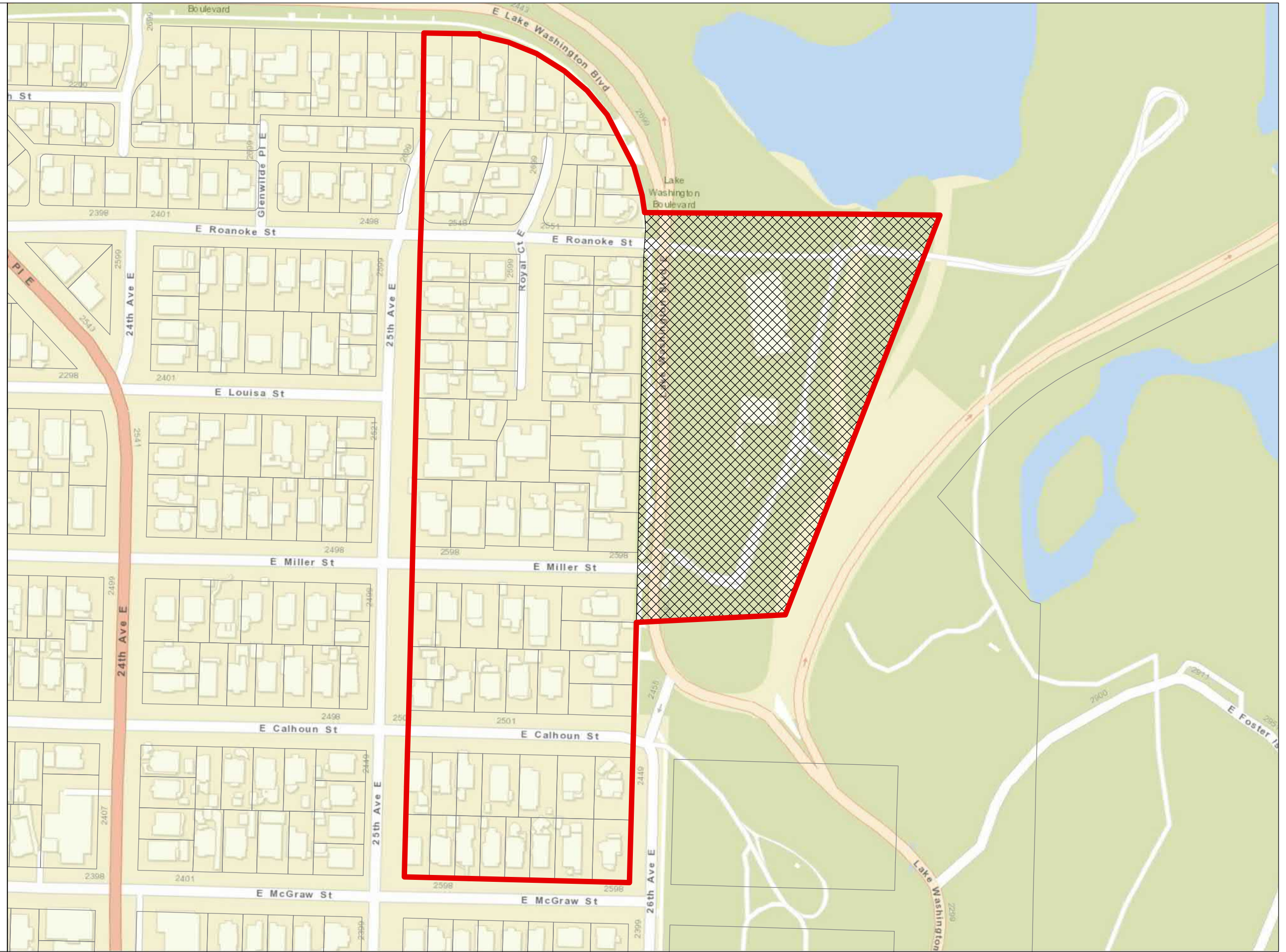
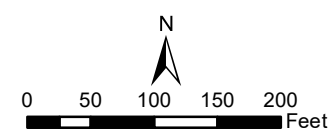
Legend

-  Outreach Area
-  Parcel Boundary
-  Staging Area



Legend

-  Outreach Area
-  Parcel Boundary
-  Staging Area



Attachment 3 - Baseline Noise Monitoring Data

Site M1* - Table below from the SR 520/I-5 Express Lanes Connection Project MPPPCNV Application (June 2019) labeled as M5, but is M1* for this PBB MPPPCNV

Existing Sound Levels at M1*	Leq								Lmax							
	Wednesday April 3, 2019	Thursday April 4, 2019	Friday April 5, 2019	Saturday April 6, 2019	Sunday April 7, 2019	Monday April 8, 2019	Tuesday April 9, 2019	Wednesday April 10, 2019	Wednesday April 3, 2019	Thursday April 4, 2019	Friday April 5, 2019	Saturday April 6, 2019	Sunday April 7, 2019	Monday April 8, 2019	Tuesday April 9, 2019	Wednesday April 10, 2019
Midnight Hour		66.5	66.1	69.4	69.1	65.2	65.4	65.6		78	78.3	85	87	78.1	77.3	75.5
1:00 AM		63.6	64.4	67.1	67.1	62.8	63.1	64.7		77.1	78.4	79.7	75.8	74.1	83.5	75.6
2:00 AM		63.1	62.6	65	65.6	61.8	61.8	76.8		77.5	76.2	75.2	78.2	77.7	75.6	83.5
3:00 AM		63.2	62.6	62.7	62.7	62.8	62.2	77		78.5	75.3	75.2	74.3	77.5	75.8	83.6
4:00 AM		66.6	66.4	63	62.2	65.9	66.6	68.2		76.6	78.5	75.8	73.7	77.2	77.3	81
5:00 AM		70.9	70.5	65.8	64.5	70.5	71.1	70.9		78.1	79.8	76.5	76.8	79	83.6	79.5
6:00 AM		74.4	74.1	69.1	68.4	74.1	74.7	74.1		84.9	84.1	80.2	77.3	80.8	81.4	80.5
7:00 AM		75.7	76.0	71.5	70.4	76.1	76.5	76.6		84.8	88.5	79.8	81.2	83.1	85.3	97
8:00 AM		74.6	75.7	73.3	71.8	74.9	74.9	75		83.6	84.8	79.6	78.2	83.2	81.3	83.2
9:00 AM		76	75.4	74.3	73.7	75.6	75.5	75.6		92	84.4	80.6	80.9	81.8	82	84.2
10:00 AM		75.3	74.8	75	74.6	75.3	75.4	75.5		84.3	81.6	80.7	79.3	82.1	82.2	87.7
11:00 AM		74.9	74.8	75	75	74.9	76.8	75.8		85.7	80.4	81.3	89.1	80.9	103.3	86.1
Noon hour		74.6	74.7	74.8	75.1	74.7	75	75.4		83.3	83.6	81.6	79.7	82.4	83.7	85.6
1:00 PM		74.8	75.0	73.1	75.1	74.6	75.1			84.2	89.5	88.4	83.1	79.6	80.8	
2:00 PM		74.3	73.8	75.1	74.8	75.1	75.2			82.1	81.9	90.3	85.6	85.9	86.4	
3:00 PM		73.6	73.8	75.1	75	75.2	75.1			82.7	86.9	84.2	94.3	86.3	80.6	
4:00 PM		73.8	74.6	75	74.5	75.2	75.1			84.7	90.3	83.5	80.1	84.2	84.9	
5:00 PM	75.2	74.1	74.8	75.1	74.2	74.8	75.1		81.9	79.9	84.9	79.5	79.2	79.3	81.5	
6:00 PM	74.5	74.4	75.3	74.8	74.2	75.2	75.4		84.4	82.5	82.8	80.6	94	79.5	86.4	
7:00 PM	74.8	74.2	74.8	73.7	73.3	74.1	74.7		79.5	80.6	87.8	83.3	84.1	79.4	84.7	
8:00 PM	73.7	73.2	73.5	72.9	72.6	72.8	73.3		83.3	78.6	79.2	89.8	86.7	80.8	82.8	
9:00 PM	72.9	72.7	72.9	72.8	71.8	72.2	72.1		80.2	79.1	79.0	79.1	79.3	79	82.6	
10:00 PM	71.4	71.3	72.3	72.3	70.4	70.2	70.2		82.8	83.5	80.4	78.4	78.5	77.9	78.5	
11:00 PM	69.3	69	70.9	70.7	68	67.7	68.6		81	84.7	81.7	77.3	77.6	76.6	87.5	

Existing Sound Levels at M2									
	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
	March 3, 2022	March 4, 2022	March 5, 2022	March 6, 2022	March 7, 2022	March 8, 2022	March 9, 2022	March 10, 2022	March 11, 2022
Midnight Hour		52.9	56.1	57.3	53.8	51.8	51.4	53.3	51.7
1:00 AM		50.9	53.5	56.6	50.7	48.4	48	52.3	50.9
2:00 AM		49.6	52.1	54.3	49.3	48.5	48.2	49.2	48.8
3:00 AM		50.9	49.2	50.3	51.7	48.8	48.8	50.1	50.5
4:00 AM		50.7	48	50.5	55.8	50.3	50.1	55.2	52.1
5:00 AM		56.2	50.4	51.3	58.9	54.4	54.8	57.6	56.4
6:00 AM		58.9	54.3	55.6	60.6	58.8	58.2	59	58.7
7:00 AM		60.1	56.7	56.5	61.5	60.1	59.4	59.7	60
8:00 AM		60	57.2	57.8	60	60.7	59.4	59.6	60.9
9:00 AM		61.1	58	58.9	60.8	60.3	59.3	59.2	
10:00 AM		59.7	58.2	58.9	60.3	60.6	61.6	56.1	
11:00 AM		56.7	57.1	59.8	61.5	59.1	56.1	55.9	
Noon Hour		57.2	57.4	59.8	59.5	59.2	54.7	55.1	
1:00 PM		56.6	57.9	59.9	61.2	57.6	54.7	58.4	
2:00 PM		57.4	58.8	60.2	60.2	58.2	54.5	57	
3:00 PM		56.6	56.1	59	60.4	56.1	61.9	56.5	
4:00 PM	63.6	55.6	58.5	59.4	61.9	55.9	53.6	56.6	
5:00 PM	57	57.3	57.7	57.9	61.9	53.7	53.8	55.1	
6:00 PM	57.9	56.4	57.2	60.2	60.7	56.8	53.5	56.1	
7:00 PM	60.9	56.9	57.7	55.3	61.8	59.5	53.7	57.3	
8:00 PM	62	59.2	58	55	62.7	58.2	54.3	58.1	
9:00 PM	61.3	58.8	57.2	56.6	60.7	57.4	54.8	58.8	
10:00 PM	57.8	58	59	56.9	59.9	56.2	56	56.7	
11:00 PM	56.9	57.6	57.8	55.6	56.2	54.9	54	56	

Existing Sound Levels at M3									
	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
	March 3, 2022	March 4, 2022	March 5, 2022	March 6, 2022	March 7, 2022	March 8, 2022	March 9, 2022	March 10, 2022	March 11, 2022
Midnight Hour		56.7	59.6	59.8	56	56.5	56.4	57	57.2
1:00 AM		54.8	58.3	58.6	53.4	53.7	54	55.9	55.5
2:00 AM		53.5	56.8	57.2	52.6	53.5	53.5	53.4	54
3:00 AM		55.2	55.1	54.2	53.8	53.9	53.8	54.2	54.9
4:00 AM		56.2	53.8	53.9	57.6	56.3	57	57.9	57.3
5:00 AM		60.6	56.9	55.1	61.3	60.6	61.4	62.2	61.6
6:00 AM		63.7	60.5	59.9	64.1	63.9	64.5	64.5	64.2
7:00 AM		65.3	62.2	60.9	65.4	65.6	65.8	65.7	65.4
8:00 AM		65.3	63.8	61.6	65.2	65.9	71.6	65.4	66
9:00 AM		65.5	65.1	63.4	65.2	65.5	68.1	65.2	
10:00 AM		64.9	64.4	63.5	64.9	65.5	65.8	64	
11:00 AM		64.4	64.2	64.6	65.3	66.1	65.2	64.2	
Noon Hour		64.8	64.1	64.6	67.8	94.7	64	64.1	
1:00 PM		64.2	63.8	64.3		96.8	67.3	64.5	
2:00 PM		64.3	63.1	64.4		65.3	64.2	64.4	
3:00 PM		63.8	61.9	64.1		64.5	63.2	64	
4:00 PM	72.6	63.1	62.5	64	68.2	63.4	62.5	62.9	
5:00 PM	62.2	62.5	62.9	63.3	63	62.1	61.2	63.1	
6:00 PM	62	62.5	63.7	63.3	64.9	64.2	62.9	63.5	
7:00 PM	64.2	62.7	63.5	62.7	64.5	64.1	63.1	63.5	
8:00 PM	64	63.5	63	61.9	64.2	63.2	63.5	63	
9:00 PM	63.6	63.1	62.2	61.1	62.9	62.5	62.2	63.1	
10:00 PM	61.3	62.4	62.8	59.8	62.8	61.1	62	61.5	
11:00 PM	59.8	61	61.4	57.8	60.1	59.2	59.2	60.1	

Existing Sound Levels at M4													
	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday
	November 30, 2022	December 1, 2022	December 2, 2022	December 3, 2022	December 4, 2022	December 5, 2022	December 6, 2022	December 7, 2022	December 8, 2022	December 9, 2022	December 10, 2022	December 11, 2022	December 12, 2022
Midnight Hour		61.1	61.7	61.4	61.3	63.5	62.6	60.4	60.2		60.7	59.9	62.3
1:00 AM		58.9	60.3	60.5	59.4	61.9	60.6	57.9	57.8		57.2	58.6	61.7
2:00 AM		59.2	58.8	59.9	58.8	60.6	58.2	58.5	57.7		56.8	58.9	60
3:00 AM		59.4	59.7	60.9	62.3	59.4	58.7	58.7	58.5		58.5	58.8	59
4:00 AM		64.5	64	63.9	63.6	60	58.1	64.2	63.1		63.6	63.2	58
5:00 AM		69.6	69.2	68.5	68.9	64.3	60.6	68.6	68.2		68.4	68.2	62.5
6:00 AM		70.4	70.2	69.9	70.8	67.2	64.6	70	69.8		69.8	69.7	66.2
7:00 AM		72	71.5	70.9	71.2	68.7	65.4	70.7	71		70.8	71.2	67.8
8:00 AM		72.1	71.8	71.5	71.8	69.5	66.7	71.4	71.7		71.4	71.6	69
9:00 AM		71.8	71.9	71.4	72	70.8	69	71.5	71.2		71.3	71.3	70.1
10:00 AM		71.5	70.7	71.9	71.3	70.8	70.2	71.3	70.5		71	70.3	71.5
11:00 AM		71.2	71.6	71.7	71.5	71.2	70.5	70.7	70.6		71.6	71.1	
Noon Hour		71.6	71.3	71.3	71.3	70.9	71	71.3	71		72.6	71.6	
1:00 PM		71.7	70.7	71.6	71.2	70.9	70.8	71.1	71.9		71.8	71.6	
2:00 PM		72	70.6	71.5	70.2	70.6	70.4	70.9	Data break		71.8	72	
3:00 PM		71.9	71.4	71.3	71.8	71.3	69.9	70.7			71.5	71.7	
4:00 PM		71.7	71.4	71	71.6	71.4	70	70.6			71.2	71.6	
5:00 PM	70.4	71.4	71.3	70.6	71.6	69.5	69.8	70.2			70.4	71.7	
6:00 PM	69.3	70.4	70.5	70	71.3	69.8	67.1	69.2		Monitoring resumes	70	71.3	
7:00 PM	68.2	69.2	69.3	68.9	70	68.7	67.3	67.8			68.5	70.2	
8:00 PM	67.2	67.1	67.9	67.2	68.9	67.7	66.8	66.2		68.2	66.4	68.7	
9:00 PM	66.4	66.3	66.9	65.8	67.4	66.7	65.5	65		66.3	65.3	67.9	
10:00 PM	65.1	65.7	65.8	64.6	66.6	65.6	64.6	63.6		64.9	64.3	66.3	
11:00 PM	63	64.2	64.2	62.9	65.3	64.5	62.6	61.9		62.9	62.4	64.5	

Site M5* - Table below from the SR 520/I-5 Express Lanes Connection Project MPPPCNV Application (June 2019) labeled as M4, but is M5* for this PBB MPPPCNV

Table A-1: Existing Sound Levels at M5*																	
Leq										Lmax							
	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Wednesday		Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday
	April 3, 2019	April 4, 2019	April 5, 2019	April 6, 2019	April 7, 2019	April 8, 2019	April 9, 2019	April 10, 2019		April 3, 2019	April 4, 2019	April 5, 2019	April 6, 2019	April 7, 2019	April 8, 2019	April 9, 2019	April 10, 2019
Midnight Hour		64.1	63.8	67.4	66.9	63.6	63.5	63.6			76.9	72.6	84.6	79.5	73.5	72.5	72.6
1:00 AM		61.3	62.3	65.3	65.2	61.1	60.9	62.9			73	71.7	75.1	71.7	71.5	75.5	72.7
2:00 AM		61.1	60.8	63.1	63.5	59.8	60.7	72.3			72.5	73.5	71.7	76.8	74.1	73.9	81.7
3:00 AM		61.2	60.6	61.1	60.8	60.8	61.8	71.9			73.7	74.4	75.8	70.7	71.8	77.1	82.7
4:00 AM		65.4	64.7	61.5	61	64.7	66.1	65.8			73.3	75.0	71.4	70	73.2	76	77.5
5:00 AM		69.4	68.7	64.3	63	69	69.9	69.1			78.7	74.9	73.4	72.7	75.9	74.9	81.8
6:00 AM		72.8	72.6	67.9	67.4	72.4	73.2	72.3			81.1	78.5	76.9	78.9	79.2	78.8	76.7
7:00 AM		73.3	73.7	69.6	68.6	73.7	74.5	73.6			80.6	78.4	77.9	77.8	78.8	82.7	83.7
8:00 AM		71.6	73.4	71.2	70	71.6	73	72.7			76.6	76.9	75.8	76.1	76.7	76.9	79.7
9:00 AM		70.9	73.4	71.9	71.5	73.2	73.3	73.1			80.8	85.8	76.2	76.1	77.4	79.1	80.9
10:00 AM		72.3	72.4	72.7	72.3	73.6	73.4	75.3			82.7	78.5	78.3	79.2	78.9	78.6	84.5
11:00 AM		72.4	72.7	72.9	72.7	73.3	73.2	73.1			78.4	76.7	78.5	76.4	77.7	84.1	82.6
Noon hour		72	72.3	72.5	72.6	72.5	72.9	72.7			84.4	81.0	76.9	76.3	80.2	83.8	79.3
1:00 PM		72.1	72.3	69.9	73	72.6	72.8	72.8			86.1	87.9	84.4	78.1	76.4	78.7	83.5
2:00 PM		71.4	71.3	72.6	72.7	72.9	72.8				79	76.0	86.5	79.9	81.2	79.8	
3:00 PM		70.7	71.2	73	72.6	72.6	72.7				78.1	86.8	89.6	89.2	82.9	77.2	
4:00 PM	71.9	71.2	72.3	72.7	72.4	72.5	72.7			80.7	80.2	88.7	77.9	83.5	77	81.9	
5:00 PM	72.3	71	72.5	72.8	72.2	72.1	72.8			75.5	76	78.7	75.7	77.2	75.7	77.9	
6:00 PM	71.8	71.7	72.9	72.5	72.3	72.8	73.2			77.7	75.9	77.7	77.5	90.9	77.4	82.8	
7:00 PM	72.1	71.7	72.6	71.6	71.6	72	72.4			77.1	78.6	86.9	76.6	83.1	76.6	79.6	
8:00 PM	71.2	71	71.2	71.1	70.9	70.6	71			75.7	75.9	75.5	87.8	82.1	77.8	75.6	
9:00 PM	70.4	70.7	71.0	70.9	70.2	70.1	70.2			75.1	74.6	76.2	79.8	75.1	75.9	75.8	
10:00 PM	69	69.4	70.3	70.3	68.8	68.4	69			75.8	81.3	78.1	74.4	74.7	75	75.5	
11:00 PM	67	66.7	68.9	68.5	66.3	65.8	68.8			75.9	79.8	79.5	74.6	75.1	74.3	82.2	

Site M6* - Table below from the SR 520/I-5 Express Lanes Connection Project MPPPCNV Application (June 2019) was labeled as M6, and is still M6* for this PBB MPPPCNV

Existing Sound Levels at M6														
	Leq								Lmax					
	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday
	April 10, 2019	April 11, 2019	April 12, 2019	April 13, 2019	April 14, 2019	April 15, 2019	April 16, 2019	April 10, 2019	April 11, 2019	April 12, 2019	April 13, 2019	April 14, 2019	April 15, 2019	April 16, 2019
Midnight Hour		60.2	60.9	63	63.3	60.8	59.7		73	72.9	71.7	71.2	74.3	73.9
1:00 AM		58.8	60.2	62.2	62.4	58.6	58.1		71.6	72.3	73.2	74.8	72.6	70.2
2:00 AM		60.1	59.2	61.3	61.1	58.8	58.7		73.8	75.4	72.9	74.8	74.7	72.4
3:00 AM		59.9	59.3	59.9	59.3	58.7	59		70.5	69.9	78.9	77.3	74.1	68.4
4:00 AM		63.6	62.0	61.1	59.2	62.1	62.1		75.6	77.5	73.7	72.3	74.4	74.8
5:00 AM		77.1	76.5	62.7	59.5	76.7	76.6		82.7	82.2	72.9	69.8	85.6	81.6
6:00 AM		78.3	78.1	64.9	61.9	78.3	78.2		82.6	82.8	74.5	72.2	82.8	82.8
7:00 AM		78.5	78.5	65.9	63.6	78.7	78.7		82.1	83.1	73.7	74.1	81.9	85.4
8:00 AM		78	78.6	75.3	73.4	77.3			81.7	83.3	81.6	81.6	82.7	
9:00 AM		77.7	77.8	76.2	75.1	76.9			81.6	82.9	82	82.5	84.4	
10:00 AM		76.8	76.7	76.3	75.4	75.7			83.1	82.4	81	81.2	81.7	
11:00 AM		75.6	75.7	76.4	75.6	74.7			83.4	83.1	81.7	83.4	81.7	
Noon hour		76.8	77.1	76.7	75.8	75.9			82.5	84.0	90	81.3	82.5	
1:00 PM		77.4	77.6	75.7	74.9	76.7			83	82.9	96.5	83.5	82.4	
2:00 PM		78.5	78.3	77	76.3	77.8			86.4	83.4	87.6	83.7	86.8	
3:00 PM	78.8	78.9	78.6	76.7	76.6	78.4		84.7	83.3	84.8	82.5	83.6	83.6	
4:00 PM	77.7	78.9	78.5	77.1	76.8	78.3		82.8	82.6	83.3	89.7	83.6	82.4	
5:00 PM	78.5	78.7	78.3	76.6	76.9	78.3		84.6	83.1	86.2	81.8	90.1	84.1	
6:00 PM	77.8	77.8	77.3	76	76.3	77.4		85.6	82.2	83.4	81.6	82.7	82.6	
7:00 PM	76	76.4	75.9	75.1	75.9	75.4		82	81.9	81.9	81.2	81.5	82.3	
8:00 PM	74.8	75.3	74.5	74.4	75	73.9		83.2	81.7	82.3	82.2	80.7	81.5	
9:00 PM	74.1	74.4	74.4	75.4	74	73.8		81.7	82.6	81.0	81.4	82.6	83.7	
10:00 PM	72.7	73.4	74.4	74.2	72.4	72.9		79.9	80.6	83.6	81	80.1	81.3	
11:00 PM	66.3	67.5	70.0	68.4	65.8	66.7		79.8	79.7	79.0	79.5	79	78.7	

Site M7* - Table below from the SR 520 Montlake Project MPPPCNV Application (July 2017) was labeled as Site 2, and is labeled as M7* for this PBB MPPPCNV

Existing Sound Levels at Site M7																														
	Leq															Lmax														
	Thurs, Oct 20	Fri, Oct 21	Sat, Oct 22	Sun, Oct 23	Mon, Oct 24	Tue, Oct 25	Wed, Oct 26	Thurs, Oct 27	Fri, Oct 28	Sat, Oct 29	Sun, Oct 30	Mon, Oct 31	Tue, Nov 1	Wed, Nov 2	Thurs, Nov 3	Thurs, Oct 20	Fri, Oct 21	Sat, Oct 22	Sun, Oct 23	Mon, Oct 24	Tue, Oct 25	Wed, Oct 26	Thurs, Oct 27	Fri, Oct 28	Sat, Oct 29	Sun, Oct 30	Mon, Oct 31	Tue, Nov 1	Wed, Nov 2	Thurs, Nov 3
0:00:00		75.2	75.4	73.7	73	74.3	74	74.5	65	67.4	67	67.1	69.4	71.2	68.9		83	83.2	80.5	83.1	79.5	83.3	79.5	88.2	87.4	80.7	76.3	74.3	75.6	74
1:00:00		75.1	75.2	72.7	72.9	74.6	74	73.2	64.1	66.9	66	66.4	69.3	71.1	69.2		82.2	84.5	78	82.1	80.2	80	79.9	77.4	79.9	82.7	77.5	76.4	75.2	73.7
2:00:00		75.1	75.2	72.4	72.8	74.5	74	73.1	63.5	65.9	64	66.3	69.4	71.1	69.4		79.4	87.1	77	80.7	79.5	79.4	89.3	75.1	77.7	74.8	83.9	74.8	74.1	74.7
3:00:00		75.1	75.1	71.8	72.7	74.3	73.8	73.1	63.7	64.6	63.7	67.8	69.2	71.2	69.6		79.6	79.1	85.3	78.5	79.4	78.6	80.6	76.2	75.1	75	82.8	73.1	75.7	74.8
4:00:00		75.1	75	71	72.8	74.4	74		65.1	64.4	63.9	69.5	68.9	71.1	69.7		79.9	79.8	76.2	80.5	79.5	79.2		81.4	81.6	72.4	83.7	74.1	77.7	75.9
5:00:00		75.4	75.3	72	73.8	74.9	74.6		67.5	65.2	65.3	70.1	68.2	70.9	69.4		81.4	87.4	78.7	89	81.4	81		83.8	78.9	81	82.4	75	76.7	75.5
6:00:00		75.8	75.2	72.4	76.2	75.3	76		69.3	65.7	66.6	71.4	68.6	71.3	69.2		92.7	82.4	82	84.5	83.6	84.3		93.4	76	73.2	91.9	75.2	81.1	76.8
7:00:00		76.5	75.2	72.6	76.4	76.8	76.5		70.2	67.5	68.4	72.2	69.6	71.7	70.3		86.3	80.7	78.5	87.8	85.7	88.4		83.6	77.9	84.5	92.5	77.8	80.1	83.5
8:00:00		76.6	75.4	75	76.6	77.4	77.4		69.5	69.6	69	71.3	69.5	70.3	69.3		85.9	84	103.7	87.2	89.7	84.4		84.8	80.3	83.8	84.2	79.5	78.2	75.5
9:00:00		76.2	75.7	73.2	77.1	77.5	77.4		69.7	70.2	68.9	72.2	69.6	70.1	69.1		84.9	83.6	82.2	103.5	87.6	87.4		87.3	92.9	77.3	87.6	76.4	79.1	81.8
10:00:00		76.2	76.2	73.9	77.2	76.9	76.5		69.8	70.2	69.3	73.3	69.5	70.1			84.2	85.3	88.1	99.1	87.8	82.3		87.8	81.2	80.2	99.5	76.8	77.6	
11:00:00		76.2	75.1	75.5	76.9	76.2	76.1		69.2	71.1	69.8	71.3	70.1	69.3			84.4	83.8	102.9	90	90.3	90.5		84.6	98.4	94.8	89.1	76.2	76.1	
12:00:00		76.9	76	74.3	76.8	75.7	76.4		69.3	70.9	74.3	71	70.1	70			87.8	97.8	90.1	88.2	83.4	91.1		84.9	81.4	104.6	88.6	77.1	77	
13:00:00		76.2	75.9	74.9	77.6	75.4	77.5		68.2	69.2	70.7	71.7	70.5	70.1			84.3	92.9	89.8	97.6	85.2	90.5		84.3	80.2	80.8	80.4	76.6	77.4	
14:00:00	76.3	76.5	75.2	75.1	76.9	76.7	77.1		69.4	68.6	70.6	72.5	71.2	70.7		84.4	85.7	90.7	85.3	81.8	104.8	83.6		85	84.6	89.3	81.3	78.7	78.7	
15:00:00	76.4	76.7	75	75.3	76.8	75.5	77.6	69.2	70.5	69.1	70.1	73.1	71.7	71.1		85.1	84.4	85.1	84.2	83.7	90.9	86.5	81.3	82.9	89.3	85.8	81.7	78.1	78.3	
16:00:00	76.5	77	75.2	75.1	77.5	76.4	77.4	69.2	70.8	69.2	69.6	73.5	72.4	71.4		87.1	85.9	90.6	81.4	88.6	81.9	85.2	87.5	86.4	78.9	78	85.2	79.9	79	
17:00:00	76.7	76.9	75.3	74.7	77.5	76.7	78.1	69	70.7	69.2	69.4	72.6	72.4	71.4		86	85.8	85.7	83.5	86.2	86.6	85.1	85.8	86.4	79.2	87.5	79.3	82.6	78.5	
18:00:00	76.7	76.6	75.3	74.6	76.9	77.8	77.7	68.8	69.6	70.3	68.7	71.7	71.8	71.3		85.1	85.2	83.8	81.1	82.5	94.3	97.2	83.9	87.4	100.6	81.9	82.1	81.6	76.6	
19:00:00	76.7	76.5	75.4	74.3	75.9	75.8	77.6	69.7	71.1	69	68.3	71.3	71.4	70.3		99.2	85.6	87.1	81.7	82.7	82.8	85.2	87	97.3	84.5	80.9	82	78	77.5	
20:00:00	76	75.9	75.4	73.7	75.6	75.2	77.5	71.5	67.9	68.8	69.2	70.3	71.3	69.8		82.2	85.8	100	79.5	82.2	82.8	86.3	100	87.8	87.6	76.1	86.8	77.5	75	
21:00:00	78.7	75.7	75.4	73.8	75.7	74.9	76.9	68.7	67.8	68.6	68.2	68.9	71.2	70.6		107.8	83.1	85.9	79.4	82.8	83.5	88.8	95.3	75.7	74.9	75.3	79.7	76.2	75.6	
22:00:00	75.5	77.4	75.2	73.2	75.6	76.3	77.2	67.6	68.6	68.2	68.2	68.5	71.2	70.4		87.7	107	82.9	82.5	81.1	88.2	86.2	82.5	82.4	78.5	87.8	77.4	75.7	75.8	
23:00:00	75.4	75.5	74.9	73.1	74.8	74.5	76.1	66.2	68.2	67.3	67.6	70	71.2	69.2		80.2	87.6	89.4	77.6	81.2	80	82.4	81	81.6	75	77.1	78.8	75.7	74.8	

Existing Sound Levels at M8									
	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
	March 3, 2022	March 4, 2022	March 5, 2022	March 6, 2022	March 7, 2022	March 8, 2022	March 9, 2022	March 10, 2022	March 11, 2022
Midnight Hour		51.7	59.9	59.3	55.4	55	53.6	55.6	54.4
1:00 AM		50.8	59	57.7	53.9	49.1	50.6	52.4	53.3
2:00 AM		52.7	59	55.5	50.5	50.5	50.9	51.6	52
3:00 AM		53.5	57.5	53.3	51.9	51.7	51.2	51.8	53.3
4:00 AM		55.1	56.7	54.2	56.8	55.2	56.5	55.6	55.7
5:00 AM		60	58.7	53.1	60.7	60.1	60.8	60	59.3
6:00 AM		63.3	61.6	57.9	63.2	62	63.7	63.3	62.3
7:00 AM		64.4	63.4	58.6	64.1	64.5	64.7	63.8	63.8
8:00 AM		65.3	64.3	60.3	62.7	63.8	65.3	62.5	64.1
9:00 AM		65.7	64.5	62.1	62.3	64	65.7	62.6	
10:00 AM		68	65.2	63.4	62.3	63.6	65.1	62.2	
11:00 AM		68.5	67.7	63.6	63.2	64	67.3	62.9	
Noon Hour		68.2	67	63.8	62.8	67.2	66	62.3	
1:00 PM		67.8	65.3	62.6	62.3	67.9	66.5	62.4	
2:00 PM		69	63.5	63.2	63.4	67.3	66.8	62.6	
3:00 PM		69.4	61.9	62.7	64.3	66.9	67.4	63.2	
4:00 PM		68.1	61.6	61.6		65.3	67.3	62	
5:00 PM		66.9	64.6	63.7	66.2	63.5	65.4	63.3	
6:00 PM	61.1	65.2	64.6	64.4	64.5	64.9	65.2	62.9	
7:00 PM	62.8	64.1	64.5	64.8	64	63.8	64.5	63.1	
8:00 PM	60.8	63.8	64	64.6	63.6	62.8	63.9	61.8	
9:00 PM	60.5	63	63.5	61.7	60.5	62.7	63.4	62.6	
10:00 PM	58.7	63.1	63.7	59.4	59.8	60.7	61.6	59.4	
11:00 PM	57.3	61	62.2	56.9	58.5	57.3	58.6	58.4	

Existing Sound Levels at M9											
	Thursday	Friday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday
	March 3, 2022	March 4, 2022	March 7, 2022	March 8, 2022	March 9, 2022	March 11, 2022	March 12, 2022	March 13, 2022	March 14, 2022	March 15, 2022	March 16, 2022
Midnight Hour		55.8		55.3	57.5		60.5	57.8	55.5	53.9	56.3
1:00 AM		50.9		52	54.9		57.3	55.1	54.3	52.8	54.4
2:00 AM		49.9		51.5	52.9		55.4	Daylight Savings	51.7	49.8	54.5
3:00 AM		51.2		49.6	52.6		52.2	55.9	49	51.8	53.2
4:00 AM		54.3		54.5	55.4		52.4	55.6	55	56.1	56.4
5:00 AM		58.9		58.6	59.4		56.2	56	59.1	60.6	59.5
6:00 AM		60		62.4	62.3		59.9	59.8	61.1	62.9	62.1
7:00 AM		62.3		63.7	63.9		58.4	60.4	61.9	63.6	62.2
8:00 AM		63		63.6	62.6		59.8	61.8	62.5	63.4	65.2
9:00 AM		63.8		63.8	Power		61.4	62.6	62.5	63.3	
10:00 AM		63.5		62.2	Outage		61.9	61.9	63.1	64.1	
11:00 AM		63.3		66.9	Resumed	62.8	62.3	63.2	61.9	64.2	
Noon Hour		66.4		67.1	on	61.6	62.4	64.3	62.5	64	
1:00 PM		67.5		65.7	March 11, 2022	62.4	61.7	63.4	62	64.2	
2:00 PM		66.9		67.2		62.3	64.6	63.9	63	64.8	
3:00 PM		66.8		67.2		62.2	63.5	62.2	62	65.4	
4:00 PM		Power	65.5	66.1		61.7	63.2	63.2	62.7	65.6	
5:00 PM		Outage	62.8	65.6		61	64.1	63.6	63.1	63.6	
6:00 PM	66.8	Resumed	65.5	64.1		61.5	62.6	63.9	62.4	64.8	
7:00 PM	63	on	63.5	64.5		62	62.2	63.9	60.6	64.6	
8:00 PM	62.6	March 7, 2022	62.9	64.4		62.7	61.5	64	61.2	64	
9:00 PM	60.4		63.4	63.3		62.4	60.5	63.3	61.5	62.3	
10:00 PM	59.6		61.8	61.6		61.9	60.2	61	56.8	60.5	
11:00 PM	58.5		58.8	60.2		61.5	58.8	58.1	55.6	58.4	

Site M10* - Table below from the SR 520 Montlake Project MPPPCNV Application (July 2017) was labeled as Site 1, and is labeled as M10* for this PBB MPPPCNV

Existing Sound Levels at M10																														
	Leq															Lmax														
	Mon, Oct 17	Tue, Oct 18	Wed, Oct 19	Thurs, Oct 20	Fri, Oct 21	Sat, Oct 22	Sun, Oct 23	Mon, Oct 24	Tue, Oct 25	Wed, Oct 26	Thur, Oct 27	Fri, Oct 28	Sat, Oct 29	Sun, Oct 30	Mon, Oct 31	Mon, Oct 17	Tue, Oct 18	Wed, Oct 19	Thurs, Oct 20	Fri, Oct 21	Sat, Oct 22	Sun, Oct 23	Mon, Oct 24	Tue, Oct 25	Wed, Oct 26	Thur, Oct 27	Fri, Oct 28	Sat, Oct 29	Sun, Oct 30	Mon, Oct 31
0:15:00		60.1	61.4	61.6	62.9	64.5	65	61.2	60.4	60.6	60.7	60.5	65.3	66.2	59.3		73	73.9	72.1	76.5	74.1	74	74.6	71.6	72.1	74.6	71.3	82.5	73.4	74.1
1:15:00		57.9	59.6	60.1	61.3	63.2	63.2	58.3	58.8	58.2	58.1	58.7	64.5	65.1	57.2		71.2	77	73.9	75.1	74.4	72.8	76.7	71.9	72	73	71.4	74.5	73.9	73.7
2:15:00		56.6	59.6	59.9	58.4	61.9	61.7	57.3	57.3	56.9	56.7	58.2	62.9	63.7	56.1		72.4	74.3	74.3	73.1	73.5	73.9	73.2	72.4	74.6	71.3	73	80.1	73	72.8
3:15:00		56.9	60.4	60.4	58.8	59.3	58.1	58.3	58.7	57.4	57.1	57.4	60.6	60.8	56.5		73.8	76.1	75.6	72.9	76.1	73.5	74.4	73.2	72.5	73	73.2	75	72.4	71.8
4:15:00		61.5	64	62.5	62.1	59	56.9	62.3	62.4	61.5	60.9	61.4	59.5	58.9	60.6		75.5	78.4	76.3	77	74.7	72	75.9	74.2	72.4	74.2	77.6	76.9	73.1	74.1
5:15:00		65.6	67.5	66.5	66.2	60.7	58	66.2	66.2	65.1	66.2	65.6	60.4	58.9	64.7		76.3	76.9	77.4	76.4	74	71.2	78.9	78.5	74.8	75.1	73	71.1	72.3	77.4
6:15:00		70.3	71.2	70.1	70.9	63.8	62.7	70.5	70	69.1	69.7	69.2	62.2	61.5	68.9		79.4	80.4	79.2	80.9	74.3	74.6	77.3	80.4	80.3	80.1	80.4	77.8	73.2	76.2
7:15:00		70.4	70.8	69.9	72.4	67.9	64.7	70.9	69.2	68.9	68.9	70.7	65.3	63.8	68.6		81.5	77	76.4	84.4	76.2	74.2	79.2	78.6	77.3	78.1	86	83.4	75.6	75.9
8:15:00		69.7	68.4	69.3	72.1	69	66.9	67.9	67	69	67.1	69	66.8	67.1	68.3		82.2	75.5	79.8	86	79.7	77	81.2	80	78.6	74.8	77.8	78.3	74.9	78.4
9:15:00		71.4	71.6	69.1	71.8	70	68.8	71.6	70.5	69.8	70.5	70.8	68.4	69	69.7		77.9	81.9	81.2	82.6	81	81.8	82.8	77.5	79.5	80.9	76.5	75.3	79.2	80.5
10:15:00		70.3	71	70.6	70.9	70.5	70.5	70.9	69.2	70.4	68.9	70.5	68.9	69	69.1		77.4	81.9	79.2	78.7	82.9	76.3	79.8	81.4	78.5	81.1	79.9	75.9	76.4	75.9
11:15:00		69.9	71.5	70.3	70.7	70.6	70.6	70.8	68.7	69.7	69.8	71.1	69.2	69.5	68.9		84.6	83.3	83.2	82.2	79.9	78.2	77.4	82.7	78.9	78.7	85.1	75	84.9	79.7
12:15:00		69.6	71.1	69.9	70.2	70.1	70.4	69.8	68.4	69.6	68.9	71.3	69.7	69.4	68.7		78.2	82.7	79	81.7	83.2	76.7	78.4	82.4	78.2	79.7	85.8	75.8	78.3	80.9
13:15:00		69.7	70.8	69.8	70	69.6	70.3	69.4	68.5	69.6	69.6	69.9	69.4	69.2			77.7	84.3	88	84.1	80.8	81.8	83.7	79.3	85.3	83.5	86	76.1	80.6	
14:15:00		70.1	70.5	71	70.6	69.8	70		68.6	69.6	69.3	70.4	69.3	69.2			76.6	80.9	85	82.7	83	78.2		74.6	75.2	85.7	76.4	83.4	76.4	
15:15:00		70.2	71.1	70.9	70.3	70.6	71	69.5	69.1	69.7	69.7	71.2	69.8	69.3			78.9	77.5	78.7	78.7	82.3	79.1	76.9	91	80.9	83.4	84.9	84.9	75	
16:15:00	70.8	70.7	71.9	71.4	70.3	71	70.7	70.4	69.5	70.5	70	70.6	69.7	69.1		86	80.4	79.6	78.4	76.5	84.6	78.3	98.6	79.4	80.1	76.8	83.6	80.9	83.9	
17:15:00	71.2	71	71.8	71.2	70.1	70.5	70.1	69.7	70	69	69.7	70.2	69.5	68.3		90.9	75.4	80.3	79.5	81.3	82.7	77.8	80.6	78.6	76.4	78.7	82	77.5	74.1	
18:15:00	70	70.5	71.1	70.2	69.4	70.4	68.6	69.1	69.5	68.2	68.4	70.5	68.6	67.5		84	83.4	101.1	76.3	76.3	94.2	76	77.4	78.5	74.8	85.8	82.9	74.4	77	
19:15:00	68.4	69.1	69.2	69.4	68.8	68.7	67.5	68.1	68.4	67.8	68.1	69.7	68.4	66.5		75.2	78.2	76.7	75.7	75.8	79.8	78.1	75.1	77.2	78.2	74.3	81.2	74.2	74	
20:15:00	67.5	68.7	68.9	69.3	67.6	68.8	66.8	67	67.9	66.8	67.9	68.5	67.8	66.1		75	77.6	83.2	78.5	75.6	80.5	76.3	74.7	74.6	74.3	74.7	75.8	73.7	73.6	
21:15:00	66.7	67.8	67.1	68.4	67.9	69.1	68.1	66	67.2	66.2	68.2	68.8	67.6	65.3		84.2	77.3	76.3	81.8	77.5	81.4	77.6	82.3	75.7	74.3	84.8	77.8	74.4	73.6	
22:15:00	64.3	65.3	65.6	66.9	67.4	69.1	64.1	63.4	65.3	69.2	65.9	68.2	67.9	63		75.9	76.7	80.4	75.5	83.5	80	77.1	72.8	77.6	102.1	73.9	75.4	74.9	71.8	
23:15:00	62.4	64.6	64.9	64.5	66.6	67.2	62.9	62.7	63.8	62.5	63.5	66.4	66.8	61.4		79.6	75.6	79.6	77.3	85.2	78.9	74.7	71.9	81.5	83.2	74.2	73.7	73.8	72	