

Construction Impacts Mitigation Plan:

Seattle Center Arena Renovation Project

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Intent of the Construction Impacts Mitigation Plan

This Construction Impacts Mitigation Plan (the “CMP”) anticipates and reduces the potential impacts from construction of the Seattle Center Arena Renovation Project (the “Project”) on the surrounding Seattle Center campus, resident organizations, and other community neighbors and businesses. Impacts addressed in this CMP relate to construction noise and sensitive receivers, haul routes, street closures, construction dust, erosion control measures, environmental health, historic and cultural resources preservation, aesthetics, light and glare, public services and utilities, and tree protection. A key component of this CMP is the implementation of regular communications with Seattle Center and its resident organizations, the community, and Project neighbors regarding process and schedule. Implementation of this CMP is the responsibility of Seattle Arena Company, LLC (the “Tenant”), the General Contractor, and the subcontractors working on the Project.

The CMP is an exhibit to the Development Agreement. The CMP provides additional detail regarding Tenant’s plans to mitigate construction impacts; it does not modify the terms of the Development Agreement. The CMP must be interpreted, implemented, and enforced consistent with the terms of the Development Agreement. Additionally, if there is a conflict between any permit or regulatory approval and the CMP, including Appendix B, the regulatory approval or permit shall govern to the extent necessary to resolve the conflict.

1.0 Project Overview

The Project is the renovation of the existing arena at Seattle Center and associated improvements to create a modern, multi-purpose entertainment and sports center that would host concerts, sporting events, family shows, community-oriented events, and numerous other events, and that could accommodate a professional National Hockey League (NHL) and/or National Basketball Association (NBA) franchise. The proposal would also continue to accommodate many current uses, including the Seattle Storm Women’s National Basketball Association (WNBA) franchise. The plan for this Project is to transform the existing arena by expanding its footprint below-grade while protecting the landmarked exteriors above grade. It is anticipated that construction will commence in Fall 2018 and be completed by Fall 2020.

The Project will include the following infrastructure, buildings, and other related improvements:

- Landmark-designated arena features will be preserved or restored, including the roof and edge beam structure, pylons, and the north, west, and east curtain walls.
- The south façade of the arena, including the curtain wall, will be removed.

- An atrium lobby will be added to the south of the arena, which would be the main entrance to the arena.
- Five (5) buildings (West Court Building, NASA Building, Blue Spruce Building, Seattle Center Pavilion, and Restroom Pavilion); the skatepark; one surface parking lot; and the loading/marshaling area to the south of the arena will be demolished, as well as the plazas to the west and east of the arena.
- A new box office and buildings that will contain emergency exit stairs and mechanical equipment will be constructed in plazas around the arena.
- If additional exhaust fans are needed for the life safety system, the size of the cupola—the structure on top of the existing arena—may be modified.
- New signage and accent lighting will be installed throughout the site.
- The exterior plaza level will be returned to a condition similar to its original 1962 grade by removing the below-grade entrances and associated stairs. Hardscape and landscape features will also be redesigned and reconstructed. This redesign would make the exterior plazas ADA compliant and would include spaces for recreation, performance, and gathering.
- In the International Plaza, the existing hardscape and select landscaping and trees would be removed and replaced with landscape, hardscape, lighting and way-finding to create a consistent 360 degree pedestrian experience around the arena, an east-west oriented ADA ramp would be installed, and the DuPen Fountain and Thiry Planter would be maintained.
- A below-grade parking garage for approximately four hundred fifty (450) vehicles will be built below the south plaza, south of the arena, with a two-lane access drive from Thomas St.
- A loading area with approximately eight (8) loading docks will be built below the south plaza. The loading area will be accessed off of 1st Ave N through a tunnel under the Bressi Garage and Thomas St.

The proposed improvements are depicted within the figures below and the Site Logistics Plan in Appendix A.

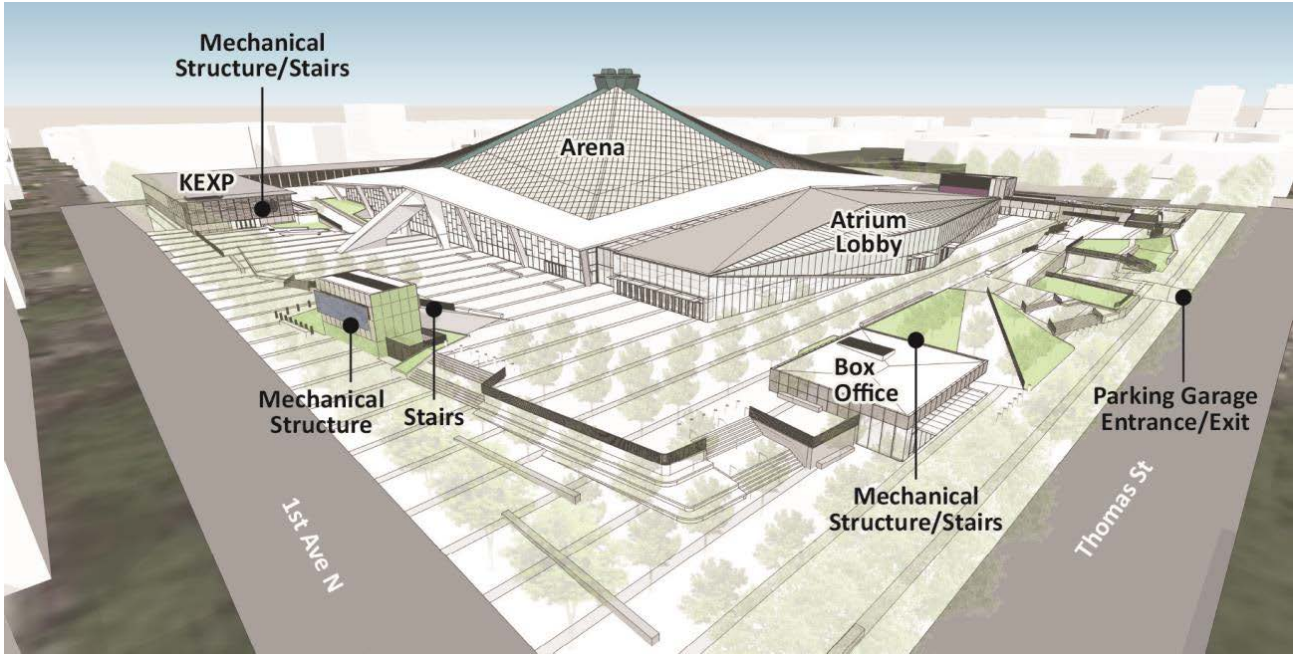


Figure 1-1. Schematic Drawing of Arena Project

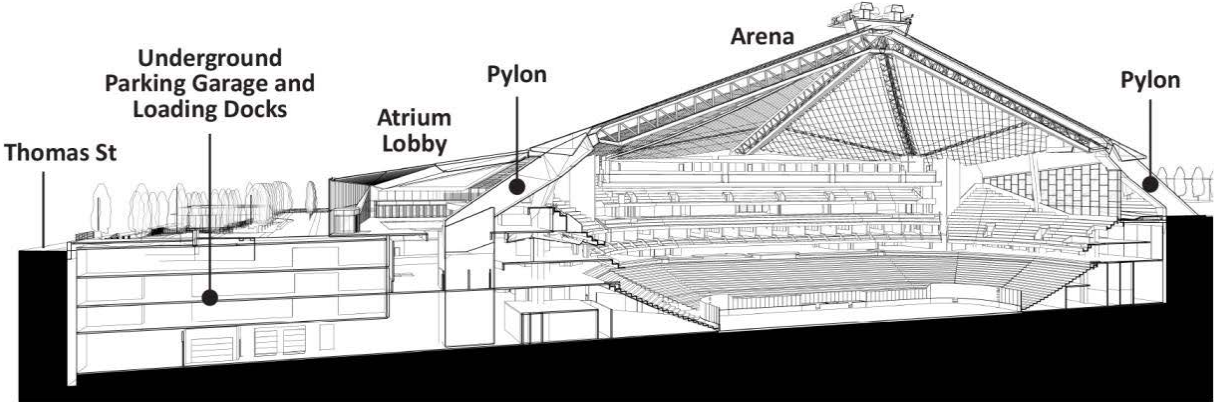


Figure 1-2. Cross Section – Showing Arena and Parking Garage

1.1 Construction Activities and Project Phases

Construction is generally divided into 4 overlapping phases. Demolition and excavation would be the most intense phase. The construction phases are summarized below.

Phase 1: Demolition and Excavation

- Work would include interior and exterior demolition, excavation to the perimeter of the existing roof footings, removal of demolished and excavated materials from the site, and installation of earth retention systems including soldier piles immediately outside of the foundation walls around the perimeter of the arena. Soldier piles would be placed using a drilling method, followed by a concrete pour; no pile driving would occur. Demolition and removal of any hazardous materials would be in accordance with federal, state, and City regulations. All hazardous materials in the buildings to be demolished or renovated have been identified and will be safely abated prior to demolition in accordance with SDCI regulations.
- Excavation of the arena building below-grade would begin on the north side of the arena and progress to the south side of the arena.
- Demolition of exterior structures (Blue Spruce Building, skatepark, Seattle Center Pavilion, West Court Building [existing box office], Restroom Pavilion, and NASA Building) and plaza hardscape and vegetation would occur from approximately October 2018 to mid-November 2018.
- Most demolition and excavation materials would first be stockpiled in two areas: at the south end of the International Fountain Pavilion building, adjacent to the vacated portion of 2nd Ave N, and to the south end of the KEXP building adjacent to 1st Ave N.
- Up to 200 workers would work 2 extended or 3 shifts daily (between 400 and 600 total daily construction workers).
- With nighttime work, truck hauling would occur 7 days a week, 18 hours a day, for approximately 6 months.
- Seattle Center has approved truck hauling through the Seattle Center campus on vacated Harrison Street, which is no longer a public street, between 11:30 pm and 6:30 am and south on the western half of vacated 2nd Street during some daytime hours until 11:30 pm.
- A sound-deflecting border will be installed along the north, west, and south sides of the project for the duration of construction.

Phase 2: Loading Dock Access Tunnel Construction

- The loading dock tunnel would be dug out using a mining-style method that would leave Bressi Garage undisturbed. The mining method would involve horizontal drilling with perforated pipes. The pipes would be pressure-grouted to form a shell of grout and enhanced soils. Soils would be

removed by hand in 3- to 4-foot increments. Tunnel footings and structure would be built as the tunnel advances.

- Trucks would access the site using the current parking lot access on 1st Ave N. Once the tunnel is complete, the tunnel will become the main artery for construction deliveries.

Phase 3: Structure Construction I

- Excavation for the underground parking garage would be completed and construction of the parking garage and atrium would begin.
- Interior construction would occur, including concourse structural work, erection of bridge-level trusses, upgrades to the roof structure, and installation of the rigging structure.
- Retaining and shear wall installation at the parking structure would begin.
- Three cranes (two mobile cranes and one tower crane) would be located on the project site. Deliveries to the southern crane would occur on the closed portion of Thomas St.

Phase 4: Structure Construction II and Interiors

- The remainder of the arena structure would be built and the interiors of the arena installed.
- The rooftop platform and equipment would be installed.
- All levels of the new underground parking garage would be built.
- The plazas, signage, and landscaping would be completed.
- Trucks would mostly enter and exit the project site through the loading dock tunnel.

1.1 Schedule Milestones

- Estimated start date: October 2018
- Duration: 24 Months

ID	Phases	2018			2019									2020														
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			
1	Demolition	█																										
2	Perimeter Shoring, Zones C and D	█																										
3	Perimeter Shoring, Zones A and B	█																										
4	Temp Roof Structure Shoring	█																										
5	Mass Excavation	█																										
6	Loading Dock Tunnel	█																										
7	Existing Roof Structure Upgrades				█																							
8	Bowl and concourse Structure				█																							
9	Parking Garage and Atrium Structure				█																							
10	N, E, and W Plaza							█																				
11	Atrium Buildout													█														
12	Event Level										█																	
13	Main Concourse Level										█																	
14	Mezzanine Level										█																	
15	Suite Level										█																	
16	Upper Concourse Level										█																	
17	Space Needle Club Level										█																	
18	Press/Bridge Level										█																	
19	Punch List and Commissioning																						█					

Figure 1-3. Approximate Construction Schedule Overview

2.0 Construction Communication

2.1 Contact Person

General Requirements

- The General Contractor will designate a project manager to fill the position of “Construction Project Manager” to provide information to the local community and to address comments regarding on-going operations and schedule.
- Tenant has retained as of June 2018 a “Community Liaison” to communicate with Seattle Center and its resident organizations, and with the community and Project neighbors regarding process and schedule. The Community Liaison will work with each group in coordination with the Construction Project Manager to ensure that any comments are promptly addressed.
- For night-time work, Tenant will also retain an Independent Noise Monitor (“INM”), an individual, firm, or contracted staff member within SDCI. The INM will coordinate with

SDCI, gather continuous noise data, take periodic noise measurements, and respond to noise complaints during hours of night-time work covered by the variance.

Specific Plans and Procedures

- The Construction Project Manager will:
 - Act as the initial point of contact for general construction information and non-emergency concerns related to construction.
 - Attend meetings of the affected neighbors with the Community Liaison and the Seattle Center project coordinator.
 - Manage a construction hot line, including logging calls and coordinating with the Community Liaison to generate appropriate responses.
 - Assemble and maintain a Construction Notification List.
 - Prepare and distribute monthly construction bulletins describing general progress and schedule related information for distribution via email to the Construction Notification List.
 - Provide reports of construction hot line calls and responses to Tenant.

- The Community Liaison will:
 - Collect and distribute general information about the Project.
 - Schedule and attend meetings with neighbors and the Construction Project Manager in advance of the start of construction and as desired by neighbors during construction. Should periodic neighborhood-wide meetings be scheduled, the Community Liaison will coordinate with the City, Seattle Center, the INM, and the Construction Project Manager in advance.
 - Assemble contact names for the Construction Notification List and keep it up to date.
 - Act as a point of contact for people seeking information about the Project.
 - Maintain the Project website, which will include general information about the Project, construction updates, and periodic special updates on construction activity.
 - Meet with Seattle Center's communication director.
 - Attend regular meetings with Tenant and City project management teams.
 - Provide regular reports of community engagement and responses.

- The INM will:
 - Coordinate with contractor's night-time crews about planned work operations.
 - Coordinate with Tenant's Community Liaison on any updates or concerns from the neighborhood and residents.

- Coordinate with SDCI on any questions or concerns from the City regarding project noise.
- Conduct nightly verification of fixed noise monitoring stations with hand-held noise monitor to validate noise monitoring results from the fixed locations.
- Conduct regular spot-check noise monitoring at various locations of the project site with hand-held monitor.
- Address noise exceedances and monitor alarms in the field.
- Generate weekly and annual reports to SDCI regarding exceedances, noise complaints logged, and work modifications completed to resolve complaints.

2.2 Communication Methods

- **Monthly Bulletins:** The Construction Project Manager will prepare monthly construction update bulletins, beginning September 2018 (assuming an October 2018 start of site preparation and start of utility work) and continue at least through completion of construction (October 2020). These bulletins will cover general construction updates, notices for street and sidewalk closures, noise and work hour variances, and other construction activities that may affect the surrounding neighborhood. Bulletins prepared by Tenant and the General Contractor will be distributed by email and/or mailings to the immediately surrounding neighborhoods. The current list includes the following:
 - Seattle Center
 - SDOT
 - King County
 - Residences and businesses within three hundred (300) feet of the Project site.
- **Construction Hotline:** A construction hotline, managed by the Construction Project Manager, will serve as the primary access point for Project information. Complaints received by the Community Liaison or the Construction Project Manager, including impacts related to noise, dust, traffic, parking, lighting, construction personnel, schedule or any items pertaining to construction, will be acknowledged and a response coordinated. A response to daytime complaints will be provided within four (4) hours, and a response to night-time complaints will be provided within two (2) hours. Coordination meetings will be held as needed depending on the nature of the complaint. The General Contractor shall implement commercially reasonable modifications to the construction practices to eliminate or mitigate the concerns relayed in the complaints.
- **Construction Website:** Tenant will maintain a construction media website that will include general information about the project, design, construction updates, and

periodic special updates on construction activity. The website will also contain links to real-time noise monitoring data.

- **Special Project Updates:** The Construction Project Manager will provide the Construction Notification List with an additional Project update if there is to be any construction activity beyond the usual day-to-day work that will affect the surrounding neighbors. Notices will be sent out at least ten (10) days prior to each phase of construction and at least ten (10) days prior to any one-day or several-day mobility impact that is not a part of the day-to-day construction activities such as street or sidewalk closures, and noise and work hour variances. This notification will be in addition to the regular Project updates described elsewhere in this CMP.
- **Public Engagement Events:** Tenant and the City will provide public engagement events, including campus coordination meetings, communication committee meetings, and event collaboration meetings. Tenant will host bi-weekly (every other week) meetings to coordinate with community, city, and resident organizations on mitigation construction impacts and advance efforts to support ongoing activities at Seattle Center and in the adjacent communities. Participants will include Tenant, contractor, and City representatives including SDOT and SDCl, as needed.

City and Tenant will staff a monthly Community Coordination Committee that will ensure frequent communications between Tenant, communities/resident organizations and Seattle Center regarding construction activities, impact mitigation and on-going operations of the Arena. The Committee membership will include all affected organizations both in the community and on the Seattle Center campus.

Tenant will work with the community to jointly sponsor events on campus and off-campus that promote small businesses in the area and arts and culture in the respective communities. These events can be new or existing events to host and/or promote. The intent is to activate the neighborhood and provide incentives for customers to continue to support the Uptown businesses and organizations during the construction period.

- **Project Sign:** A project sign will be in place prior to construction with the name of the Project, a 24-hour hotline with contact information, and the anticipated duration of the Project.
- **9-1-1 Emergency:** Contact the appropriate public authority using 9-1-1 for any emergency requiring immediate assistance.

2.3 Notification Timing and Tracking

When	Action
4 months prior to construction	Outreach to neighboring property owners introducing the Project and proposed permit actions (in connection with permit notice standards). Notice will include advance notice of construction activities.
10 weeks prior to construction	Outreach to affected parties within a 2-block radius.
6 weeks prior to construction	Provide construction information on the project website.
4 weeks prior to construction	Post flyers at nearby community gathering spaces.
72 hours prior to construction	Place no-park signs for lane closures as needed; place signs for pedestrian and business access notices. To be coordinated with SDOT, Seattle Center Project Coordinator, and the Community
Ongoing activities	Web and email updates to Construction Notification List and others as requested. To be reviewed with General Contractor and Community Liaison.

3.0 Construction Noise and Sensitive Receivers

3.1 Construction Hours

- Daytime hours will utilize louder equipment that would not be used during night-time hours. The equipment used during the night-time will not exceed levels permitted within the approved MPPCNV (defined below).
- During the first phase of construction, truck hauling will not occur during the weekday peak traffic hours (7-9 AM and 3-7 PM) and will be coordinated with SDOT.

3.2 Noise-Sensitive Receivers

- Nearby residential-use properties in the commercial district include several multi-unit apartment complexes, including the Expo apartments on Republican Street; Astro apartments and Dalmasso apartments; and the Sacred Heart Women's Shelter on Thomas Street. Residences are sensitive receivers for night-time noise.
- KEXP, a broadcast facility with a recording studio, is located immediately northwest of the existing arena (in the Northwest Rooms). In addition to noise, as a broadcast facility, KEXP is also sensitive to vibration impacts.
- Although not considered a sensitive receptor for noise by the Federal Transit Administration or the City's noise ordinance, the Project will also consider noise impacts that might impact theaters (such as the SIFF Film Center, The Vera Project, Seattle Children's Theatre, Seattle Repertory Theatre, and Cornish Playhouse).
- The nearest school facility, the Downtown (Lakeside) School at 204 Warren Ave N, is about 200 feet east of the 1st Ave N Garage and 300 feet south of Seattle Center, and is scheduled to open in fall 2018.

3.3 Construction Noise Management

- The General Contractor will submit to Seattle Center and then SDCI for review and approval, prior to the commencement of construction activities, a final Noise Management and Mitigation Plan ("NMMP") that will detail the mitigation measures that must be implemented to minimize the noise impacts on receptors. A Tenant-developed NMMP can be seen in Appendix B (approved as part of the MPPCNV) will serve as the baseline for the General Contractor to follow.
- To mitigate noise impacts during the construction phases, many measures will be employed. These measures are described in detail in the NMMP, and include the following:

- Construct 12-foot high noise barriers on the north, west, and south sides of the construction site
- Use conveyors to load excavated material into trucks for off-site transport
- Use a quieted loader on the west side of the arena for activities related to the off-site transport of excavated materials (75 dBA at 50 feet)
- Operate concrete mix or pump trucks in the northeast corner of the north plaza construction area or, alternatively, around the nearest corners to the east or west
- Prohibit mobile crane use west of arena or in the north plaza during night-time hours
- Reduce impact wrench noise by 10 dBA, when operating north, west, or south of the arena, through use of quieter equipment, portable noise barriers, enclosures, or combinations thereof
- Prohibit impact work such as auger shaking, jack hammering, hoe ram use, or vibratory compacting during night-time hours
- Use drilling methods in lieu of impact driving methods for shoring (i.e., soldier pile walls) and pier installation
- Prohibit concrete saw use during night-time hours
- Maintain a minimum operating setback of 375 feet from the façade of The Astro apartment building for concrete trucks operating in the excavated southern portion of the site during night-time hours
- In lieu of pure-tone, mobile equipment backup alarms, use strobe warning lights or flaggers when possible. When the use of strobe warning lights or flaggers is not feasible, the construction contractor will use broadband backup alarms. Also, create site logistics that minimize the need for mobile equipment to reverse.
- Conduct continuous noise monitoring at locations representing sensitive receivers in vicinity of site to ensure night-time construction activities comply with the proposed modified night-time construction noise limits
- Where predictive noise modeling indicates bedroom/sleeping room windows would be exposed to levels over the 60- dBA standard night-time limit due to night-time construction:
 - Offer to install new bedroom/sleeping room windows for buildings more than 20 years old
 - For buildings without air conditioning or ventilation systems, offer to purchase portable or window air conditioning units for bedrooms/sleeping

rooms where predicted levels under warm season scenarios exceed 60 dBA.

- Perform construction activity within the existing building shell when feasible to provide shielding to noise-sensitive receiver locations.
- Reduce ramp grades from maximum possible slopes to reduce vehicle engine power needed to ascend roadways.
- Prohibit compression brakes
- Construct enclosures around stationary equipment that is outside the existing shell of the arena
- Perform particularly noisy operations during daytime hours and/or schedule several noisy operations to occur concurrently rather than separately
- Employ time constraints for noisy operations to reduce potential impacts during sensitive time periods
- Provide training to supervisors to increase awareness of construction noise as it relates to the noise-sensitive surroundings and the requirements of the NMMP
- Use properly sized and maintained mufflers, engine intake silencers (if feasible), and engine enclosures (if feasible)
- Turn off idle equipment after no more than five minutes
- To reduce noise during loading of heavy materials such as concrete debris into haul truck trailers, employ one of the following mitigation measures:
 - Line truck beds with rubberized, shock and noise-absorbing material. Load large concrete pieces using progressive link excavator buckets or similar, and ensure that loading is performed by a skilled operator to minimize the potential for impact-type noises during loading activities, or, alternatively,
 - Load truck beds first with soils and/or fine gravels followed by larger pieces of concrete debris using excavator equipped with progressive link excavator buckets or similar. Ensure that loading is performed by a skilled operator to minimize the potential for impact-type noises during loading activities.
- Maintain and/or lubricate material conveyors to ensure they do not squeak
- Provide 24-hour construction noise monitoring system to log construction site noise
- Use broadband backup alarms, in lieu of pure-tone alarms, during daytime hours
- Restrict truck hauling during the AM and PM peak traffic hours (typically between 7 and 9 AM and between 3 and 7 PM, Monday through Friday)
- Coordinate schedules with sensitive receptors (e.g., KEXP, theaters, venues)

3.4 Construction Haul Route

- A haul route control plan will be developed with the General Contractor, hauling subcontractor, SDOT, and Seattle Center prior to the start of construction. Subcontractors are anticipated to use two routes to haul demolition materials off-site, with the primary and secondary routes varying during day-time and night-time hours. The final haul route plan will be established in the final quarter of 2018 after further investigation into pricing, logistics, and coordination with stakeholders. See Appendix A for initial haul route information.
- Preliminary planning estimates suggest that the earthwork would generate about 51,640 truck trips during the first six months of construction and approximately 73,000 truck trips during months 7-18 of construction. This would correspond to about 290 truck trips per day for months 1-6 and 80-100 truck trips for months 7-18. To minimize traffic impacts in the Project vicinity, truck hauling will not be allowed during peak trip hours defined in coordination with SDOT. Night-time truck hauling is expected to result in significant impacts to noise in the site vicinity. As a result, in coordination with Seattle Center (Seattle Center Project Coordinator), special hauling routes heading east through the Seattle Center campus (away from the closest residences) will be used in night-time hours (11:30 PM to 6:30 AM). See Figures 3-1 and 3-2 for mitigation measures associated with the through-campus truck hauling route.

Truck hauling route - Harrison St
 mitigation (limited to 11:30 pm -
 6:30 am)



Figure 3-1. Harrison Truck Hauling Route Mitigation



Figure 3-2. Pedestrian route to Harrison turnaround.

3.5 Construction Traffic Management Plan

- General Contractor will develop a Construction Traffic Management Plan (the “Construction TMP”) with SDOT before the start of construction.
- The Construction TMP shall include:
 - Identification of truck staging and off-site queueing locations.
 - Locations and methods for partial or complete street closures (e.g., timing, signage, location and duration restrictions).
 - Closed for the duration of construction (24 months), unless otherwise specified:
 - On Thomas St between 1st Ave N and 2nd Ave N, the northside parking lane and sidewalk would be closed. In Phase 4 only, the north-side travel lane (west-bound) may be closed for a period of time to complete the parking garage. Flaggers would be used to ensure traffic circulation.
 - Phase 1 only: The western half of vacated 2nd Ave N from Thomas St to the south edge of the intersection of vacated Harrison would St be closed. The western half of vacated 2nd Ave N would be reopened for the following: New Year’s Eve, Northwest Folklife Festival, Pride Festival, Seafair, Bite of Seattle, Bumbershoot, and the installation and removal of the Fisher Pavilion ice. It may also be open during the day on other dates.
 - On 1st Ave N, the east parking lane and sidewalk between Thomas St and the south end of the King County Metro bus stop would be closed (the bus stop would remain open).
 - The King County Metro bus stop along 1st Ave N, immediately north of John St would be closed.
 - The bus layover area on 1st Ave N would be closed.
 - Phases 2, 3, and 4: East parking lane and sidewalk of 1st Ave N between John St and Thomas St closed.
 - Vacated Harrison Street from vacated 2nd Ave N to the east through the Seattle Center campus, during night-time (11:30 pm to 6:30 am) hours only. Seattle Center operations vehicles will be allowed on Harrison and coordinated with hauling. Specific pedestrian routes will

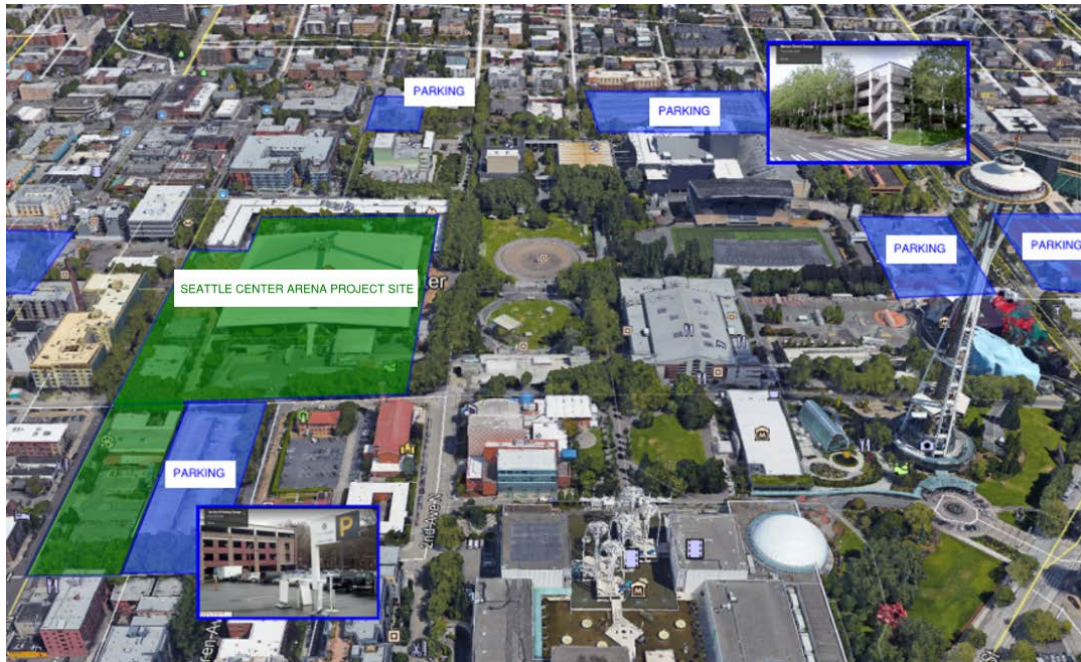
be established to allow east/west foot traffic. General Contractor must obtain Seattle Center's approval of traffic control and safety plan for this use. General Contractor must provide a guard at the gate 8 (the Harrison turnaround) and install a temporary or permanent driveway cut. See Figures 3-1 and 3-2.

- Dump trucks during excavation
 - Each truck is assumed to hold approximately 20 cubic yards of soil. Preliminary planning estimates suggest that the earthwork would generate about 51,640 truck trips during the first six months of construction and approximately 73,000 truck trips during months 7-18 of construction.
 - To minimize traffic impacts in the Project vicinity, truck hauling will not be allowed during peak trip hours (7-9 AM and 3-7 PM) as coordinated with SDOT Monday thru Friday. Frequency of trucks during exporting of soil will be about 290 truck trips per day.
- Identification of arrival/departure times that would minimize traffic impacts
 - Trucks will avoid peak trip hours as coordinated with SDOT Monday thru Friday to minimize traffic impacts. For continuous concrete pours, this may not be possible.
- General trucking circulation patterns mitigation, delivery routing, size/type of trucks
 - Trucks will be located:
 - On Thomas St, between Warren Ave N and 2nd Ave N, in north parking lane.
 - On 1st Ave N between John St and the King County Metro Bus stop, in east parking lane.
 - On the western half of the vacated portion of 2nd Ave N within the Seattle Center campus.
 - Flaggers and traffic control will be utilized to reduce noise and idle time where applicable. Flaggers will be used to assist trucks getting into the site, reduce backing up and staging of vehicles.
 - General Contractor will be responsible for coordinating deliveries among the different trades to avoid traffic congestion. Off-site lay down yards / warehouses will be utilized when possible to reduce the number

of trips and truck traffic. Trucks will be a mix of flatbed trucks and trailer trucks.

- Delivery and haul truck routes may change throughout each phase of the Project.
 - The General Contractor will be responsible for hiring contract haulers.
 - To prevent tracking of debris from the site to the city streets, proper Temporary Erosion and Sediment Control (TESC) and SWPPP measures will be in place. Additionally, equipment located within the mass excavation will remain in the area of mass excavation and the trucks will be located on the closed portion of the streets/curbs/plazas.
 - General Contractor will properly coordinate trucking details to ensure no queuing of trucks in right-of-way areas that would block traffic.
 - Per request of Seattle Center, truck queuing on 2nd Ave N will be limited to night-time hours only (after 10 PM).
- Tenant will coordinate with Seattle Center regarding curbside management. An adequate location will be identified for relocating a temporary loading zone to serve school buses that currently use the 1st Ave N loading zone along the arena plaza. Bus loading and unloading locations on 2nd Ave N will be open for daytime use and as needed per the Curbspace MOA.
- No truck queuing or staging will be allowed at or in the vicinity of I-5.
- All necessary SDOT and SDCI permits shall be in place prior to any trucking activity.
- During heaviest periods of truck hauling, signal timing modifications may be made by SDOT.
- Construction parking management:
 - Construction workers will initially park at 1st Ave N garage. Overflow parking will be accommodated by surrounding parking lots and garages. Onsite craft employees will peak at approximately 600 per day.
 - Carpooling, use of mass transit, and use of non-motorized vehicles will be encouraged. The Construction Project Manager will facilitate “lunch ‘n learns” at the construction site offering information on how to use the King County Metro and Sound Transit Systems.
 - Tenant will coordinate with Seattle Center regarding limitations on parking during peak/holiday weekends and special events.
 - A construction outreach plan will be developed and implemented to provide information to businesses and residences along 1st Ave N if the temporary flex zone (i.e., on-street parking) loss occurs.

- See below for parking map.



- Throughout the Project, the General Contractor would monitor haul routes through Seattle Center campus and on designated non-arterial haul routes to assess roadbed damage. If damage is identified, General Contractor would repair project related roadway damage on haul routes through Seattle Center campus and on designated non-arterial haul routes, to the satisfaction of SDOT and/or Seattle Center.
- The General Contractor will use commercially reasonable efforts to avoid impacting parking and events during peak/holiday weekends and special events. The General Contractor is aware of the parking demands for events and will coordinate with Seattle Center and surrounding community groups pursuant to the Seattle Center Integration Agreement.
- Tenant agrees to pay to the City \$125,000 on account of the staffing and capital costs identified in Section 3.5 of the Construction Impact Mitigation Plan, payable in two (2) installments of \$62,500 each, on January 1 and July 1, 2019.

3.6 Pedestrian Safety Plan

- A pedestrian safety plan will be developed by the General Contractor in coordination with Seattle Center and SDOT standards to ensure pedestrian access around the construction zone, including safe pedestrian pathways along Thomas St between 1st Ave N and 2nd Ave N, access to the Northwest Courtyard and the Northwest Rooms, or an alternative pathway

with signage. Flaggers will be posted for pedestrian and Seattle Center vehicle crossings along vacated Harrison St during its night-time truck hauling usage.

- Safe and convenient passage for cyclists and pedestrians will be maintained through and around construction areas.
- Pedestrian crossings will be improved (sidewalk replacement and new lighting), advanced signage will be installed, and/or alternative pathways will be provided along 1st Ave N between John St and Republican St as applicable.

3.7 Metro Bus Planning

- An adequate location for a temporary King County Metro bus layover facility will be established in coordination with King County to replace the layover space at the north end of the arena plaza. Potential locations could include Republican St just east of 1st Ave N or Warren Ave N just north of Republican St.
- In coordination with King County Metro, a temporary bus stop will be added to replace the stop just north of John St along 1st Ave N. Potential locations could include the stop just south of Republican or just north of Denny Way or other locations as determined by King County. The General Contractor will coordinate with King County Metro and Seattle Center to address the loss of some on-street parking spaces in these locations.

3.8 Bike Lane Accommodations

- Temporary bike lane accommodations will be made to replace any loss of the on-street bike lane along 1st Ave N between John St and the north edge of the arena plaza. Alternatives are under review to shift the lanes along 1st Ave N to the west to accommodate all existing bicycle and vehicle lanes. This could also be designed as a protected bike lane along the west side of the street. This would require the temporary loss of on-street parking and may require traffic signal modifications.

4.0 Construction Dust & Erosion Control Measures

4.1 Air

- Tenant will obtain approval of a Dust Control Plan from the City. Dust control measures will include:
 - Establishing a hotline for surrounding community members who may be affected by project-related dust. The contact person shall respond to and take corrective action within 48 hours. Signs with information about the hotline will be posted around the site.
 - Watering soils to prevent blowing of dust.

- Using water sprays or other non-toxic dust control methods on unpaved roadways.
- Wash down all equipment before moving from the project site onto the Seattle Center campus or a paved public road. Install and use wheel washers to clean truck tires.
- Covering soil piles when practical.
- Minimizing work during periods of high winds.
- Limiting vehicle speeds on unpaved construction areas to 15 miles per hour (MPH).
- Turning off construction vehicles when not in use to help control emissions. Construction activities and equipment will follow Seattle Department of Construction and Inspections (SDCI) regulations for controlling emissions to the air.
- Covering all haul trucks transporting soil, sand, or other loose material off-site to minimize impacts to air quality.
- Regularly servicing and maintaining construction equipment engines to minimize air quality and odor issues caused by tailpipe emissions.
- Installing self-contained wheel washes at each construction exit. Wheel washes will be maintained on a weekly basis and monitored by both the construction manager and the installing subcontractor.
- Adequately wet all storage piles, treat with chemical dust suppressants, or cover piles when material is not being added to or removed from the pile.
- Surrounding streets will be street swept as needed during the duration of the project until such time as all interior roadways / plazas are paved. Thereafter, if soil or mud is tracked onto public streets or vacated roadways through Seattle Center campus used for hauling, the General Contractor will remove all visible mud or dirt track-out onto adjacent public roads by street sweeping or a high efficiency particulate air (HEPA) filter equipped vacuum device.
- General Contractor shall schedule delivery of materials transported by truck to and from the project area to minimize congestion during peak travel times on adjacent City streets. This will minimize secondary air quality impacts otherwise caused by traffic having to travel at reduced speeds.
- General Contractor shall comply with SDCI dust control standards.
- Street sweeping on Seattle Center campus between 6:30 am and 7 am during Phase 1 and while trucks are hauling through the Seattle Center campus.

4.2 Erosion Control

- During construction, a Stormwater Pollution Prevention Plan (SWPPP) and associated Best Management Practices (BMPs) will be implemented to manage stormwater properly. The Project will comply with Erosion and Sediment Control guidelines set forth in King County's stormwater manual. The civil engineer will prepare a Temporary Erosion and Sediment

Control Plan (TESC) and a SWPPP to meet the 12 Required Elements per the NPDES General Construction permit and the County's stormwater manual.

- Specific measures to reduce or control erosion include:
 - Clearly marking the clearing limits with high visibility fencing and stabilizing construction entrances located off existing paved driveways.
 - Providing stabilized construction roads and parking onsite.
 - Controlling stormwater flow rates through temporary sediment traps, as well as through permanent stormwater control facilities.
 - Providing perimeter protection through silt fencing and straw wattles. Sediment controls may also include filtration or chemical treatments, if necessary.
 - Stabilizing soil on a temporary and permanent basis through seeding/sodding, mulching, and plastic covering.
 - Protecting slopes through interceptor swales, check dams, and plastic covering. Inlet protection will be provided to prevent discharge of sediment-laden stormwater offsite.
 - Stabilizing and protecting all existing and proposed drainage channels through channel lining and outlet protection. All trench de-watering will be routed to appropriate sedimentation traps or ponds. The General Contractor will implement, inspect, and maintain all BMPs on a regular basis.
 - General Contractor shall ensure that its subcontractors cover the soils loaded into the trucks with tarps or other materials to prevent spillage onto the street and transport by wind.
 - General Contractor shall ensure that its subcontractors use tarps to cover temporary on-site storage piles.
 - Excavation activities will be conducted consistent with WAC requirements and include required shoring and safety systems.
 - A licensed geotechnical engineer shall conduct a geotechnical hazard evaluation, and recommendations from that evaluation will be incorporated into the project design.
 - A Washington-licensed geotechnical engineer shall monitor earthwork activities to ensure that conditions encountered are consistent with the findings of the final design-level geotechnical report.

5.0 Public Health and Safety

- Reasonable and customary quantities of chemicals will be used during the construction process, such as gasoline and diesel, for vehicle use. No other toxic or hazardous chemicals will be stored onsite during construction.
- Rodent control measures will be implemented a minimum of 15 days prior to any clearing or demolition. The project will comply with the requirements outlined in Section 3303.15 of the 2015 Seattle Building Code. The rat eradication program must be approved by a qualified pest control agent and in compliance with Seattle-King County Public Health

Department guidelines and approved by the SDCI building official prior to demolition permit issuance (2015 Seattle Building Code).

- All construction would be conducted in compliance with the City of Seattle Fire Code, which is based on the International Fire Code and provides minimum standards for fire and life safety for buildings, access roads, and fire protection equipment installation (SDCI, 2015). Workplace safety and construction site BMPs, such as fencing, designated pedestrian walkways, business access points, signage, etc., will be used to protect construction workers, pedestrians, and visitors to Seattle Center during active construction.

6.0 Historic and Cultural Resources Preservation

- Vibration monitoring will be conducted for the Northwest Rooms, International Plaza, Bressi Garage, and any other sensitive structures within one hundred (100) feet of earthwork activities.
- The exteriors of Key Arena, the Northwest Rooms, the Bressi Garage, and the International Plaza will be stabilized during construction as needed.
- The exterior masonry walls of Bressi Garage will be restored as needed using in-kind tuck pointed and cleaning.
- Dust and particulate impacts adjacent to the project site and haul route could be reduced by the implementation of a dust control program, use of a noise curtain within the Arena where the glass curtain is removed, and regular cleaning.
- If cultural or archeological objects are found during site preparation work, the Washington State Department of Archaeology and Historic Preservation will be notified, and appropriate measures will be taken. An Inadvertent Discovery Plan has been prepared, which outlines construction phase protocols for Discovery of Archaeological Resources and Protocols for Discovery of Human Remains.
- Tenant will abide by the conditions of the Landmarks Preservation Board's Certificate of Approval and the Controls and Incentives Agreements for the Northwest Rooms, KeyArena, and Bressi Garage.

7.0 Aesthetics, Light and Glare

- A construction lighting plan will be created and implemented. The construction lighting plan will contain the following elements:
 - The General Contractor will ensure that all lighting related to construction activities is shielded or directed when feasible to restrict direct illumination onto properties

located outside the Project site. However, construction lighting shall not be so limited as to compromise the safety of construction workers.

- Fugitive light sources from portable sources used for construction will be minimized.
- Night-time exterior construction work will be limited as much as possible following the demolition and excavation phase.
- Construction fencing will be installed around the perimeter of the construction area. Signage would be posted along the fencing (e.g., providing notice of businesses open during construction; identifying pedestrian walkways and routes; announcing the coming land use, improvements, and events; identifying construction companies on site; and perhaps including art). All signage facing into campus shall be reviewed and approved by the Seattle Center Director.
- General Contractor will utilize existing vegetation to reduce light and glare impacts to sensitive receptors. Vegetation removed for construction activities would be replanted.
- Construction staging and materials storage areas will be restored as quickly as possible following project completion.
- Low-level directional construction and security lighting shall be provided to increase visibility for security / construction personnel and passersby.

8.0 Public Services and Utilities

- Construction will be conducted in compliance with the City Fire Code.
- General Contractor will coordinate with utility providers to reduce utility outages to area businesses and residences.
- General Contractor will work closely with Seattle Center Project Coordinator and the Northwest Rooms tenants to schedule utility down-times during non-business hours, and to coordinate any access needs to the Northwest Rooms to minimize disruption and keep tenants fully informed of each step of the process.
- Potholing and utility location and identification would be conducted in advance of any construction activity to minimize the potential to inadvertently disrupt underground utility services.
- The planning, scheduling, relocation, and reconnection of applicable Northwest Rooms utilities shall be coordinated to ensure, as much as possible, a seamless transition.
- General Contractor will provide advance notice of any planned temporary service outages.
- Coordination with SPU and King County during project design will reduce the potential for construction-related impacts to existing pipes or other facilities.

- Tenant has hired a full-time Community Liaison to coordinate with local community organizations during the construction phase to minimize impacts to the surrounding community.

9.0 Tree Protection

- A Tree, Vegetation, and Soil Protection Plan will be developed that includes the following elements:
 - Consultation from a registered arborist to assist the General Contractor with tree preservation guidelines and protection specifications.
 - On-site monitoring and review of tree protection barriers in coordination with the General Contractor.
 - Tree preservation details for critical root zone, pruning, and other work near trees.
- The Project will follow the protection measures outlined in the following documents:
 - Director's Rule 30-15 – A tree protection plan will be prepared by a tree care professional who has field reviewed the site and assessed the tree's size, location, and condition, and determine that the encroachment into the drip line will not adversely impact the survival or stability of the tree.
 - SDOT's 2014 Street Tree Manual – Each Street Tree that is not approved for removal shall be fenced, including all unpaved areas of the critical root zone to prevent compaction, grading or other disturbance.
 - Seattle Center's Landscape Management Plan and Site Standards where applicable.
 - All existing trees along the project limits (vacated 2nd Ave N, Northwest Rooms courtyard and Harrison Street) which are to remain after the project is completed shall be protected during construction in accordance with Seattle Center site standards incorporated into the technical specifications approved by the Seattle Center Director.
 - Legacy tree (Atlas Cedar) located outside of the construction fence within the lower courtyard to be retained with protection when construction activities occur.
 - Provide access to Seattle Center staff to check on and water protected trees.
- Tenant has committed to tree replacement at a 2:1 ratio as required by Executive Order 03-05 (Tree Replacement). Tenant has committed to planting approximately 100 new trees on the project site, including specimen trees to be planted in the same location as the 2 legacy trees that would be removed from the southeast portion of the International Plaza (also known as the North Courtyard).

- Historic markers may be installed to recognize the legacy of the removed trees, and steps may also be taken to preserve other legacy trees on campus.
- The Project will also comply with Seattle Municipal Code 25.11 to reduce impacts to trees. The purpose and intent of following this code is to:
 - Implement the goals and policies of Seattle's Comprehensive Plan especially those in the Environment Element dealing with protection of the urban forest;
 - Preserve and enhance the City's physical and aesthetic character by preventing untimely and indiscriminate removal or destruction of trees;
 - Protect trees on undeveloped sites that are not undergoing development by not allowing tree removal except in hazardous situations, to prevent premature loss of trees so their retention may be considered during the development review and approval process;
 - Reward tree protection efforts by granting flexibility for certain development standards, and to promote site planning and horticultural practices that are consistent with the reasonable use of property;
 - Especially protect exceptional trees that because of their unique historical, ecological, or aesthetic value constitute an important community resource; to require flexibility in design to protect exceptional trees;
 - Provide the option of modifying development standards to protect trees over two (2) feet in diameter in the same manner that modification of development standards is required for exceptional trees; and
 - Encourage retention of trees over six (6) inches in diameter through the design review and other processes for larger projects, through education concerning the value of retaining trees, and by not permitting their removal on undeveloped land prior to development permit review.

10.0 Marketing and Promotion

Tenant has committed to contributing \$500,000 (payable over 2 years and up to 30% of the contribution may be delivered in-kind in lieu of cash) to Seattle Center's operation and development of an "open for business during construction" marketing campaign. The cash portion

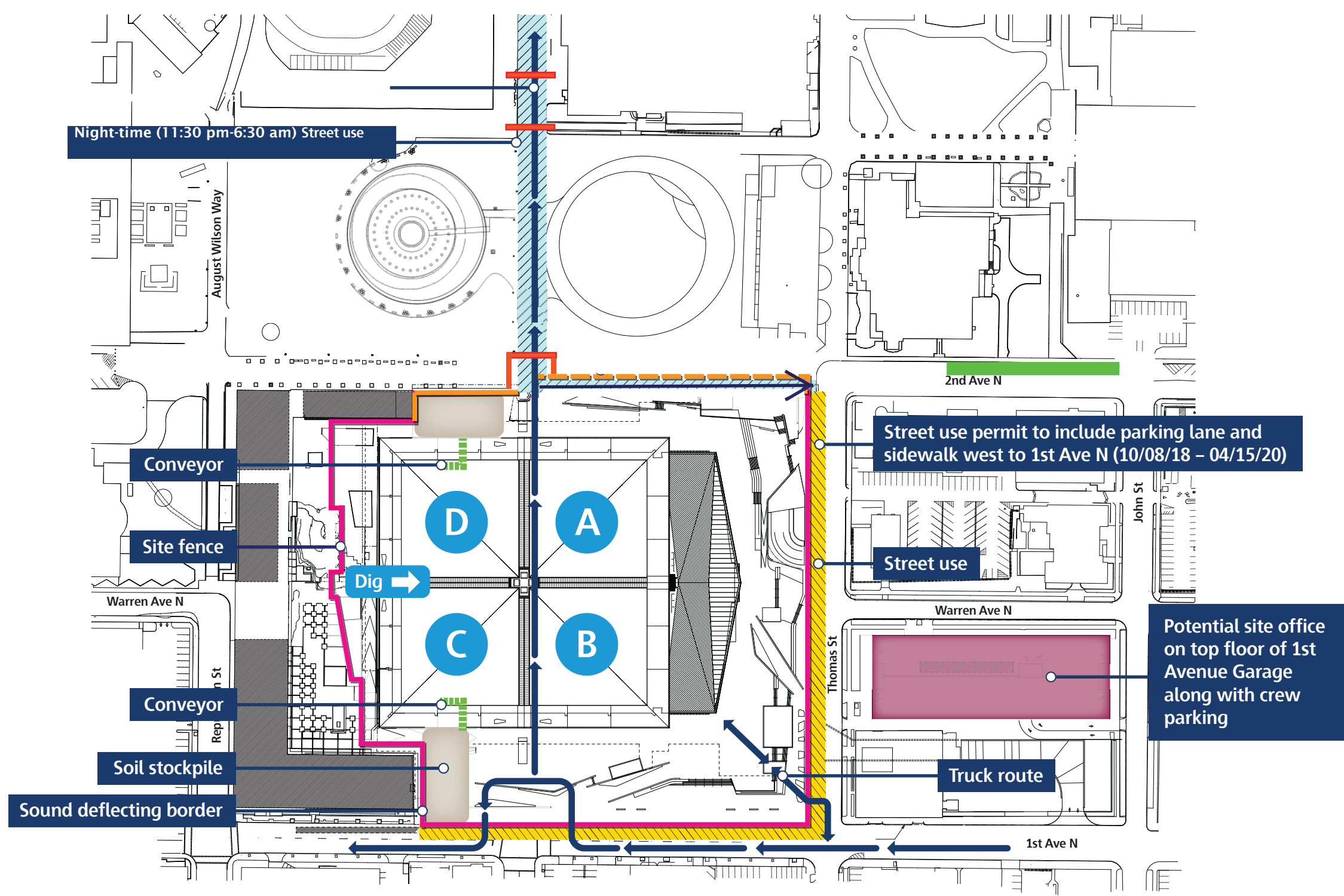
of this payment is payable in two equal installments, the first by a date to be mutually agreed upon by the Seattle Center Director and Tenant's chief executive officer.

Tenant has hired a full-time Community Liaison to work with Seattle Center tenants and affected Uptown businesses to ensure the public is aware that businesses are open during construction. The Community Liaison was hired in June 2018, and the position will continue after construction is complete and into project operation.

Tenant agrees to pay \$74,000 for City's costs associated with the rescheduling of the Seattle/King County Clinic at Tenant's previous request.

APPENDIX A

Site Logistics Plan



Phase 1

Legend

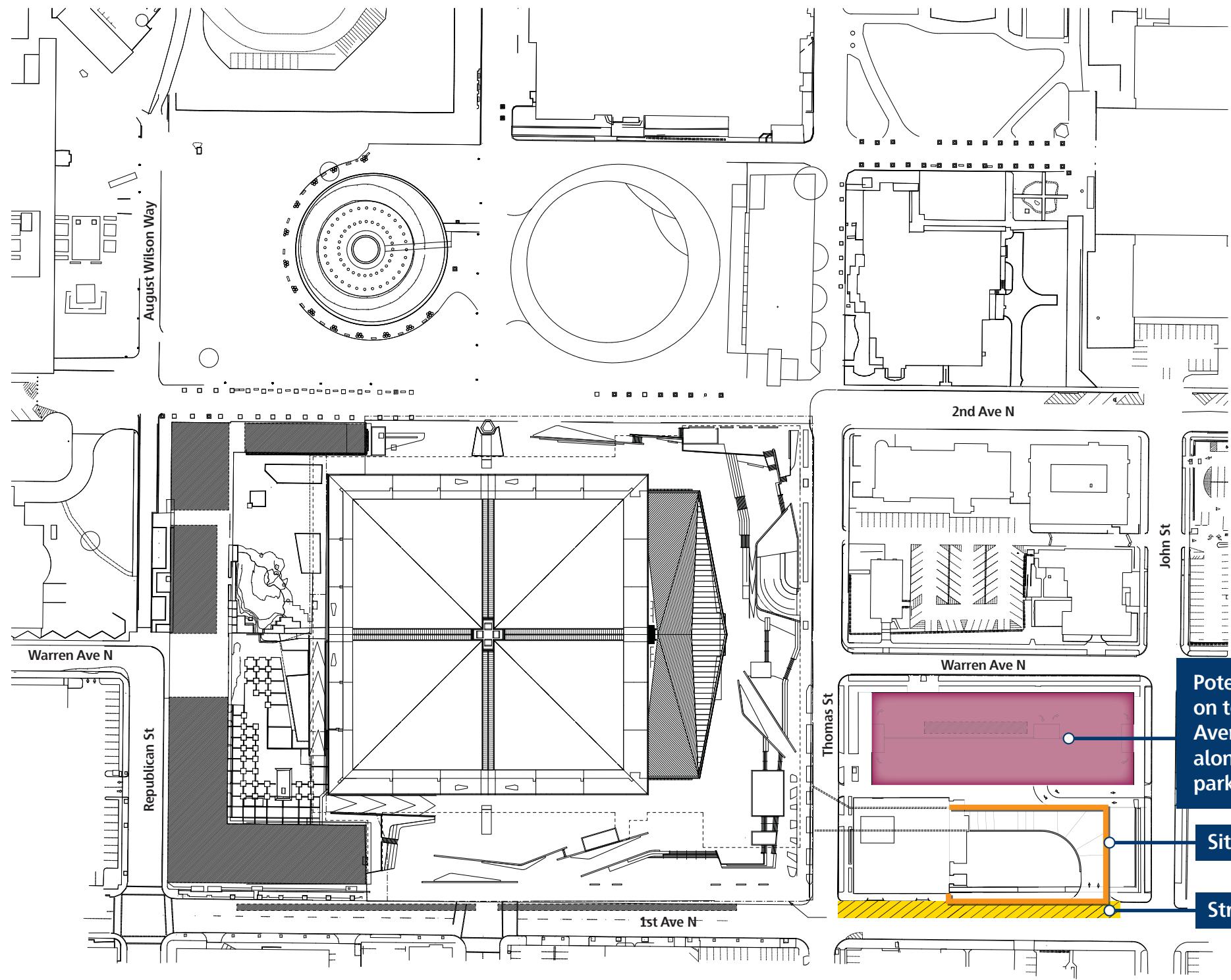
- Site fence
- - - Fence at centerline of vacated 2nd Ave N; movable for certain events.
- Sound deflecting border
- Potential site office with parking
- A Dig order
- Truck route
- Street use on Seattle Center property
- Street use
- Soil stockpile
- Conveyor
- Potential truck queue to enter the site during night-time hauling
- Crosswalk with flagger to control pedestrian flow

Oak View Group
Seattle Center Arena

Phase 1
Excavation/Demolition (Interior)
10/2018 – 03/2019



Scale: NTS



Phase 2

Legend

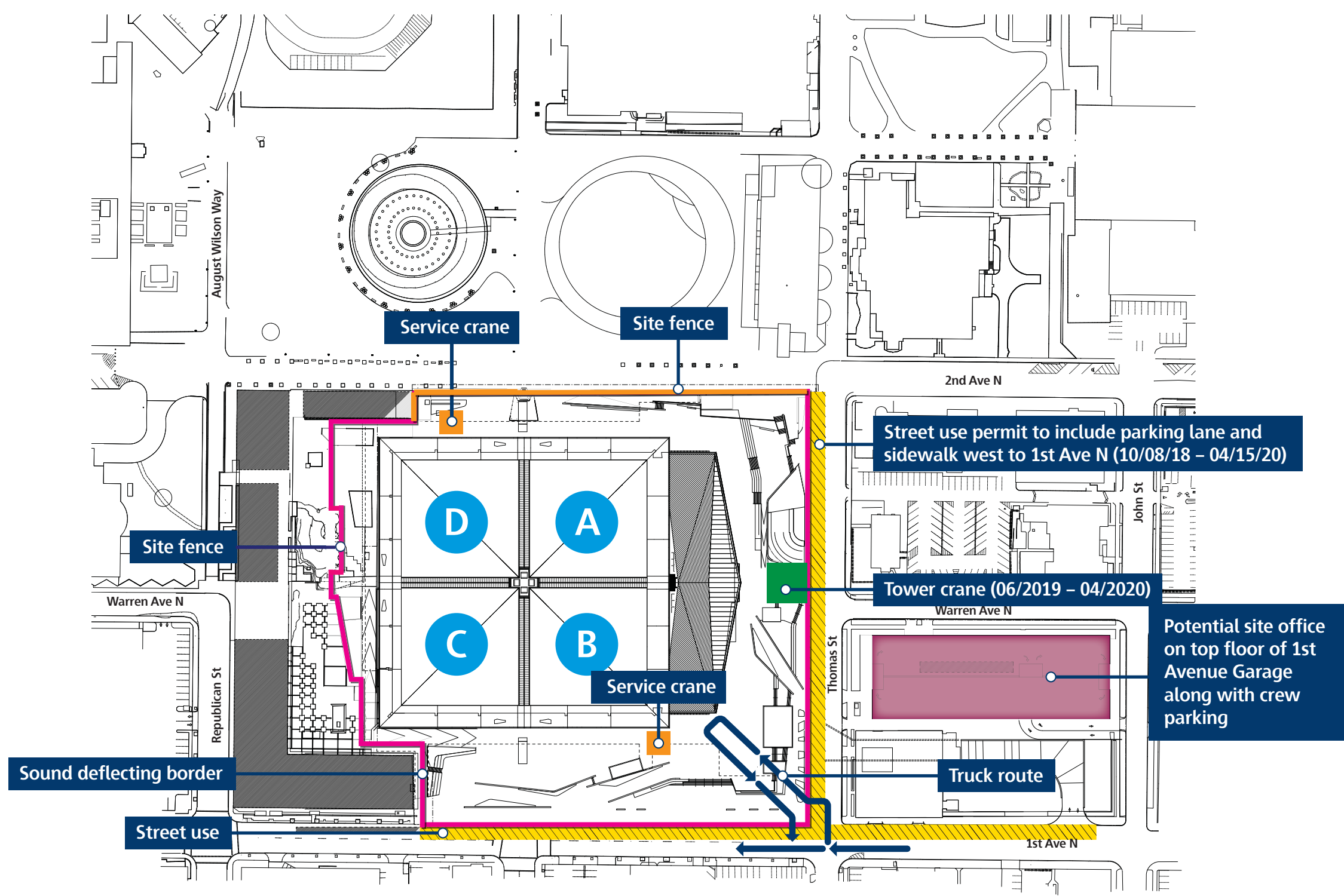
- Site fence
- Potential site office with parking
- Street use

Potential site office on top floor of 1st Avenue Garage along with crew parking

Site fence

Street use





Phase 3

Legend

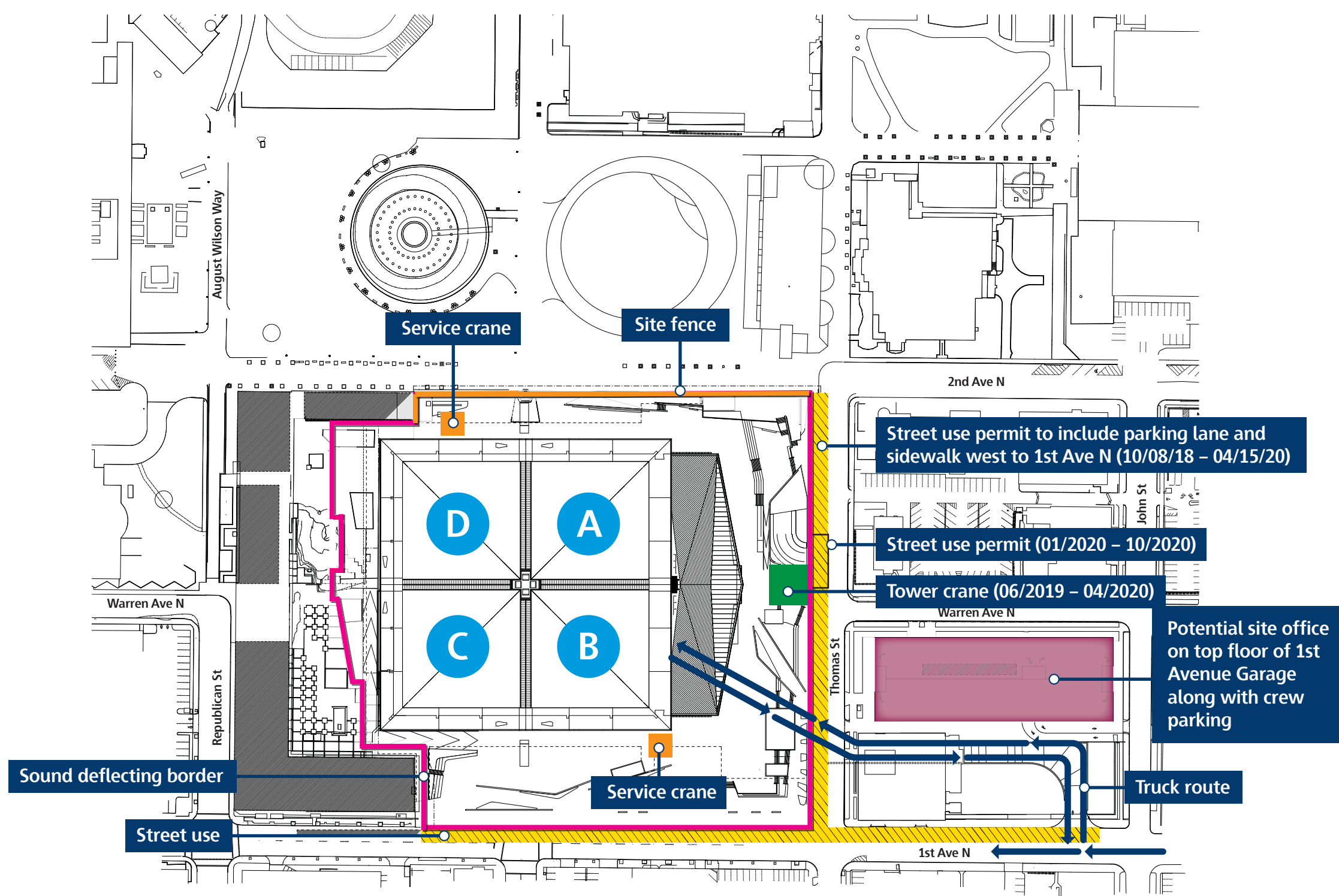
- Site fence
- Sound deflecting border
- Potential site office with parking
- A Dig order
- Truck route
- Service crane
- Tower crane
- Street use

Oak View Group
Seattle Center Arena

Phase 3
Structure I
01/2019 - 08/2019



Scale: NTS



Phase 4

Legend

- Site fence
- Sound deflecting border
- Potential site office with parking
- A Dig order
- Truck route
- Service crane
- Tower crane
- Street use

Oak View Group Seattle Center Arena

Phase 4
Structure II and Interiors
09/2019 - 09/2020



Scale: NTS

APPENDIX B

Noise Management and Mitigation Plan

Prepared for:
CAA Icon
Seattle, WA

Prepared by:
Ramboll US Corporation
Lynnwood, Washington

August 30, 2018

**SEATTLE ARENA REDEVELOPMENT
PROJECT**
NOISE MANAGEMENT AND MITIGATION PLAN
REVISED AUGUST 30, 2018

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APPENDICES

- Appendix A: Sound Level Measurement Data
- Appendix B: Site Logistics Plan

ACRONYMS AND ABBREVIATIONS

Acoustically neutral	a description of equipment or material such as a wind screen used over a sound level meter microphone that, due to its composition, has little or no effect on the sound pressure levels reaching the microphone
CadnaA.....	Computer Aided Noise Abatement, a computer noise model used in this analysis
dB.....	decibel, referring to a unit measured on the decibel scale used to quantify sound levels
dBA.....	A-weighted decibel, a system for weighting measured sound levels to reflect the frequencies that people hear best
Distance attenuation	the rate at which sound levels decrease with increasing distance from a noise source based on the dissipation of sound energy as the sound wave increases in size (think of a balloon getting thinner as it becomes more inflated)
Equivalent sound level (Leq)	A sound level metric that is the level that if held constant over the same period of time would have the same sound energy as the actual, fluctuating sound (i.e., an energy-average sound level)
ISO	International Organization for Standardization, which establishes standard methods and procedures for accomplishing specific activities and calculations. The ISO has defined a number of standards related to the quantification of environmental noise.
Leq	Equivalent sound level (see above)
Lmax.....	Maximum sound level; highest sound level within a specified time interval; Fast Lmax is a 125 millisecond (1/8 second) sound level
Ln.....	Statistical noise level, the level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (for example, L50 is the level exceeded 50 percent of the time)
Maximum permissible level	Term used in state and local noise rules in Washington State to define base sound levels specified in these regulations. Such base levels are often allowed to be exceeded for defined time periods. <i>Not</i> to be confused with Lmax or the actually allowed maximum sound level limit.
Model Receptor.....	A theoretical location used in computer modeling at which the model calculates sound levels from a source or sources. Modeling receptors are usually placed at locations representing one or more potentially noise-sensitive uses.
Noise contour	Graphic depiction of model-calculated sound levels showing changes with distance(s) from the noise source(s) and indicating changes due to any intervening obstacles such as buildings or terrain

Noise metric	One of a number of measures used to quantify noise (e.g., Leq, or Lmax)
SLM.....	Sound level measurement
SMC	Seattle Municipal Code
Sound level	Sound pressure level (see below)
Sound power level.....	A measure of the sound energy emitted by noise source expressed as energy per unit of time. <i>Not</i> to be confused with sound pressure level.
Sound pressure level	Ten times the base-10 logarithm of the square of the ratio of the mean square sound pressure, in a stated frequency band (often weighted), and the reference mean-square sound pressure of 20 μ Pa (micro pascals, a standard reference unit of pressure), which is approximately equal to the threshold of human hearing at 1 kilohertz. Sound pressure level is expressed in decibels.

1. INTRODUCTION

This Noise Management and Mitigation Plan (NMMP) was prepared in support of the Major Public Project Construction Noise Variance (MPPCNV) submitted to the Seattle Department of Construction and Inspections (SDCI) by Oak View Group (“OVG”) for the renovation of the arena at Seattle Center (“Arena”) under Chapter 25.08 Seattle Municipal Code (“SMC”) and the City’s Director’s Rule 3-2009.

OVG requests a two-year noise variance for the renovation of the Arena to allow necessary construction work activities to exceed the sound level limits described in Chapter 25.08 SMC during nighttime hours (between 10 PM and 7 AM on weekdays and between 10 PM and 9 AM on weekends and legal holidays (“nighttime”). The analysis in this NMMP demonstrates that means and methods are available to meet the noise limits requested in the MPPCNV over the proposed two-year construction period. Ultimately, the selected construction contractor will propose their own construction activities and schedule and the NMMP will be updated to meet the commitments OVG has made in the MPPCNV application.

Construction activities and equipment used during the renovation of the Arena may not be identical to the equipment identified in this application, but will be substantially similar to those identified in the Proposed Construction Activities section.

This NMMP includes the following:

- Description of existing baseline sound levels at noise-sensitive receptors near the Arena
- Proposed modified noise limits for nighttime construction activities that would render the project economically or functionally unreasonable if limited to daytime construction
- A description of the proposed construction activities, including a description of the noisiest proposed activities or periods
- Model-calculated noise contours to identify levels that may be expected at nearby properties during the noisiest nighttime construction activities
- Proposed noise-mitigation measures
- Provisions for compliance tracking and actions taken to resolve public complaints
- Description of public communication and outreach efforts

2. PROJECT DESCRIPTION

2.1 Overview of the City of Seattle Arena Renovation

On January 11, 2017, the City of Seattle ("City") released a Request for Proposals ("RFP") for the redevelopment of the Arena as a world-class, multi-purpose sports and entertainment facility. The City developed the RFP with input from ten City departments and in consultation with constituencies throughout Seattle. The City's objectives for the redevelopment of the Arena include each of the following (collectively, the "Arena Objectives"):

- To provide a world-class civic arena to attract and present music, entertainment, and sports events, potentially including National Basketball Association ("NBA") and NHL events, to Seattle and the region;
- To provide for Arena design and operations in a manner that integrates with and enhances connections to Uptown and adjoining neighborhoods and aligns with the Urban Design Framework;
- To provide for design, permitting, development, demolition and construction of the Arena with minimal City financial participation;
- To provide for the continuous, successful, and sustainable operation of the Arena as a world-class civic venue with minimal City financial participation or risk;
- To provide for mitigation of transportation impacts due to Arena construction and operations;
- To provide Arena construction and operations in a manner that is equitable for workers and consistent with the City's Race and Social Justice Initiative; and
- To provide for Arena design and operational integration with Seattle Center, contributing positively to the vibrancy of Seattle Center.

On April 12, 2017, OVG submitted to the City a proposal in response to the RFP. Between April 12, 2017 and June 2, 2017, the City carefully evaluated the various proposals in response to the RFP to determine, among other things, how the proposals met the Arena Objectives.

On June 7, 2017, the City selected OVG's response as the preferred proposal for the renovation of the Arena. Between June 7, 2017, and December 4, 2017, OVG and the City negotiated the terms of the Memorandum of Understanding (the "MOU"), regarding, among other terms, the Parties' commitment to negotiate a lease and development agreement in good faith consistent with the terms, conditions, and limitations set forth in the MOU.

On August 14, 2017, the Seattle City Council adopted Resolution 31764, which set forth the City Council's expectations for the negotiation of, and approval process for, the MOU. On December 4, 2017, the Seattle City Council adopted Ordinance 125480 approving the MOU. On December 6, 2017, Mayor Jenny Durkan signed the ordinance and executed the MOU.

Since the adoption of the MOU, OVG has been working closely with the City and community stakeholders to design a redevelopment project that achieves the Arena Objectives. In an effort to secure an NHL hockey team, OVG's partner, Seattle Hockey Partners LLC ("SHP"), applied for an expansion team on February 13, 2018. As part of the application process, and in an effort to demonstrate to the NHL that Seattle would be a thriving marketplace for a hockey team, SHP

conducted a season ticket drive on March 1, 2018, receiving an overwhelmingly positive response. Over 25,000 tickets were sold in the first hour. SHP continues to work with the league regarding expansion opportunities.

As set out in Exhibit E to the MOU, OVG and the City have planned a timeline for the redevelopment of the Arena to have an arena ready by the fall of 2020 in order to achieve the Arena Objectives. Finishing the redevelopment of the Arena for the 2020 hockey season has become increasingly important to further SHP's and the City's chances of being awarded an NHL expansion team. Project delays could jeopardize SHP's chances of securing an NHL team, frustrating the Arena Objectives.

Opening the Arena by the fall of 2020 will require nighttime construction activities to occur over the two-year construction period.

3. TERMINOLOGY AND BACKGROUND

3.1 Noise Level Terminology and Human Hearing

Noise is sometimes defined as unwanted sound; the terms noise and sound are used more or less synonymously in this plan.

The human ear responds to a very wide range of sound intensities. The decibel scale (dB) used to describe sound is a logarithmic rating system which accounts for the large differences in audible sound intensities. This scale accounts for the human perception of a doubling of loudness as an increase of 10 dB. Therefore, a 70-dB sound level will sound about twice as loud as a 60-dB sound level. People generally cannot detect differences of 1 dB; in ideal laboratory situations, differences of 2 or 3 dB can be detected by people, but such a change is generally not detectable in an average outdoor environment. A 5-dB change is generally perceived under normal listening conditions.

As mentioned above, the dB used to describe noise is logarithmic. On this scale, a doubling of sound-generating activity causes a 3-dB increase in average sound produced by that source, but not a doubling of the loudness of the sound (which requires a 10-dB increase). For example, if traffic along a road is causing a 60-dB sound level at a nearby location, a doubling of the number of vehicles on this same road would cause the sound level at this same location to increase to 63 dB. However, such an increase might not be discernible in a complex acoustical environment such as a typical outdoor environment.

When addressing the effects of noise on people, it is useful to consider the frequency response of the human ear. Sound-measuring instruments are therefore often programmed to weight measured sounds based on the way people hear. The frequency-weighting most often used is A-weighting because it approximates the frequency response of human hearing and is highly correlated to the effects of noise on people. Measurements from instruments using this system are reported in "A-weighted decibels" or dBA. All sound levels in this document are reported in A-weighted decibels.

Relatively long, multi-source line sources such as roads with steady traffic emit cylindrical sound waves. Because these sound waves spread cylindrically, sound levels from such sources decrease at a rate of 3 dBA with each doubling of distance from the source. Sound waves from discrete events or stationary point sources (such as a generator or crane in a stationary location) spread as a sphere, and sound levels from such sources decrease 6 dBA per doubling of the distance from the source. Conversely, moving half the distance closer to a source increases sound levels by 3 and 6 dBA for line and point sources, respectively.

Distance from the source, the frequency of the sound, the absorbency of the intervening ground, obstructions, and duration of the noise-producing event all affect the transmission and perception of noise. The degree of this effect also depends on who is listening and on existing sound levels.

Table 1. Common Sound Levels/Sources and Subjective Human Responses

Noise Source At a Given Distance	Sound Level (dBA)	Noise Environments	Subjective Impression
Civil defense siren (100 feet)	130		
Jet takeoff (200 feet)	120		Pain threshold
Loud rock music	110	Rock music concert	
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)			
	90	Boiler room	
Freight cars (50 feet)		Printing press plant	
Freeway (100 feet)	80	Noisy restaurant	
Busy traffic, hair dryer	70		Moderately loud
Normal Conversation (5 feet)	60	Data processing center	
Light traffic (100 feet)	50	Private business office	
Bird Calls (distant)	40		Quiet
Soft whisper (5 feet)	30	Quiet bedroom	
	20	Recording studio	
Normal Breathing	10		
	0		Hearing threshold
Source: Beranek, 1998			

3.2 Noise Level Descriptors

Environmental noise is usually described in terms of certain metrics that allow comparison of sound levels at different locations or in different time periods.

The equivalent sound level, or L_{eq} , is the level that, if held constant over the same period of time, would have the same sound energy as the actual, fluctuating sound. As such, the L_{eq} can be considered an energy-average sound level. Because the L_{eq} considers sound levels over time, this metric accounts for the number and levels of noise events during an interval (e.g., 1 hour) as well as the cumulative duration of these events.

The maximum sound level, or L_{max} , is the highest sound level within a specified time interval.

The L_n s are statistical noise levels, or levels exceeded during n percent of the measurement period (for example, L_{50} is the level exceeded 50 percent of the time). The L_1 metric may be used in lieu of the L_{max} when monitoring compliance with noise regulations. It has been found to more reliable at identifying representative, worst-case sound levels during higher intensity construction activities than the L_{max} . The L_{max} may be affected by singular, uncharacteristic events (e.g., an accidental dropped load or crash), and is not typically representative of regular worst-case events or activities.

4. AFFECTED ENVIRONMENT

4.1 City of Seattle Noise Regulations

The project site and the surrounding properties are located within the City of Seattle, and the noise limits included in the Seattle noise ordinance (Seattle Municipal Code Chapter – SMC 25.08) apply to this project. The SMC sets noise limits based on sound levels and durations of allowable daytime/nighttime operational noise (upper portion of [Table 2](#)) and daytime construction noise (lower portion of [Table 2](#)). These limits are based on the zoning of the source and receiving properties.

As indicated in [Table 2](#), the Seattle operational and construction noise limits are based on sound-energy average equivalent sound levels (Leqs) that vary by zoning of the noise source and receiving properties. Operational noise limits also include not-to-be-exceeded L_{max} levels.

The Seattle noise code identifies a number of noise sources or activities that are exempt from the noise limits shown in [Table 2](#). The following sources are among those specifically exempted:

- Sounds created by motor vehicles, except that sounds created by any motor vehicle operated off highways shall be subject to the exterior sound level limits when the sounds are received within a residential district of the City (25.08.480), and
- Sounds created by warning devices or alarms (such as back-up alarms on vehicles) not operated continuously for more than 30 minutes per incident (25.08.530)

Construction or maintenance equipment that exceeds the exterior operational sound level limits established by Section 25.08.410, when measured from the interior of buildings within a commercial district, is prohibited between the hours of 8 AM and 5 PM. For purposes of this assessment and report, interior sound levels shall be measured only after every reasonable effort, including but not limited to closing windows and doors, is taken to reduce the impact of the exterior construction noise.

Table 2. Seattle Maximum Permissible Levels and Construction Noise Limits (dBA)

Zoning District of Noise Source [25.08.410 & 420 & 425]	Zoning District of Receiving Property		
	Residential Day / Night	Commercial	Industrial
Operational Noise Limits (SMC 25.08.410) ^(a)			
Residential	55 / 45	57	60
Commercial	57 / 47	60	65
Industrial	60 / 50	65	70
Daytime Construction Noise Limits (SMC 25.08.425) ^(b)			
On-site sources like dozers, loaders, power shovels, cranes, derricks, graders, off-highway trucks, ditchers, and pneumatic equip (maximum+25) [25.08.425 A.1]			
Residential	80	82	85
Commercial	82	85	90
Industrial	85	90	95
Impact types of equipment like pavement breakers, pile drivers, jackhammers, sand-blasting tools, or other impulse noise sources - may exceed maximum permissible limits between 8 AM and 5 PM weekdays and 9 AM and 5 PM weekends, but may not exceed the following limits [25.08.425 B]: Leq (1 hr) 90 dBA Leq (30 minutes) 93 dBA Leq (15 minutes) 96 dBA Leq (7.5 minutes) 99 dBA			
<p>Note: The above operational noise limits are based on the measurement interval equivalent sound level (Leq) and a not-to-be-exceeded Lmax level 15 dBA higher than the indicated limits. The construction noise limits are based on an hourly Leq, unless noted otherwise for impact equipment.</p> <p>^(a) The operational noise limits for residential receivers are reduced by 10 dBA during nighttime hours (i.e., 10 PM to 7 AM weekdays, 10 PM to 9 AM weekends) and are displayed for daytime/nighttime hours.</p> <p>^(b) Construction noise limits apply at 50' or a real property line, whichever is <u>greater</u>. Construction noise is limited to the higher levels listed in the lower portion of the table during "daytime" hours only. For purposes of limiting construction noise received in certain zones, daytime hours are defined as 7 AM to 7 PM weekdays and 9 AM to 7 PM weekends for noise received in Lowrise, Midrise, Highrise, Residential-Commercial, or Neighborhood-Commercial zones. For construction projects in all other zones, and for public projects or locations where there are no residential uses within 100 feet, daytime construction hours are defined as 7 AM to 10 PM weekdays and 9 AM to 10 PM weekends.</p> <p>Source: Seattle Municipal Code - 25.08 - Specific sections indicated.</p>			

4.2 Land Use, Zoning, and Sensitive Receivers

The project site and surrounding residential-use and commercial properties are zoned "Seattle Mixed" or SM and are classified as Commercial receiving districts. As shown in [Table 2](#), this 1-hour Leq sound level limit for a commercial noise sources affecting a commercial receiving source is 60 dBA, 24 hours a day (see shaded cell in upper portion of table). In the absence of a noise variance, the noise limit applied to nighttime construction activities would be 60 dBA.

The project site is located in a dense, urban environment, with residential-use receivers in the commercial zone west, north, northwest, and southwest of the project site, as well as the women's shelter to the south. While residential uses may be sensitive to increases in daytime noise, they are generally most sensitive to nighttime noise, including noises that may affect sleep.

Non-residential, noise-sensitive receptors in the project vicinity include KEXP and several theaters. Although not included in the assessment for the variance application, OVG is working with these venues separately, to minimize impacts to these uses.

4.3 Existing Ambient Sound Levels

To establish alternative nighttime construction noise limits to be applied to the project, Ramboll measured ambient sound levels at potentially affected sensitive receivers in the project vicinity. Sound levels were measured between June 12 and 13 and again between June 30 and July 8, 2018. These measurement data were supplemented by sound level data captured by ESA as part of their noise impact assessment for the Draft Environmental Impact Statement for the project.

For the measurements, Ramboll used Larson Davis LxT, Class 1 sound level meters. The microphones were placed on tripods approximately 5 feet above the ground or rooftop location from which the measurement was taken. The meters were field-calibrated prior to the measurements and had been factory calibrated within the twelve-month period preceding the measurements.

The measurement locations were selected to represent sensitive receivers surrounding the Arena site with the most potential to be affected by noise during nighttime hours. The locations included the rooftop of the Expo apartments north of the site, the rooftop of the Astro apartments west of the site, and at ground level at the women's shelter south of the site.

Because there are two distinct nighttime time periods when different nighttime construction activities are proposed, Ramboll considered two distinct periods to assess the ambient levels and the resulting proposed modified nighttime noise limits. The two periods of interest are Period 1, from 5 to 7 AM and 10 to 11 PM and Period 2, from 11 PM to 5 AM. (Period 2 ambient levels are represented by the measured sound levels during the quietest nighttime hours, between midnight and 5 AM). A summary of the ambient measurements for the Period 1 time intervals is provided in [Table 3](#). A summary of the ambient measurements for the Period 2 time interval is provided in [Table 4](#). A complete data set can be found in Appendix A.

Table 3. Period 1 Ambient Sound Levels, 5 to 7 AM and 10 to 11 PM (dBA)

Date	SLM1 Expo Rooftop		SLM2 Astro Rooftop		SLM3 Sacred Heart Shelter		SLM4 Astro Ground	
	Leq (a)	Lmax (b)	Leq (a)	Lmax (b)	Leq (a)	Lmax (b)	Leq (a)	Lmax (b)
Thursday, November 30, 2017	-	-	-	-	-	-	70	87-103
Friday, December 01, 2017	-	-	-	-	-	-	66	80-82
Thursday, March 08, 2018	-	-	-	-	-	-	67	82-87
Friday, March 09, 2018	-	-	-	-	-	-	67	82-84
Thursday, May 17, 2018	-	-	-	-	-	-	67	81-89
Friday, May 18, 2018	-	-	-	-	-	-	68	84-97
Saturday, May 19, 2018	-	-	-	-	-	-	69	80-88
Sunday, May 20, 2018	-	-	-	-	-	-	66	82-83
Monday, May 21, 2018	-	-	-	-	-	-	68	81-96
Tuesday, May 22, 2018	-	-	-	-	-	-	66	82-87
Wednesday, May 23, 2018	-	-	-	-	-	-	64	82
Monday, June 11, 2018	58	87	59	77	56	72	-	-
Tuesday, June 12, 2018	60	76-84	59	71-85	57	75-81	-	-
Wednesday, June 13, 2018	-	-	58	85-96	57	72-86	-	-
Saturday, June 30, 2018	58	77	60	95	57	78	-	-
Sunday, July 01, 2018	57	75-89	58	71-79	57	72-94	-	-
Monday, July 02, 2018	57	67-80	59	74-82	60	81-85	-	-
Tuesday, July 03, 2018	57	78-84	59	72-81	55	79-85	-	-
Wednesday, July 04, 2018 ^(c)	56	71-83	67	74-88	58	78-97	-	-
Thursday, July 05, 2018	56	70-78	58	77-86	57	70-93	-	-
Friday, July 06, 2018	57	71-78	59	75-79	56	74-83	-	-
Saturday, July 07, 2018	57	68-79	59	75-81	66	74-88	-	-
Sunday, July 08, 2018	59	83	57	72-75	53	69-76	-	-
Average Leq	58	-	60	-	60	-	68	-
Range of Lmax	-	67-89	-	71-95	-	69-97	-	80-103
<p>(a) Average ambient sound level between 5 and 7 AM and between 10 and 11 PM (b) Range of Lmax levels between 5 and 7 AM and between 10 and 11 PM (c) Levels measured between 10 and 11 PM on July 4 were removed from the calculation. Source: Ramboll US Corporation, 2018</p>								

Table 4. Period 2 Ambient Sound Levels, 12am – 5am (dBA)

Date	SLM1 Expo Rooftop		SLM2 Astro Rooftop		SLM3 Sacred Heart Shelter		SLM4 Astro Ground	
	Leq (a)	Lmax (b)	Leq (a)	Lmax (b)	Leq (a)	Lmax (b)	Leq (a)	Lmax (b)
Thursday, November 30, 2017	-	-	-	-	-	-	63	80-93
Friday, December 01, 2017	-	-	-	-	-	-	62	81-84
Thursday, March 08, 2018	-	-	-	-	-	-	67	79-101
Friday, March 09, 2018	-	-	-	-	-	-	66	81-102
Thursday, May 17, 2018	-	-	-	-	-	-	62	80-83
Friday, May 18, 2018	-	-	-	-	-	-	63	78-83
Saturday, May 19, 2018	-	-	-	-	-	-	67	84-92
Sunday, May 20, 2018	-	-	-	-	-	-	65	77-86
Monday, May 21, 2018	-	-	-	-	-	-	62	78-84
Tuesday, May 22, 2018	-	-	-	-	-	-	66	82-97
Wednesday, May 23, 2018	-	-	-	-	-	-	62	78-85
Tuesday, June 12, 2018	55	70-84	56	68-90	54	71-87	-	-
Wednesday, June 13, 2018	54	62-92	54	68-76	54	68-78	-	-
Sunday, July 01, 2018	54	64-74	57	71-86	52	71-84	-	-
Monday, July 02, 2018	54	67-88	56	70-89	50	68-79	-	-
Tuesday, July 03, 2018	53	61-78	55	70-75	53	68-84	-	-
Wednesday, July 04, 2018	54	67-88	56	71-94	52	67-81	-	-
Thursday, July 05, 2018	54	69-83	56	70-82	53	71-80	-	-
Friday, July 06, 2018	53	64-72	56	70-73	56	66-85	-	-
Saturday, July 07, 2018	55	68-82	57	71-78	54	74-80	-	-
Sunday, July 08, 2018	56	70-89	59	70-84	55	69-90	-	-
Average Leq	54	-	56	-	54	-	64	-
Range of Lmax	-	61-92	-	68-94	-	66-90	-	77-102
(a) Average ambient sound level between 12am and 5am (b) Range of Lmax levels between 12am and 5am <i>Source: Ramboll US Corporation, 2018</i>								

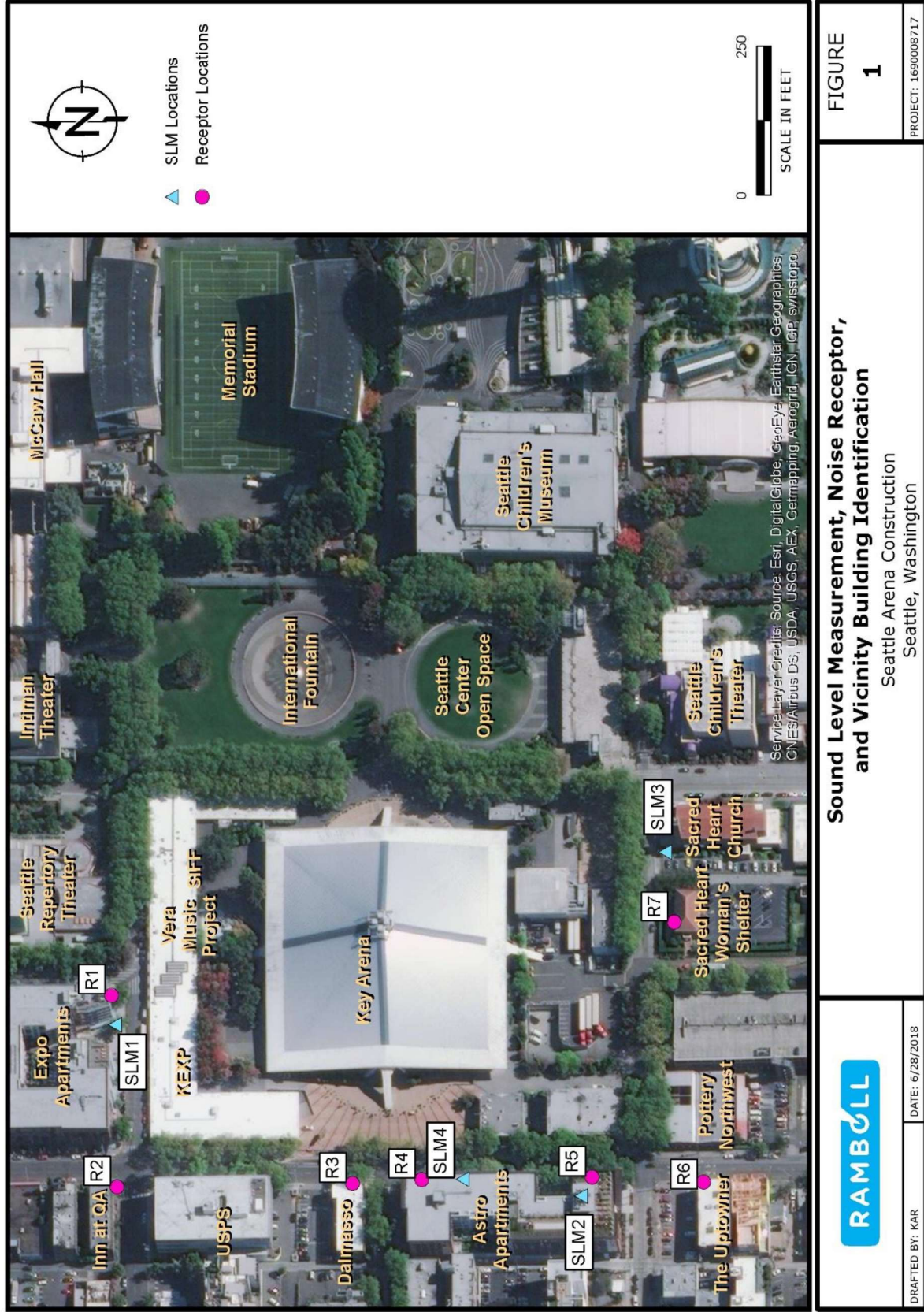
To supplement our measurements, ESA provided measured sound level data taken at ground level along 1st Avenue North in support of the noise impact assessment conducted for the FEIS for the project. ESA collected data in November-December 2017, March 2018, and May 2018. A summary of the data is included for Period 1 in [Table 3](#) and for Period 2 in [Table 4](#). The average overall measured ESA data was approximately 8 dBA higher than at the Astro roof level for during both time periods.

The Ramboll and ESA measurement locations are displayed in [Figure 1](#).

Heavy traffic on 1st Avenue N affects ground level and lower floors of buildings adjacent to 1st Avenue N more than the upper level floors. To identify the existing ambient sound levels at different floors of buildings adjacent to 1st Avenue N, Ramboll used the measured ground elevation (ESA) and rooftop (Ramboll) sound levels as a basis and assumed a linear variation between them. The resulting sound levels at Floors 2 through 6 of buildings adjacent to 1st Avenue N are identified in [Table 5](#).

Table 5. Estimated Sound Levels at Different Building Floors, 1st Ave N (Leq, dBA)

Building Floor	Leq Sound Level		Measurement Notes
	Period 1: 5-7 AM, 10-11 PM	Period 2: 12 - 5 AM	
Ground Floor	68	64	Measured By ESA
2nd Floor	66	63	Linear estimate
3rd Floor	65	62	
4th Floor	64	60	
5th Floor	63	59	
6th Floor	61	58	
Rooftop Patio	60	56	Measured by Ramboll



Sound Level Measurement, Noise Receptor, and Vicinity Building Identification
Seattle Arena Construction
Seattle, Washington

FIGURE 1

PROJECT: 169008717

DRAFTED BY: KAR DATE: 6/28/2018

Figure 1. Ambient Sound Level Measurement (SLM) and Model Receptor Locations

4.4 Terms of Proposed Variance

As detailed in the MPPCNV application, OVG requests that construction noise generated on the site during nighttime hours (between 10 PM and 7 AM on weekdays and between 10 PM and 9 AM weekends and legal holidays) be allowed to exceed the noise limits identified in SMC 25.08.410. The variance is requested for the approximately 2-year duration of construction, expected to occur between October 2018 and October 2020. The MPPCNV 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.

The noise variance application proposes two different modified nighttime noise limits for two distinct time periods. Exterior excavation and construction activities during Period 1, between 5 and 7 AM and between 10 and 11 PM, would be greater than activities proposed during Period 2, between 11 PM and 5 AM. The modified nighttime noise limits are being proposed for nighttime noise-sensitive receivers in proximity to the Arena site. Nighttime noise-sensitive receivers are generally properties where people are sleeping, such as residential uses.

The proposed descriptors and noise limits for Seattle Arena Redevelopment project are based on OVG and SDCI discussions and a review of prior SDCI decisions on MPPCNV applications. SDCI typically grants variances that allow for an increase of 6 dBA over measured ambient noise levels, with measurements taken during the quietest nighttime hours (i.e., midnight to 5 AM) used to characterize the entire overnight period. In this case, however, there will be two distinct periods of operation during the nighttime, and two different measuring periods were used to characterize the existing ambient levels. As described above, the distinct time periods are referred to as Period 1, from 5 to 7 AM and 10 to 11 PM, and Period 2, from 11 to 5 AM. It should be noted that the Period 2 ambient levels were identified using the levels measured during the quietest nighttime hours (i.e., midnight to 5 AM) although the activity is expected to occur from 11 PM to 5 AM. This ensures a conservative approach.

During Period 1 between 5 and 7 AM and 10 and 11 PM, the measured and estimated ambient L_{eq} s, as shown in [Table 3](#) and [Table 5](#), are generally at or above the applicable nighttime noise limit of 60 dBA (L_{eq}). The exception is at the Expo apartments, where a proposed modified nighttime L_{eq} limit set at 6 dBA over the measured ambient L_{eq} of 58 dBA would result in a modified limit only 4 dBA higher than the existing nighttime noise limit.

During Period 2 between midnight and 5 AM, the measured ambient levels as shown in [Table 4](#) and [Table 5](#) are below the existing noise limit of 60 dBA at both the Expo apartments and the Sacred Heart women's shelter. Adding a 6 dBA increase to the existing ambient L_{eq} of 54 dBA would result in no change to the existing L_{eq} noise limit. Receivers adjacent to 1st Avenue N, however, are currently exposed to ambient L_{eq} s greater than 60 dBA, and the proposed modified nighttime noise limits at these locations would exceed the existing limit by 4 to 10 dBA, depending on which floor the receiver is located.

The resulting proposed modified noise limits for all receptor locations are identified in [Table 6](#).

Table 6. Proposed Modified Nighttime Construction Noise Limits (dBA)

Sensitive Receiver		Period 1 5 to 7 AM, 10 to 11 PM			Period 2 11 PM to 5 AM			Standard Nighttime Limit Leq
		Ambient Leq ^a	Proposed Modified Limit		Ambient Leq ^b	Proposed Modified Limit		
			Leq	L1		Leq	L1	
R1 – Expo Apts	2nd – 6th Floors	58	64	74	54	60	70	60
R2 – Inn at Queen Anne	1st Floor	68	74	84	64	70	80	60
	2nd Floor	66	72	82	63	69	79	60
	3rd Floor	65	71	81	62	68	78	60
	4th Floor	64	70	80	60	66	80	60
R3 – Dalmasso Apts	1st Floor	68	74	84	64	70	79	60
	2nd Floor	66	72	82	63	69	78	60
	3rd Floor	65	71	81	62	68	79	60
R4 – Astro Apts	2nd Floor	66	72	82	63	69	78	60
	3rd Floor	65	71	81	62	68	76	60
	4th Floor	64	70	80	60	66	75	60
	5th Floor	63	69	79	59	65	74	60
	6th Floor	61	67	77	58	64	79	60
R5 – Astro Apts	2nd Floor	66	72	82	63	69	78	60
	3rd Floor	65	71	81	62	68	76	60
	4th Floor	64	70	80	60	66	75	60
	5th Floor	63	69	79	59	65	74	60
	6th Floor	61	67	77	58	64	80	60
R6 – The Uptowner Apts	1st Floor	68	74	84	64	70	79	60
	2nd Floor	66	72	82	63	69	78	60
	3rd Floor	65	71	81	62	68	70	60
R7 – Sacred Heart Women’s Shelter	1st - 2nd Floors	60	66	76	54	60	70	60
^a Based on measured ambient levels between 5 and 7 AM and between 10 and 11 PM. ^b Based on measured ambient levels between midnight and 5 AM.								

As shown in [Table 6](#), in addition to an hourly Leq limit, the noise variance application also proposes a limit on the hourly L1 (i.e., the sound level exceeded 1 percent of the time interval or 36 seconds of an hour) to control potential short-term noises. The proposed L1 limits are 10 dBA above the proposed modified Leq noise level limits. The proposed L1 limits would fall within the range of existing Lmax sound levels measured during Period 1 ([Table 3](#), Page 9) and Period 2 ([Table 4](#), Page 10).

5. EXPECTED CONSTRUCTION ACTIVITIES

OVG has carefully reviewed the anticipated means and methods of redeveloping the Arena, has developed an expected list of construction activities and an estimated schedule for this work. OVG and its construction contractor, Skanska Hunt Joint Venture, will develop a Construction Management Plan (CMP). OVG, Skanska-Hunt Joint Venture, and Ramboll have developed this initial Noise Management and Mitigation Plan (NMMP) for inclusion with project's application for a Major Public Project Construction Noise Variance (MPPCNV).

5.1 Construction Schedule Overview

If the noise variance were granted, construction would occur from approximately October 2018 to October 2020, a duration of approximately 24 months. Because of the dynamic nature of construction, the sequencing, extent, and timing of construction activities would vary, and timelines shown are approximate. During Phase 1, work would occur throughout the day from 7 am to 10 pm, with truck-hauling during the day and at night for approximately the first 6 months. Night-time construction would involve the following for the first 6-months: truck hauling (from 5 am and 7 am and 10 pm to 11 pm, and from 11 pm to 5 am), excavation (from 5 am and 7 am and 10 pm to 11 pm, and from 11 pm to 5 am), and shoring (from 10 pm to 11 pm, weekdays). Trucks would not operate during morning and evening peak traffic hours. Seattle Center has approved truck hauling through the Seattle Center campus on vacated Harrison Street, which is no longer a public street, between 11:30 pm and 6:30 am. For daytime only truck hauling operations, truck hauling would be limited to daytime, non-peak hours (approximately 8 hours a day or less) and would last at least 12 months. During Phase 2 of construction, no night-time construction activities are currently planned. For the remaining phases of construction (Phases 3 and 4), night-time work (from 5 am to 7 am and 10 pm to 11 pm) would include structure construction and interior finish work. Some interior finish work and deliveries will occur between 11 pm and 5 am (Monday through Friday) during Phases 3 and 4. OVG will coordinate with Seattle Center, neighborhood residents, businesses and event operators to keep them apprised of construction activities as outlined in Section 9.2.

If the noise variance were not granted, construction would extend the demolition and excavation period by at least 6 months, and total construction would take at least 30 months. Work would occur during "daytime," defined as between 7 AM and 10 PM weekdays, and between 9 AM and 10 PM on weekends and legal holidays (SMC 25.08.425). Truck hauling would be further restricted to avoid peak periods. Additionally, street closures would be different than with the night-work plan.

5.2 Major Construction Phases and Equipment

Construction will be split into four construction phases, with excavation and demolition proceeding by zone. (See Appendix B, Site Logistic Plans). The four construction phases will involve the following work.

- Phase 1: Demolition and Excavation of existing arena
 - Work would include exterior and interior demolition, excavation to the perimeter of existing roof footings, removal of demolished and excavated materials from the site, shoring, and installation of earth retention systems including soldier piles immediately

outside of the foundation walls around the perimeter of the arena. No auger-driven piles are proposed. Any required piles will be soldier piles placed at 80-foot deep using a drilling method followed by a concrete pour. Temporary roof shoring will also occur during this phase. Piles placed for roof-support will be caisson-drilled, placed, and then a concrete pour will complete the pile. At the north end of the site, concrete for soldier piles will be pumped from the north end of the east side of the arena.

- Mass excavation will begin on the north side of the arena and progress to the south and will continue to the south part of the site for excavation for the underground parking garage and atrium (see Seattle Center Arena Renovation Project Final Environmental Impact Statement (“FEIS”) Excerpts, Figures 2-2, 2-4, and 2-8 in Appendix B herein for extent of building below-grade).
- The south ends of the Northwest Rooms would be stabilized for adjacent excavation (See FEIS Excerpts, Figures 2-2 and 2-8, Appendix B).
- Most demolition and excavation materials would be stockpiled at the south ends of the Northwest Rooms, on the west and east sides of the arena. The project team will use one primary path to enter the project site and three locations to exit. All trucks will enter the site along 1st Ave N. Demolition and excavated materials will be removed from the project site from the west side of the arena and transferred to trucks on 1st Ave N, and from the east side of the arena to the vacated portion of 2nd Ave N on the Seattle Center campus and south along 2nd Ave N and to vacated Harrison St through the Seattle Center campus between 11:30 pm and 6:30 am.
- An additional truck path will enter the southwest corner of the project site off Thomas Street. Trucks will enter and exit this area, but the access point will be utilized for materials rather than exporting soil.
- Demolition of exterior structures (Blue Spruce Building, skatepark, Seattle Center Pavilion, West Court Building [existing box office], Restroom Pavilion, and NASA Building) will occur from October 2018 to mid-November 2018.
- With nighttime work, multiple shifts will be required.
- With nighttime work, truck hauling would occur 7 days a week, 18 hours a day, for approximately 6 months (see FEIS Excerpts, Table 2-2, Appendix B). For daytime only truck hauling operations, truck hauling would be limited to daytime, non-peak, hours (approximately 8 hours a day or less) and would last at least 12 months.
- Impact equipment (including impact hammers, concrete saws, concrete cutters, and vibratory compactors) would be used for demolition inside and outside of the arena.
- A sound-deflecting border (noise barrier) will be installed along the north, west, and south sides of the project for the duration of construction.
- Phase 2: Loading Dock Tunnel Construction
 - The loading dock tunnel will be dug out using a mining-style method that will leave the Bressi Garage undisturbed. The mining method would involve horizontal drilling with perforated pipes. The pipes would be pressure-grouted to form a shell of grout and enhanced soils. Soils would be removed by hand in 3- to 4-foot increments. The tunnel footings and structure would be built as the tunnel advances.
 - Trucks would access the site using the current parking lot access on 1st Ave N. Once the tunnel is complete, the tunnel will become the main artery for construction deliveries.

- Phase 3: Structure Construction I, focusing on south portion of arena site
 - Excavation for the underground parking garage would be completed and construction of the parking garage and atrium would begin.
 - Interior construction would occur including concourse structural work, erection of bridge-level trusses, upgrades to the roof structure, and installation of the rigging structure.
 - Retaining and shear wall installation at the parking structure would begin.
 - Three cranes would be located on the project site. Deliveries to the southern crane would occur on the closed portion of Thomas St.
 - During Phase 3 of construction, trucks will enter the site from the southwest corner. Trucks will enter the site by approaching the southwest corner of the site moving north along 1st Ave N. Trucks will be directed by flaggers to enter the site off Thomas directly adjacent to 1st Ave N.
 - There will be two mobile cranes located on the east and west side of the arena. A tower crane will be located at the south end of the site adjacent to Thomas St.
- Phase 4: Structure Construction II and Interiors, focusing on atrium construction
 - During Phase 4 of construction, the remainder of the arena structure will be built and the interiors of the arena will be installed. Arena concourse structural work will be completed and the bowl seating will be built.
 - The roof top platform and equipment will also be installed.
 - All levels of the parking structure will be built.
 - The plazas, signage, and landscaping will also be completed.
 - During Phase 4, traffic entering and exiting the site will do so mostly through the loading dock tunnel.
 - There will be two mobile cranes located on the east and west side of the arena. A tower crane will be located at the south end of the site adjacent to Thomas St.

Expected nighttime construction activities that require a noise variance are part of some or all of the phases above. OVG has developed an expected schedule and list of equipment to be used during nighttime hours by the contractor.

[Table 7](#) summarizes the construction phases that were used by Ramboll as the basis for the MPPCNV application assessment. Each are described in detail in Section 6.2 with a focus on those activities that are expected to occur during nighttime hours, including mainly those equipment and activities that are anticipated to generate acoustically significant levels of noise. A graphical representation of a general overview of the construction schedule has been provided in [Figure 2](#).

Table 7. Construction Phasing Summary

Construction Phase Number	Phase General Description	Date Range
Phase 1	Demolition, Shoring, and Excavation of existing Arena	October 2018 to March 2019
Phase 2	Loading Dock Tunnel Construction (No Nighttime Construction)	November 2018 to June 2019
Phase 1 – Phase 3 overlap		January 2019 to March 2019
Phase 3	Structure Construction	February 2019 to June 2020
Phase 3 – Phase 4 overlap		June 2019 to June 2020
Phase 4	Interior Build Out	September 2019 to September 2020

Note: The identification of construction phases and date ranges are approximate and subject to change. The schedule used to characterize the phases and date ranges identified the potential for overlapping phases, which resulted in a conservative assessment of construction noise.



Figure 2. Approximate Construction Schedule Overview

5.3 Construction Activities and Coordination with Surrounding Communities

Before and during construction activities, the construction contractor will coordinate with the surrounding residential properties and business, as necessary, to ensure that construction activities are carried through with minimal impact on these existing land uses. Specifically, the construction contractor will coordinate with the Seattle Center to ensure that hauling activities do not disrupt scheduled Seattle Center events. During these events hauling of construction related materials will occur along 1st Avenue and other surface streets, and not through the Seattle Center. A summary of Seattle Center events, during which time construction hauling through the Center would be temporarily suspended, is provided in [Table 8](#).

Table 8. Seattle Center Events When No Eastern Nighttime Hauling Would Occur

Year	Date	Event
2018	November 2018	Install Fisher Pavilion Ice
	December 2018	New Year's Eve
2019	January 2019	Remove Fisher Pavilion Ice
	May 2019	NW Folklife Festival
	June 2019	Pride Festival
	July 2019	Seafair
	July 2019	Bite of Seattle
	August/September 2019	Bumbershoot
	November 2019	Install Fisher Pavilion Ice
	December 2019	New Year's Eve
2020	January 2020	Remove Fisher Pavilion Ice
	May 2020	NW Folklife Festival
	June 2020	Pride Festival
	July 2020	Seafair
	July 2020	Bite of Seattle
	August/September 2020	Bumbershoot

Nearby residential-use properties in the commercial district include several multi-unit apartment complexes, including the Expo apartments on Republican Street; Astro apartments, Inn at Queen Anne, Dalmasso apartments, and The Uptowner apartments on 1st Avenue N; and the Sacred Heart Women's Shelter on Thomas Street. The noise monitoring and complaint-resolution plan, as detailed in [Section 8](#) and [Section 9](#) of this report, address methods by which the construction contractor will ensure that noise levels are maintained at permissible levels and that noise complaints are resolved swiftly and effectively. Note also that the construction contractor will construct a 12-foot tall noise barrier around the north, west, and south sides of the project boundary to further reduce noise from on-site construction activities and equipment. Details of the noise barrier are found in Section 7.1.

Nearby businesses include those located within the Northwest Rooms, including KEXP, Vera Music Project, Seattle International Film Festival, A/NT Gallery, and others. These businesses represent the

nearest commercial receivers of noise from project-related construction activities. As such, the construction contractor will coordinate directly with these businesses, as necessary, to ensure that the potential for noise impact from specific construction activities is minimized. As indicated, a noise barrier will be constructed north of the project area, within the outdoor courtyard and gathering space located south of the Northwest Rooms area. The 12-foot tall noise barrier is expected to effectively shield construction-related noise at these businesses. Additional details are provided in [Section 9](#).

6. CONSTRUCTION NOISE ASSESSMENT

This construction noise assessment was completed through predictive noise modeling of various construction phases and equipment types at potentially sensitive receiving locations in the project vicinity. The assessment used the best available information at the time of the assessment. However, once the contractor is in place and has proposed their specific construction schedule and equipment, the NMMP may need to be updated. A discussion of the methods and results of our assessment follows.

6.1 Noise Modeling Methodology

Noise modeling of construction equipment was completed using the CadnaA noise model. CadnaA is a computer tool that calculates sound levels after considering the noise reductions or enhancements caused by distance, topography, intervening structures, varying ground surfaces, atmospheric absorption, and meteorological conditions. The model uses algorithms that comply with the international standards in ISO-9613-2:1996. Existing building locations and elevations and topography were derived from readily available onsite sources of digital elevation data and aerial imagery.

[Figure 1](#) identifies the model receptors used in this analysis, which were selected to represent the nearest uses sensitive to nighttime noise (e.g., residences). For the Expo and Astro apartment buildings, modeled receptor locations were selected to represent floors 2-6. The first floors of both buildings are used for retail or commercial businesses. For all other locations, all floors were considered in the modeling (the other buildings all have between 2 and 4 floors).

6.2 Construction Phases and Noisiest Construction Equipment

Ramboll considered four main construction phases described in Section 5 as the basis for this modeling assessment. A description of acoustically-significant equipment and assumptions for each construction model scenario are provided below in the following subsections. The type and numbers of equipment by modeled scenario, approximate date ranges, as well as representative sound levels that were used in the analysis, are provided in [Table 9](#); equipment shown in this table include only those that would operate outdoors during nighttime hours.

Note that equipment that would operate indoors are assumed to be shielded by the existing and/or future building envelope, and are anticipated to be minor relative to most outdoor equipment noises. Smaller portable but stationary equipment (e.g., generators and compressors) will operate inside the Arena building at night where specified, and would not measurably influence exterior sound levels.

Further, note that a stationary, electrically-powered crane is proposed at the south end of the project site, south of the existing arena building. The crane would service the southern half of the project site. Noise emissions from typical electrically-powered crane operations are acoustically negligible relative to other sources of construction noise, and so the stationary crane has not been included in this assessment.

Table 9. Proposed Nighttime Construction Equipment

Type of Equipment	Sound Level at 50 feet (dBA, Leq)	Data Source
Air Compressor	78	1
Drill Rig	73	2
Concrete Truck	81	1
Conveyor	62	2
Dump Truck Passby	69	2
Excavator	81	1
Generator	81	1
Loader	81 / 75 ^(a)	2
Mobile Crane	81	1
Impact Wrench	85 / 75 ^(b)	1
<p>^(a) Sound levels are presented as unmitigated/mitigated. ^(b) Sound levels are presented as unmitigated/mitigated. To meet the specified sound levels, either quieter equipment can be selected or the equipment/activities can be housed in an enclosure.</p> <p><u>Data Sources:</u> 1 – Federal Highway Administration’s Roadway Noise Construction Model (RCNM), 2008 2 – Ramboll Archive</p>		

On-site haul routes¹, limits of construction, approximate location of construction equipment, depth of excavation, and potential noise barrier locations were derived from preliminary construction drawings provided by CAA ICON and through discussions between CAA ICON, Skanska-Hunt Joint Venture, and Ramboll.

¹ Off-site trucks were not considered in the modeling since they are not regulated by the City of Seattle’s noise ordinance.

6.3 Noise Model Scenarios

The constructed phases identified in Section 5.2 include a variety of activities, including some that will occur during daytime hours only (e.g., demolition, Bressi tunnel, etc.) and others that may occur at night for extended periods of time and/or may overlap with other construction activities. Quantitative assessment of nighttime construction activities through noise modeling, therefore, requires assessment beyond a simple review of each construction phase. This construction noise modeling assessment was completed to evaluate anticipated worst-case nighttime noise emission scenarios that would result during overlap of construction phase activities.

[Table 10](#) summarizes the scenarios that were modeled, including a description of the activities evaluated in each scenario and approximate date ranges. Note that topography was considered either at existing grade or at final excavated depth, as indicated, because equipment located at the bottom of an excavated pit may be at least partially shielded by intervening terrain.

Table 10. Summary of Noise Model Scenarios for Nighttime Construction

Model Scenario	Construction Phases				Site Topography	Construction Activities	Modeled Equipment
	1	2 (a)	3	4			
Scenario 1					Existing Grade	<p>5 to 7 AM, 10 to 11 PM</p> <ul style="list-style-type: none"> No demolition at night Perimeter and roof shoring (East Only) Mass excavation (East Only) Conveyance of excavated material Off-site hauling of materials (both East and West) 	<p>5 to 7 AM, 10 to 11 PM</p> <p>East of Arena Only:</p> <ul style="list-style-type: none"> Excavator (x1) Soldier pile drill (x1) Drill Crane (x1) Concrete truck (x1) Compressor (x2) Generator (x2) Conveyor (x3) Haul-out Loader (x1 each W, E) Haul truck, west off of 1st Ave N and/or east through Seattle Center (x12/hr each direction)
						<p>11 PM to 5 AM</p> <ul style="list-style-type: none"> No demolition at night Mass excavation (East Only) Conveyance of excavated material Off-site hauling of materials (both East and West) 	<p>11 PM to 5 AM</p> <p>East of Arena Only:</p> <ul style="list-style-type: none"> Excavator (x1) Generator (x2) Conveyor (x3) Haul-out Loader (x1 each W, E) Haul truck, west off of 1st Ave N and east through Seattle Center (x12/hr each direction)

Model Scenario	Construction Phases				Site Topography	Construction Activities	Modeled Equipment
	1	2 (a)	3	4			
Scenario 2					Excavated Depth	<p>5 to 7 AM, 10 to 11 PM</p> <ul style="list-style-type: none"> No demolition at night Perimeter and roof shoring (East Only) Mass excavation (East Only) Conveyance of excavated material Off-site hauling of materials (both East and West) 	<p>5 to 7 AM, 10 to 11 PM</p> <p>East of Arena Only:</p> <ul style="list-style-type: none"> Excavator (x1) Soldier pile drill (x1) Drill Crane (x1) Concrete truck (x1) Compressor (x2) Generator (x2) Conveyor (x3) Haul-out Loader (x1 each W, E) Haul truck, west off of 1st Ave N and/or east through Seattle Center (x12/hr each direction)
	x						

Model Scenario	Construction Phases				Site Topography	Construction Activities	Modeled Equipment
	1	2 (a)	3	4			
Scenario 3					Excavated Depth	<p>5 to 7 AM, 10 to 11 PM</p> <ul style="list-style-type: none"> • Remaining excavation (East Only) • Installation of Roof Pillar Footings • Bowl and Concourse Structure • Conveyance of excavated material • Off-site hauling of materials (both East and West) 	<p>5 to 7 AM, 10 to 11 PM</p> <p>East of Arena Only:</p> <ul style="list-style-type: none"> • Excavator (x1) • Generator (x2) • Conveyor (x3) • Haul-out Loader (x1 each W, E) • Mobile Crane (x1 E) • Drill Rig (x1 each N, S, E, W) • Concrete Pump Truck (x1 each N, S, E, W) • Impact Wrench (2x each N, S, E, W) • Haul trucks, west off of 1st Ave N and/or east through Seattle Center (x12/hr each direction) • Truck deliveries, SW corner of site (x4/hr)
	x		x				
Scenario 4					Excavated Depth	<p>5 to 7 AM, 10 to 11 PM</p> <ul style="list-style-type: none"> • Roof Structure Upgrades • Elevator Support Towers • Bowl and Concourse Structure • Parking Garage and Atrium Structure 	<p>5 to 7 AM, 10 to 11 PM</p> <ul style="list-style-type: none"> • Generator (x2 East) • Mobile Crane (x1 E) • Concrete Pump Truck (x1 each N, S, E, W) • Impact Wrench (x2 each N, S, E, W) • Truck deliveries, west side of site (x4/hr)
			x				

Model Scenario	Construction Phases				Site Topography	Construction Activities	Modeled Equipment
	1	2 (a)	3	4			
Scenario 5					Excavated Depth	<p>5 to 7 AM, 10 to 11 PM</p> <ul style="list-style-type: none"> Bowl and Concourse Structure Parking Garage and Atrium Structure N, E, and W Plaza Atrium Buildout 	<p>5 to 7 AM, 10 to 11 PM</p> <ul style="list-style-type: none"> Generator (x2 East) Mobile Crane (x1 E) Concrete Pump Truck (x1 each N, S, E, W, and SW corner) Impact Wrench (x2 each N, S, E, W) Truck deliveries, west side of site (x4/hr)
			x	x			
Scenario 6					Excavated Depth	<p>5 to 7 AM, 10 to 11 PM</p> <ul style="list-style-type: none"> Finish Exterior Work 	<p>5 to 7 AM, 10 to 11 PM</p> <ul style="list-style-type: none"> Generator (x2 East) Mobile Crane (x1 E) Concrete Pump Truck (x1 E) Impact Wrench (x2 E) Truck deliveries, west side of site (x4/hr)
			x				
<p>(a) During Phase 2, construction activities will be limited to daytime hours only Source: Ramboll US Corporation, 2018</p>							

6.3.1 Noise Model Scenario 1

Noise model Scenario 1 includes activity that will occur during Phase 1 of the project, at the very start of the construction program. During this period, the following tasks may occur **outside** during **nighttime** hours:

Period 1: 5 to 7 AM and 10 to 11 PM

- Install Soldier Piles
 - Assumed use of soldier drill pile rig on the east side of the arena to install soldier piles
 - Assumed use of mobile crane and concrete truck concurrent with drill rig
 - Drill rig and associated equipment operating at existing grade
 - Zone D (NE quadrant) and Zone A (SE quadrant) are on the east side of the arena, and piling activities in these zones could occur at night
 - Zones B and C are on the west side of the arena, and piling activities in these quadrants will occur during daytime hours only

Period 1: 5 to 7 AM and 10 to 11 PM and Period 2: 11PM to 5 AM

- Excavate around Perimeter East of Arena
 - Use of excavator on east side of the arena
 - Excavator will operate within the area to be excavated for shoring
 - Excavator operating at existing grade
- Conveyance of Excavated Materials
 - Assumed use of 3 conveyors to move fill materials to east and west sides of arena for truck loading and off-haul
 - Conveyors operating at existing grade
 - Conveyance noise is from motors that drive conveyor belts
- Off-Site Haul of Excavated Materials
 - Hauling of excavated materials to occur from the west and east sides of arena
 - On east side, trucks would arrive at the site traveling north from 2nd Avenue N to approximate center of eastern project boundary and exit on vacated Harrison through the Seattle Center campus
 - On west side, trucks would enter and exit the site from 1st Avenue N, with trucks entering just south of Harrison St and trucks exiting just north of Harrison St
 - Assumed up to 12 trucks per hour would arrive for loading and haul-out during nighttime hours
 - A loader would be operating on the east or west side during hauling to fill hoppers feeding conveyors for truck loading

6.3.2 Noise Model Scenario 2

Noise model Scenario 2 includes activity that will occur during Phase 1 of the project, as excavation reaches the final intended depths. During this period, the following may occur **outside** during **nighttime** hours:

Period 1: 5 to 7 AM and 10 to 11 PM

- Complete Installation of Soldier Piles
 - Assumed use of soldier drill pile rig on the east side of the arena to install soldier piles
 - Assumed use of mobile crane and concrete truck concurrent with drill rig
 - Drill rig and associated equipment operating at existing grade

Period 1: 5 to 7 AM and 10 to 11 PM and Period 2: 11PM to 5 AM

- Continue Perimeter Excavation on East Side of Arena
 - Use of excavator on east side of the arena
 - Excavator operating at final grade
- Conveyance of Excavated Materials
 - Assumed use of 3 conveyors to move fill materials to east and west sides of arena for truck loading and off-haul
 - Conveyors operating at existing grade
 - Conveyance noise is from motors that drive conveyor belts
- Off-Site Haul of Excavated Materials
 - Hauling of excavated materials to occur from the west and east sides of arena
 - On east side, trucks would arrive at the site traveling north from 2nd Avenue N to approximate center of eastern project boundary and exit on vacated Harrison through the Seattle Center campus
 - On west side, trucks would enter and exit the site from 1st Avenue N, with trucks entering just south of Harrison St and trucks exiting just north of Harrison St
 - Assumed up to 12 trucks per hour would arrive for loading and haul-out during nighttime hours
 - A loader would be operating on the east or west side during hauling to fill hoppers feeding conveyors for truck loading

6.3.3 Noise Model Scenario 3

Noise model Scenario 3 includes activity that will occur during overlap of Phases 1, 2, and 3. Phase 2, construction of the Loading Dock Tunnel, is expected to occur during daytime hours only and is not considered in this application. During the overlap, the following activities may occur **outside** during **nighttime** hours:

Period 1: 5 to 7 AM and 10 to 11 PM

- Installation of Roof Pillar Footings
 - Concurrent use of 4 drill rigs around the north, west, east, and south sides of the arena to install pillar footings
 - Concurrent use of concrete pump trucks near pillar footing locations
 - Equipment assumed to operate at excavated depth, except for concrete pump truck in NE corner of north plaza operating outside of excavated area

Period 1: 5 to 7 AM and 10 to 11 PM and Period 2: 11PM to 5 AM

- Completion of Mass Excavation
 - Use of excavator on east side of the arena
 - Excavator operating at final grade
- Conveyance of Excavated Materials
 - Assumed use of 3 conveyors to move fill materials to east and west sides of arena for truck loading and off-haul
 - Conveyors operating at existing grade
 - Conveyance noise is from motors that drive conveyor belts
- Off-Site Haul of Excavated Materials
 - Hauling of excavated materials to occur from the west and east sides of arena
 - On east side, trucks would arrive at the site traveling north from 2nd Avenue N to approximate center of eastern project boundary
 - On west side, trucks would enter and exit the site from 1st Avenue N, with trucks entering just south of Harrison St and trucks exiting just north of Harrison St
 - Assumed up to 12 trucks per hour would arrive for loading and haul-out during nighttime hours
 - A loader would be operating on the east or west side during hauling to fill hoppers feeding conveyors for truck loading

6.3.4 Noise Model Scenario 4

Noise model Scenario 4 includes activity that will occur during Phase 3 of the project. During this period, the following tasks may occur **outside** during **nighttime** hours:

Period 1: 5 to 7 AM and 10 to 11 PM

- Footings, Slabs, Columns
 - Concurrent use of 4 drill rigs and concrete pump trucks around the north, west, east, and south sides of the arena to install pillar footings
 - Equipment assumed to operate at excavated depth, except for concrete pump truck in NE corner of north plaza operating outside of excavated area
- Erect, bolt and weld elevator support towers Zone C, Zone D Zone A, and Zone B
 - Concurrent use of 2 impact wrenches operating north, west, south, and east of arena at excavated depth

Period 1: 5 to 7 AM and 10 to 11 PM and Period 2: 11PM to 5 AM

- Truck deliveries in southwest portion of site (4 trucks per hour)

6.3.5 Noise Model Scenario 5

Noise model Scenario 5 includes activities that will occur during the overlap of Phase 3 and 4 of the project. During this period, the following tasks may occur **outside** during **nighttime** hours:

Period 1: 5 to 7 AM and 10 to 11 PM

- Structural Concrete and Steel: Interior and Exterior of Arena, Parking, Atrium
 - Use of 4 concrete trucks for footings, walls, slabs, and columns around perimeter of arena.
 - Concrete pump truck for garage in south portion of site
 - Equipment assumed to operate at excavated depth, except for concrete pump truck in NE corner of north plaza operating outside of excavated area
 - Concurrent use of 2 impact wrenches operating north, west, south, and east of arena at excavated depth

Period 1: 5 to 7 AM and 10 to 11 PM and Period 2: 11PM to 5 AM

- Truck deliveries in southwest portion of site (4 trucks per hour)

6.3.6 Noise Model Scenario 6

Noise model Scenario 6 includes activity that will occur during Phase 4 only of the project. Phase 4 work consists mostly of interior work, but will include finishing up exterior work. During this period, the following tasks may occur **outside** during **nighttime** hours:

Period 1: 5 to 7 AM and 10 to 11 PM

- Finish exterior work
 - Mobile crane operating east of arena
 - One concrete pump truck east of arena
 - Two impact wrenches east of arena

Period 1: 5 to 7 AM and 10 to 11 PM and Period 2: 11PM to 5 AM

- Truck deliveries in southwest portion of site (4 trucks per hour)

6.4 Noise Modeling Results

Using the assumed nighttime operations and equipment identified above with no specified noise barriers or quieted equipment, the nighttime construction sound levels modeled for each receptor and scenario combination are displayed in [Table 11](#) for Period 1 and [Table 12](#) For Period 2. As shown in the tables, without specified noise mitigation measures, the model-calculated sound levels substantially exceed the proposed modified nighttime construction noise limits requested in the MPPCNV for many scenario and receptor combinations. Therefore, noise mitigation was considered and evaluated.

Table 11. Noise Modeling Results for Period 1, No Mitigation

Sensitive Receiver	Floor	Modeled Sound Levels (dBA, Leq)						Modified Limit
		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	
R1 – Expo Apts	2nd	59	58	61	67	67	50	64
	3rd	61	61	63	67	67	51	64
	4th	63	63	65	69	69	52	64
	5th	63	63	66	70	70	53	64
	6th	63	63	65	69	69	50	64
R2 – Inn at Queen Anne	1st	50	49	53	62	62	42	74
	2nd	52	52	57	63	63	42	72
	3rd	53	52	58	65	65	43	71
	4th	54	53	58	65	65	46	70
R3 – Dalmasso Apts	1st	74	74	74	76	76	42	74
	2nd	71	71	71	76	76	42	72
	3rd	74	74	74	76	76	42	71
R4 – Astro Apts	2nd	70	70	70	80	80	43	72
	3rd	72	72	72	80	80	43	71
	4th	72	72	72	80	80	43	70
	5th	72	72	72	80	80	43	69
	6th	72	72	72	79	79	43	67
R5 – Astro Apts	2nd	65	65	66	75	75	44	72
	3rd	65	65	68	76	76	44	71
	4th	65	65	68	76	76	45	70
	5th	65	65	68	76	76	45	69
	6th	65	65	68	76	76	46	67
R6 – The Uptowner Apts	1st	57	56	57	65	65	40	74
	2nd	60	59	59	66	66	40	72
	3rd	60	59	59	66	66	40	71
R7 – Sacred Heart Women’s Shelter	1st	63	63	62	64	64	48	66
	2nd	65	64	63	68	69	56	66

Source: Ramboll, 2018

Table 12. Noise Modeling Results for Period 2, No Mitigation

Sensitive Receiver	Floor	Modeled Sound Levels (dBA, Leq)						Modified Limit
		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	
R1 – Expo Apts	2nd	58	58	58	11	27	27	60
	3rd	61	61	61	16	30	30	60
	4th	63	63	63	20	30	30	60
	5th	63	63	63	20	31	31	60
	6th	63	63	63	24	33	33	60
R2 – Inn at Queen Anne	1st	49	49	49	10	30	30	70
	2nd	52	52	52	12	30	30	69
	3rd	53	52	52	13	30	30	68
	4th	54	54	54	13	31	31	66
R3 – Dalmasso Apts	1st	74	74	74	18	44	44	70
	2nd	71	71	71	19	44	44	69
	3rd	74	74	74	20	44	44	68
R4 – Astro Apts	2nd	70	70	70	22	43	43	69
	3rd	72	72	72	22	45	45	68
	4th	72	72	72	24	45	45	66
	5th	72	72	72	26	46	46	65
	6th	72	72	72	28	46	46	64
R5 – Astro Apts	2nd	65	65	65	30	39	39	69
	3rd	65	65	65	33	42	42	68
	4th	65	65	65	37	44	44	66
	5th	65	65	65	40	45	45	65
	6th	65	65	65	40	45	45	64
R6 – The Uptowner Apts	1st	56	56	56	21	37	37	70
	2nd	59	59	59	22	38	38	69
	3rd	59	59	59	22	38	38	68
R7 – Sacred Heart Women’s Shelter	1st	62	61	61	24	30	30	60
	2nd	62	61	61	26	33	33	60

Source: Ramboll, 2018

7. MITIGATION

As shown in [Table 11](#) and [Table 12](#), without specified noise mitigation measures, the model-calculated sound levels exceed the proposed modified nighttime construction noise limits requested in the MPPCNV. Therefore, various noise mitigation measures were identified and evaluated for their effectiveness. The following noise mitigation was found to be effective at reducing nighttime construction noise to levels that comply with the proposed modified nighttime limits.

7.1 Permanent Construction Noise Barriers

To enable compliance with the proposed nighttime noise limits outlined in the MPPCNV, noise barriers will be required around the north, south, and west sides of the site. The barriers will shield adjacent residential-use properties in the commercial zone and non-residential uses from on-site construction activities during both daytime and nighttime hours. The barriers will be 12-feet in height, and will be located as illustrated in [Figure 3](#) through [Figure 12](#). The barriers will be installed so that they are solid from ground to top, with no gaps or breaks along their length, except where intended to allow for truck or worker access. Barrier materials will be either metal or wood and be of a density of at least 4 pounds per square foot.

Northern Barrier - At the northern perimeter of the site, a 12-foot tall noise barrier will be installed within the existing courtyard north of the arena and would wrap at the east and west ends toward the south, to the approximate southern limits of the KEXP and A/NT Gallery. The barrier will be provided to shield recreational uses within the courtyard, as well as uses immediately adjacent to the arena (e.g., KEXP, Vera, SIFF, A/NT, etc.). The barrier also would provide shielding of construction noise at residents of the multi-floor Expo Apartment building located further north, on the north side of Republican Street. The barrier will be installed prior to commencement of excavation activities and will be maintained for the entire duration of construction.

Southern Barrier - At the southern project boundary, a 12-foot barrier will be located along the north side of Thomas Street, between 1st Avenue N and 2nd Avenue N. The barrier would provide shielding during daytime and nighttime hours for existing uses on the south side of Thomas Street in the vicinity of this barrier, including the Sacred Heart women's shelter and the Sacred Heart of Jesus Catholic Parish. This barrier also will provide at least partial shielding for residential-use and non-residential land uses located west and east of 1st Ave N and 2nd Ave N, respectively, including the Uptowner Apartment building, the Children's Theater, and others. At the west end of the southern barrier, a gap may be provided to allow daytime access for material delivery.

Western Barrier - Along 1st Avenue N, a 12-foot tall noise barrier is proposed that would provide shielding at residential-use and non-residential land uses located along the west side of 1st Avenue N. Residential uses in this commercial area include the multi-floor Astro apartment building, the Dalmasso apartment building, The Uptowner apartment building to the southwest, and the Inn at Queen Anne to the northwest. The barrier would provide shielding mostly to lower-level floors located within these buildings, including those located within the 1st, 2nd, and 3rd floors. At elevated floors, the benefit of the noise barrier is reduced because line of sight between receivers and sources of

construction noise is less likely to be blocked. Gaps in the barrier just north and south of Harrison Street would be required for off-site hauling of excavated materials.

Eastern Boundary - No solid barrier is included for the eastern site boundary as part of this application.

7.2 Required Nighttime Equipment Mitigation Measures

In addition to a perimeter noise barrier, the following noise mitigation measures are required for the model to demonstrate compliance with the MPPCNV modified noise limits:

- Use conveyors to load excavated material into trucks for off-site transport
- Use a quieted loader on the west side of the arena for activities related to the off-site transport of excavated materials (75 dBA at 50 feet, as shown in [Table 9](#)) for scenarios 1 through 3
- Operate concrete mix or pump trucks in the northeast corner of the north plaza construction area or, alternatively, around the nearest corners to the east or west
- Prohibit mobile crane use west of arena during nighttime hours
- Reduce impact wrench noise by 10 dBA (as shown in [Table 9](#)), when operating north, west, or south of the arena, through use of quieter equipment, portable noise barriers, enclosures, or combinations thereof
- Prohibit impact work such as auger shaking, jack hammering, hoe ram use, or vibratory compacting during nighttime hours
- Use drilling methods in lieu of impact driving methods for shoring (i.e., soldier pile walls) and pier installation
- Prohibit concrete saw use during nighttime hours
- Maintain a minimum operating setback of 375 feet from the façade of The Astro apartment building for concrete trucks operating in the excavated southern portion of the site

7.3 Noise Modeling Results – With Mitigation

Using the assumed nighttime operations and equipment identified above with the noise mitigation measures and barriers identified above, the nighttime construction sound levels modeled for each receptor and scenario combination are displayed in [Table 13](#) for Period 1 activities and [Table 14](#) for Period 2 activities. As shown in the tables, the model-calculated results including the specified noise mitigation measures indicate that nighttime construction activities can occur and comply with the proposed modified nighttime construction noise limits requested in the MPPCNV.

Noise model contours with the specified noise mitigation measures are displayed in [Figure 3](#) through [Figure 12](#) following the table. The noise contours were developed to represent the top floors of the Astro and Expo apartments (i.e., 60 feet in elevation), since these were the worst-affected locations. The noise levels at lower elevations would be expected to receive more benefit from the 12-foot high noise barrier and would be lower than shown in [Figure 3](#) through [Figure 12](#).

Table 13. Noise Modeling Results for Period 1, With Mitigation

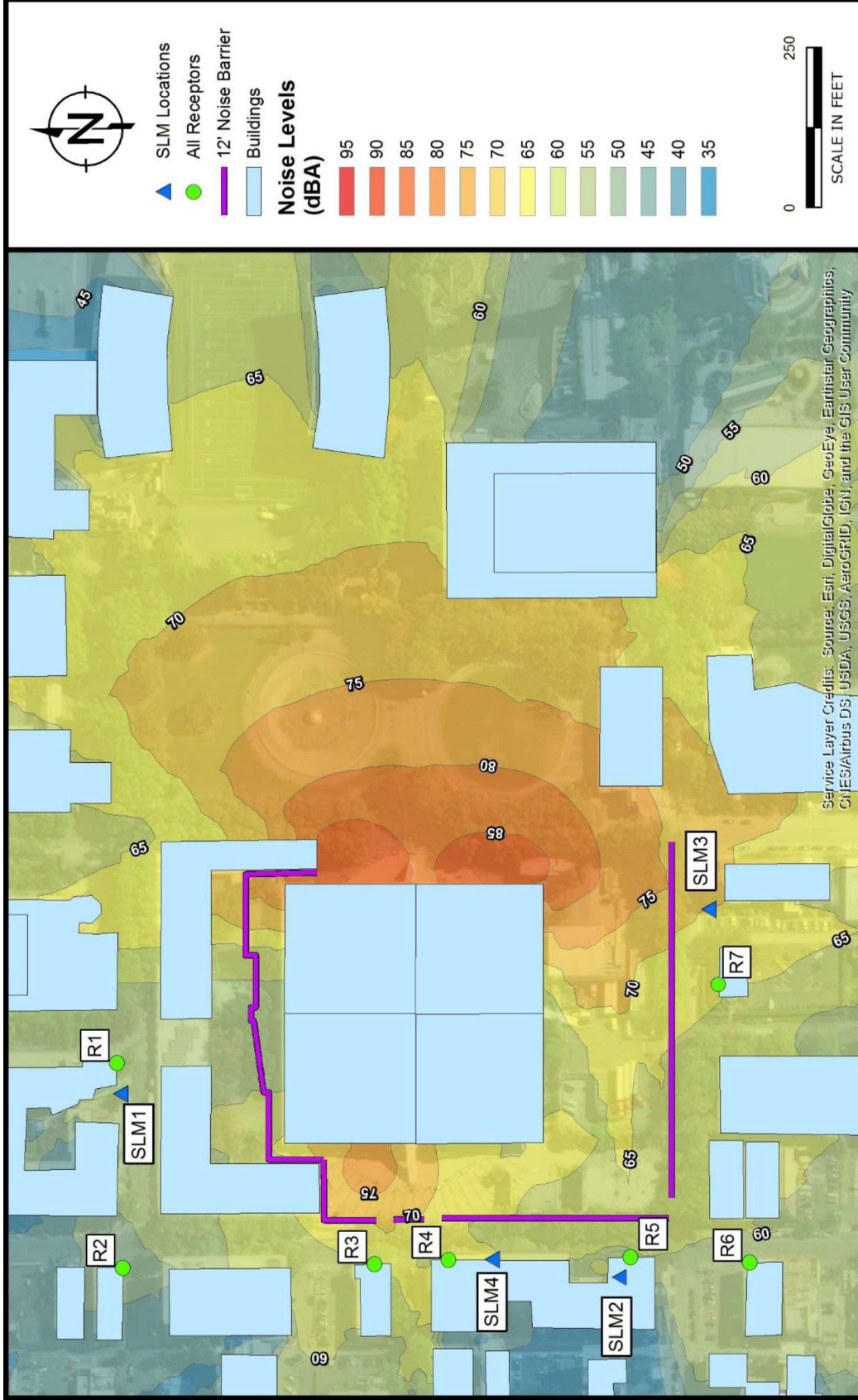
Sensitive Receiver	Floor	Modeled Sound Levels (dBA, Leq)						Modified Limit
		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	
R1 – Expo Apts	2nd	52	51	59	59	59	51	64
	3rd	55	54	60	60	60	51	64
	4th	55	54	62	62	62	53	64
	5th	56	54	62	63	63	53	64
	6th	57	57	63	64	64	51	64
R2 – Inn at Queen Anne	1st	46	43	51	52	52	42	74
	2nd	48	46	55	56	56	43	72
	3rd	49	47	56	58	58	43	71
	4th	51	49	57	58	58	47	70
R3 – Dalmasso Apts	1st	60	60	60	60	60	43	74
	2nd	61	60	61	61	61	43	72
	3rd	65	65	65	63	63	43	71
R4 – Astro Apts	2nd	59	59	59	62	62	43	72
	3rd	63	63	63	67	67	44	71
	4th	63	63	64	67	67	44	70
	5th	63	63	64	67	67	44	69
	6th	64	63	64	67	67	44	67
R5 – Astro Apts	2nd	58	52	58	60	62	45	72
	3rd	59	58	63	65	67	47	71
	4th	59	59	64	66	67	47	70
	5th	59	59	64	66	67	46	69
	6th	59	59	64	65	67	46	67
R6 – The Uptowner Apts	1st	52	50	51	52	52	42	74
	2nd	54	50	51	53	54	42	72
	3rd	54	50	51	53	54	42	71
R7 – Sacred Heart Women’s Shelter	1st	58	55	55	55	57	48	66
	2nd	62	61	59	57	58	55	66

Source: Ramboll, 2018

Table 14. Noise Modeling Results for Period 2, With Mitigation

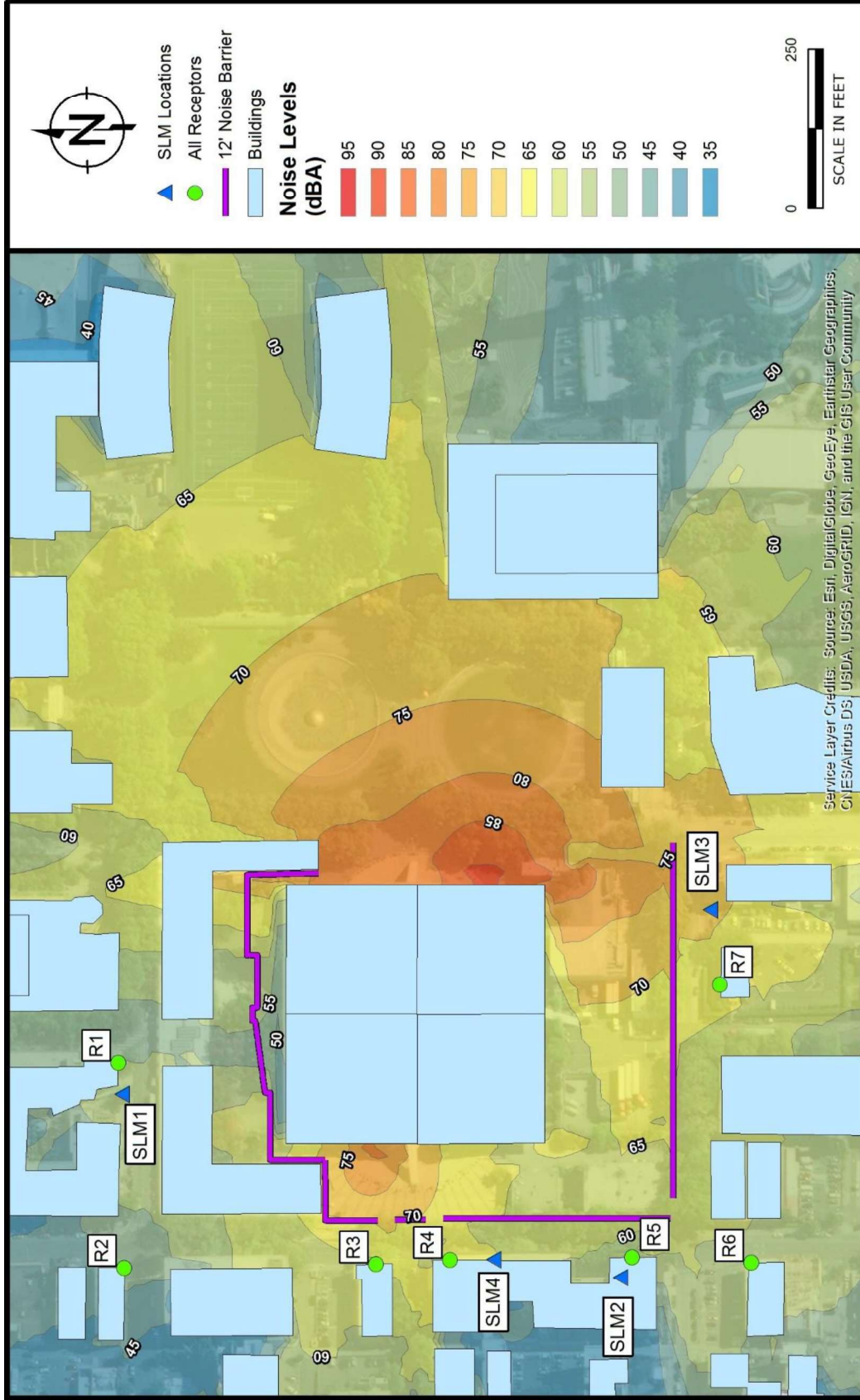
Sensitive Receiver	Floor	Modeled Sound Levels (dBA, Leq)						Modified Limit
		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	
R1 – Expo Apts	2nd	51	51	51	11	27	27	60
	3rd	54	54	54	12	30	30	60
	4th	54	53	53	20	30	30	60
	5th	55	54	54	20	31	31	60
	6th	57	57	57	23	33	33	60
R2 – Inn at Queen Anne	1st	44	43	43	10	30	30	70
	2nd	47	46	46	12	30	30	69
	3rd	48	47	47	12	30	30	68
	4th	50	49	49	12	31	31	66
R3 – Dalmasso Apts	1st	60	60	60	18	44	44	70
	2nd	61	60	60	19	44	44	69
	3rd	65	65	65	20	44	44	68
R4 – Astro Apts	2nd	59	59	59	19	43	43	69
	3rd	63	63	63	22	45	45	68
	4th	63	63	63	25	45	45	66
	5th	63	63	63	25	46	46	65
	6th	63	63	63	27	46	46	64
R5 – Astro Apts	2nd	53	51	51	27	39	39	69
	3rd	56	55	55	31	42	42	68
	4th	57	56	56	36	44	44	66
	5th	57	56	56	37	45	45	65
	6th	57	56	56	38	45	45	64
R6 – The Uptowner Apts	1st	49	48	48	21	37	37	70
	2nd	50	48	48	22	38	38	69
	3rd	50	48	48	22	38	38	68
R7 – Sacred Heart Women’s Shelter	1st	56	51	51	22	30	30	60
	2nd	60	56	56	24	33	33	60

Source: Ramboll, 2018



RAMBOLL	Period 1, Scenario 1 Results Seattle Arena Construction Seattle, Washington		FIGURE 3
	DRAFTED BY: KAR	DATE: 8/30/2018	PROJECT: 1690008717

Figure 3. Period 1, Scenario 1 Noise Contours, 60-foot Elevation



RAMBOLL	Period 1, Scenario 2 Results		FIGURE 4
	Seattle Arena Construction Seattle, Washington		
DRAFTED BY: KAR	DATE: 8/30/2018		PROJECT: 169008717

Figure 4. Period 1, Scenario 2 Noise Contours, 60-foot Elevation

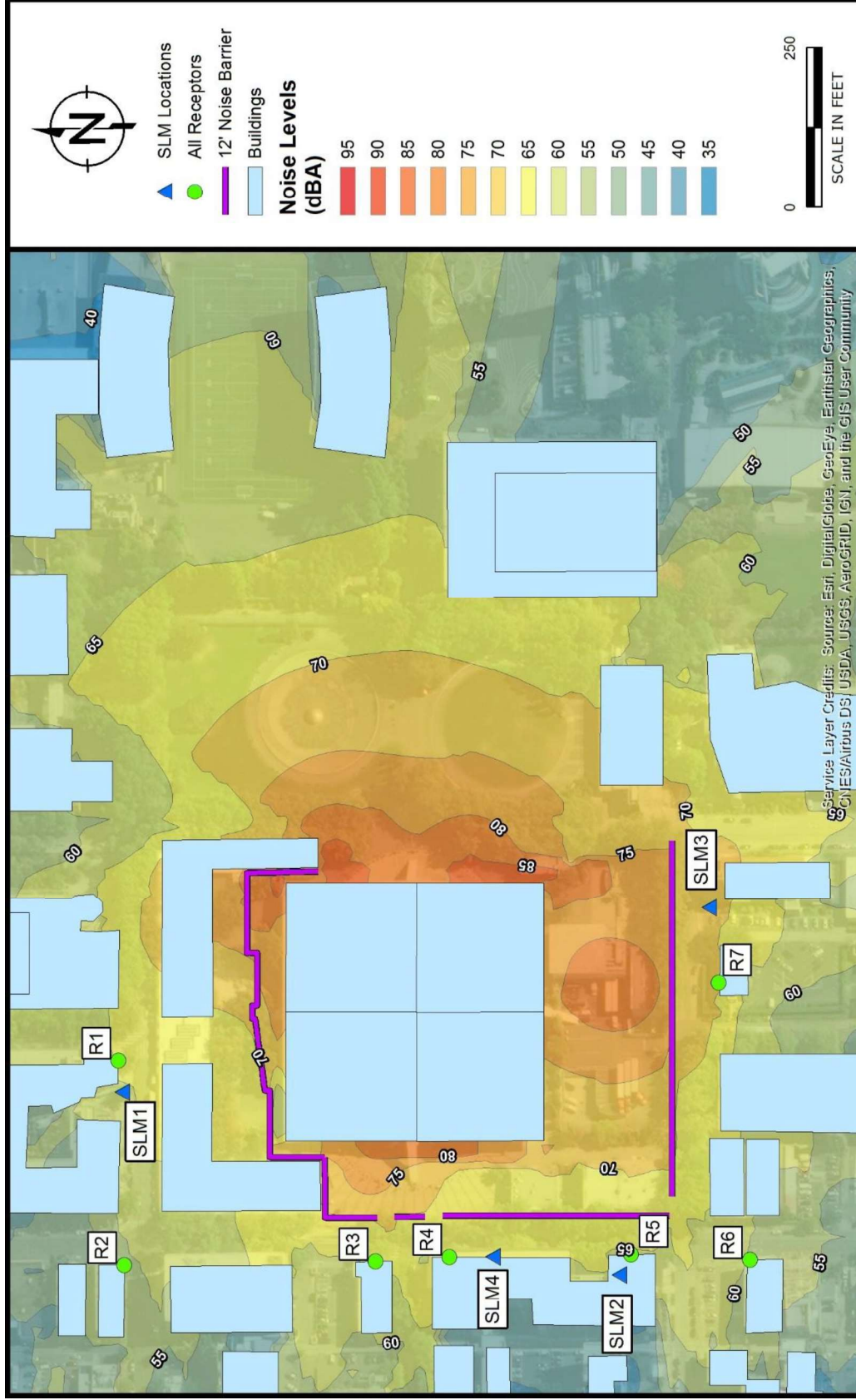


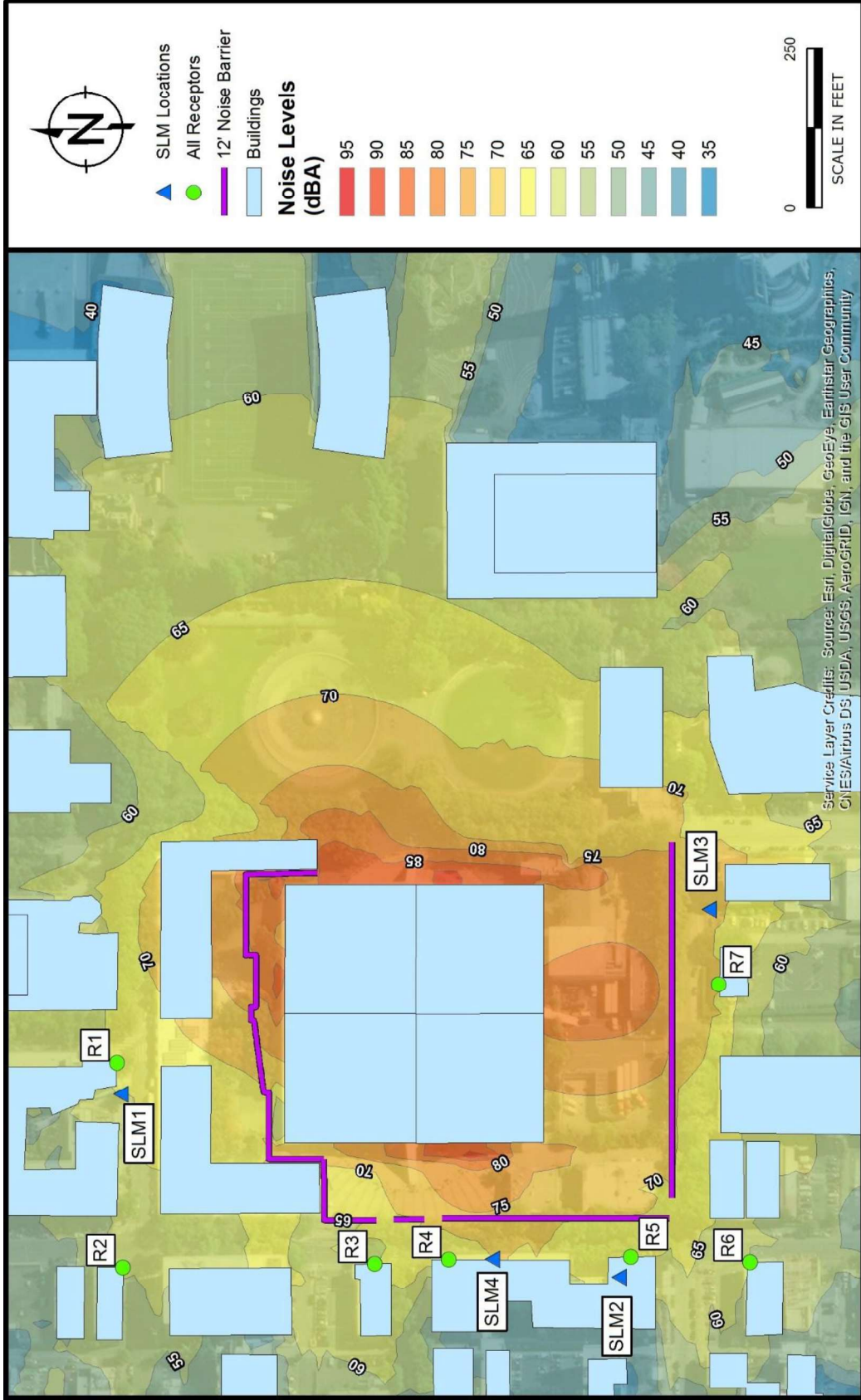
Figure 5. Period 1, Scenario 3 Noise Contours, 60-foot Elevation

Period 1, Scenario 3 Results
Seattle Arena Construction
Seattle, Washington

RAMBOLL

DRAFTED BY: K4R | DATE: 8/30/2018

FIGURE 5
PROJECT: 1690008717



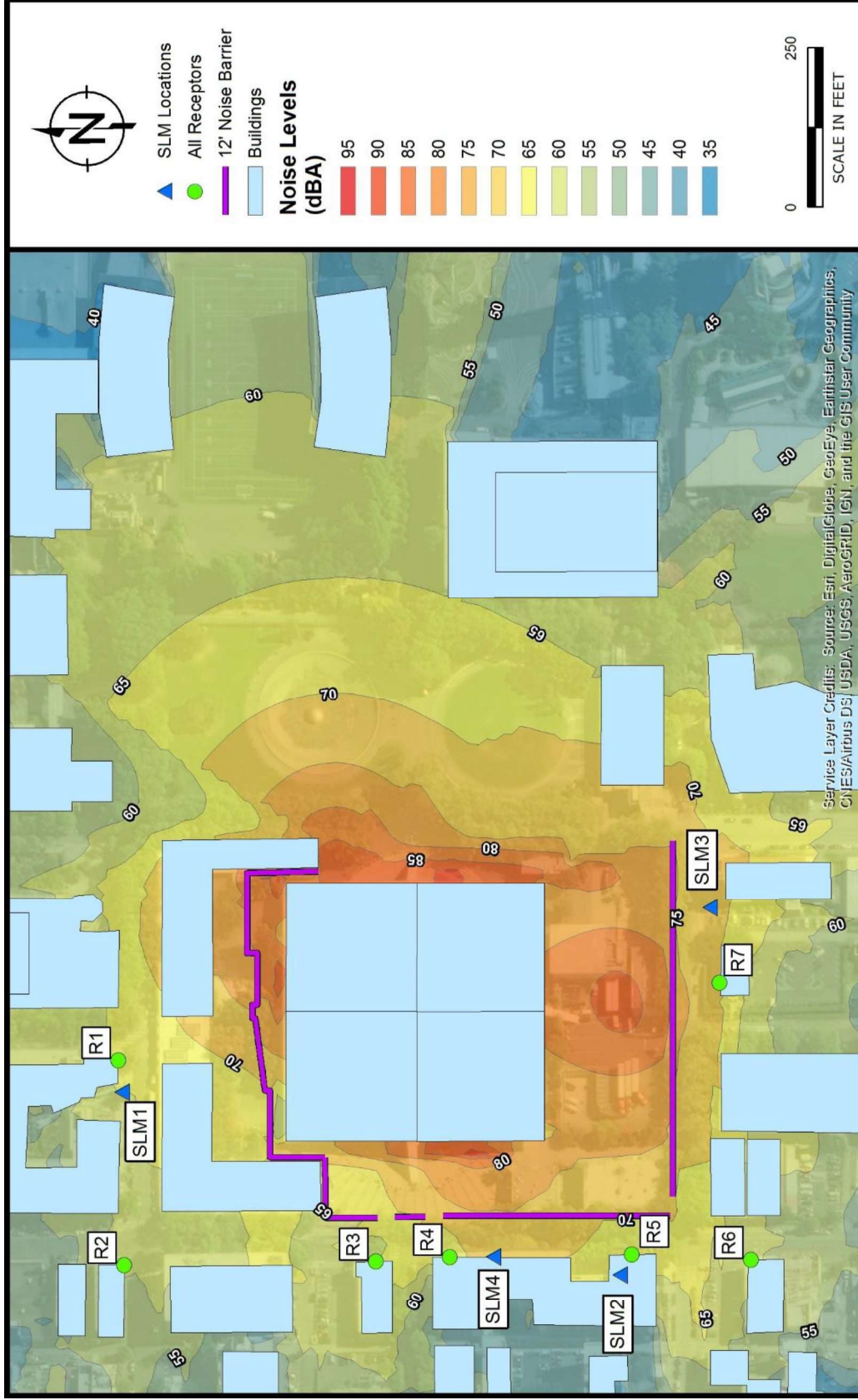
RAMBOLL

Period 1, Scenario 4 Results
Seattle Arena Construction
Seattle, Washington

FIGURE 6

DRAFTED BY: KAR | DATE: 8/30/2018 | PROJECT: 1690008717

Figure 6. Period 1, Scenario 4 Noise Contours, 60-foot Elevation



Period 1, Scenario 5 Results
Seattle Arena Construction
Seattle, Washington

FIGURE 7

DRAFTED BY: KAR | DATE: 8/30/2018 | PROJECT: 1590008717

Figure 7. Period 1, Scenario 5 Noise Contours, 60-foot Elevation

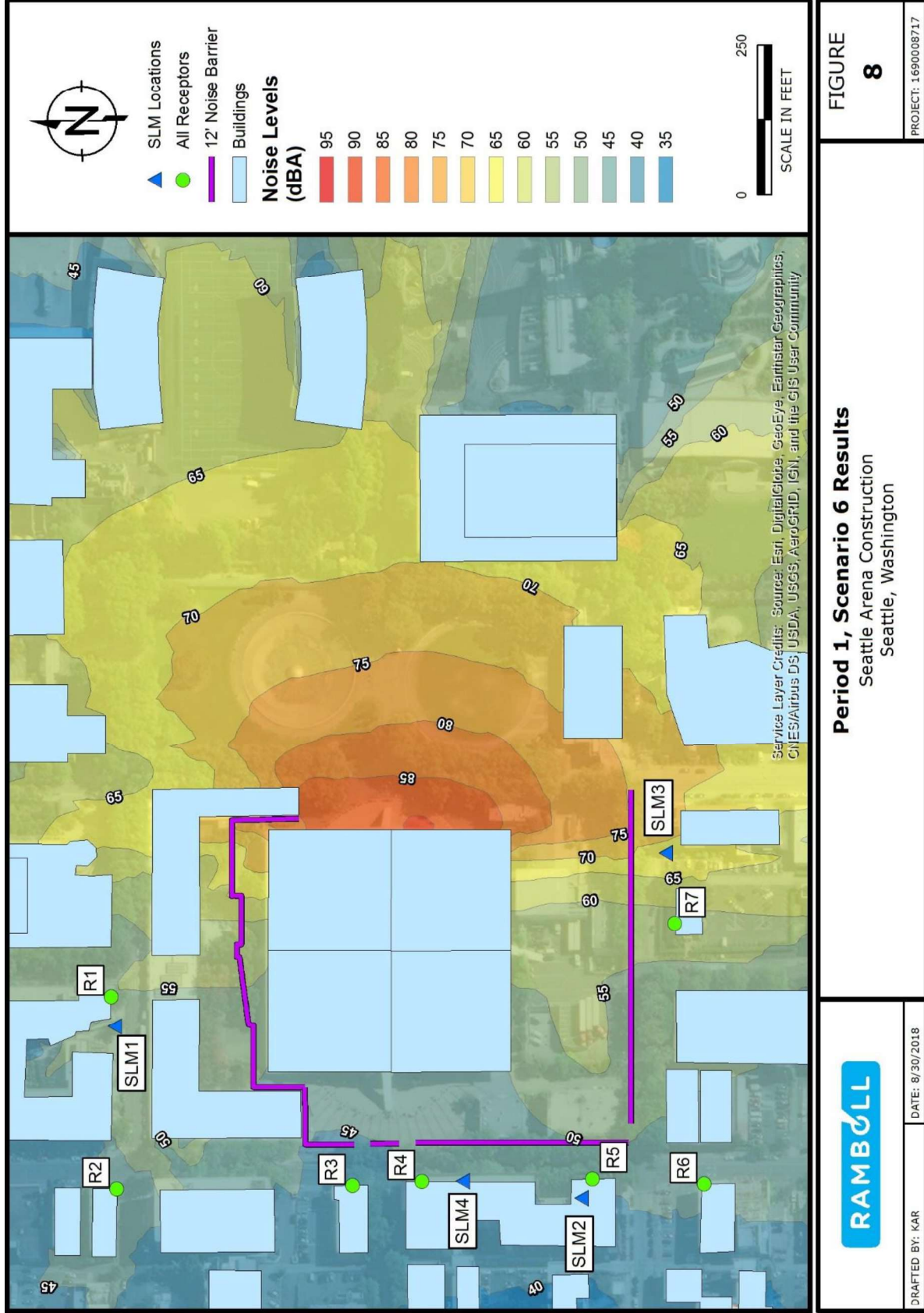
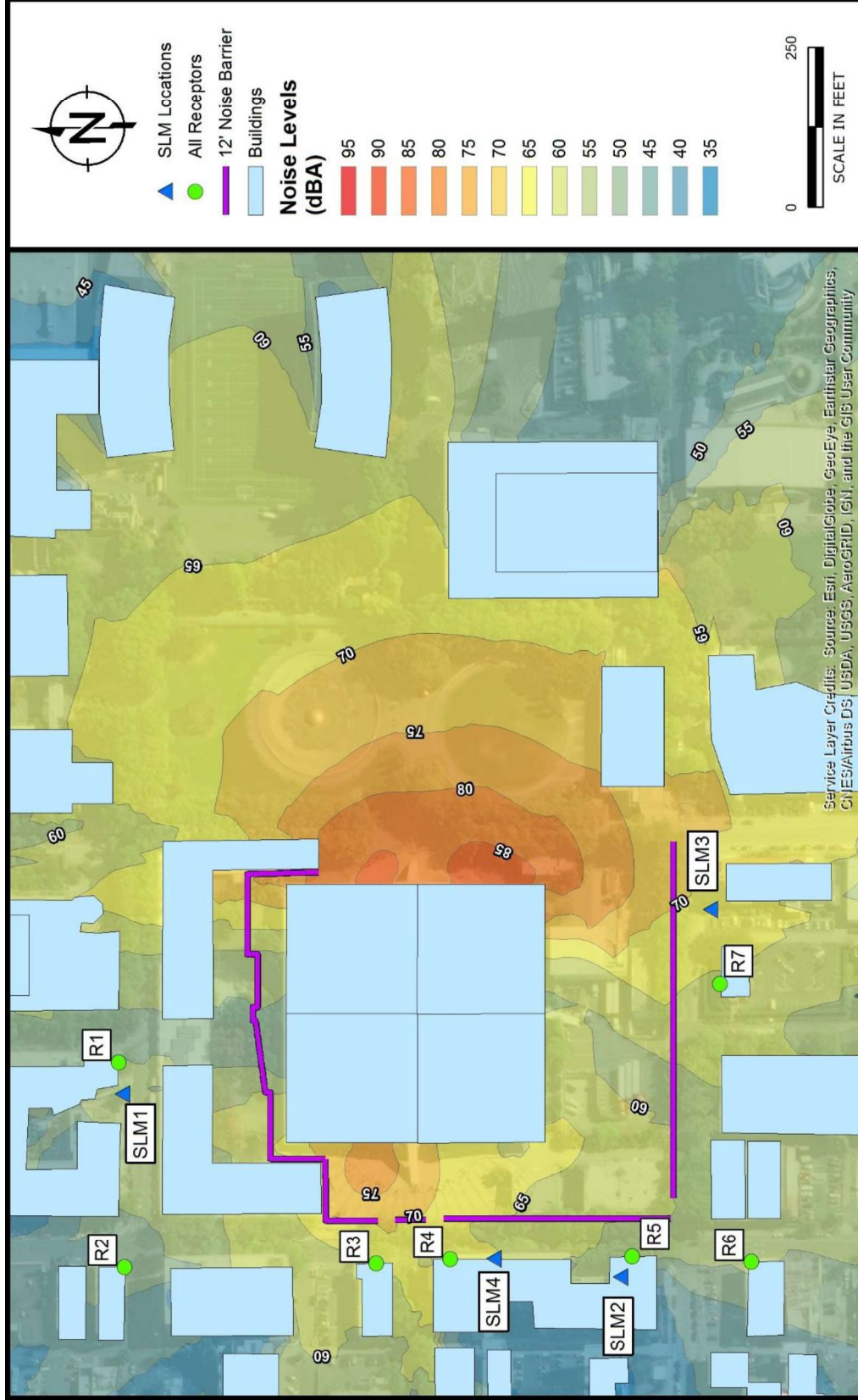


Figure 8. Period 1, Scenario 6 Noise Contours, 60-foot Elevation



	Period 2, Scenario 1 Results Seattle Arena Construction Seattle, Washington	FIGURE 9
	DRAFTED BY: KAR DATE: 8/30/2018	PROJECT: 1690008717

Figure 9. Period 2, Scenario 1, 60-foot Elevation

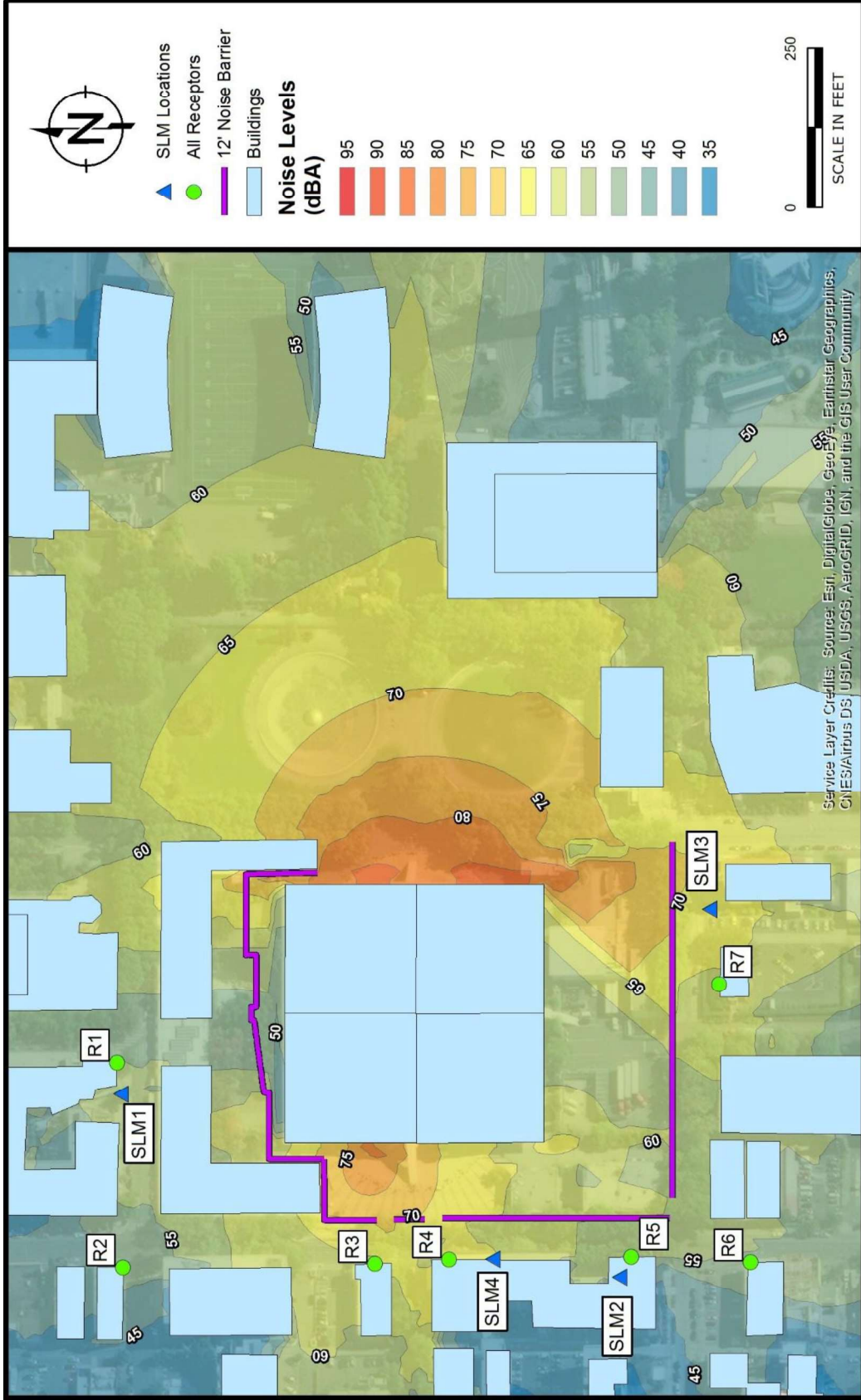


FIGURE 10

Period 2, Scenario 2 Results
Seattle Arena Construction
Seattle, Washington

DRAFTED BY: KAR | DATE: 8/30/2018

PROJECT: 1690008717

Figure 10. Period 2, Scenario 2, 60-foot Elevation

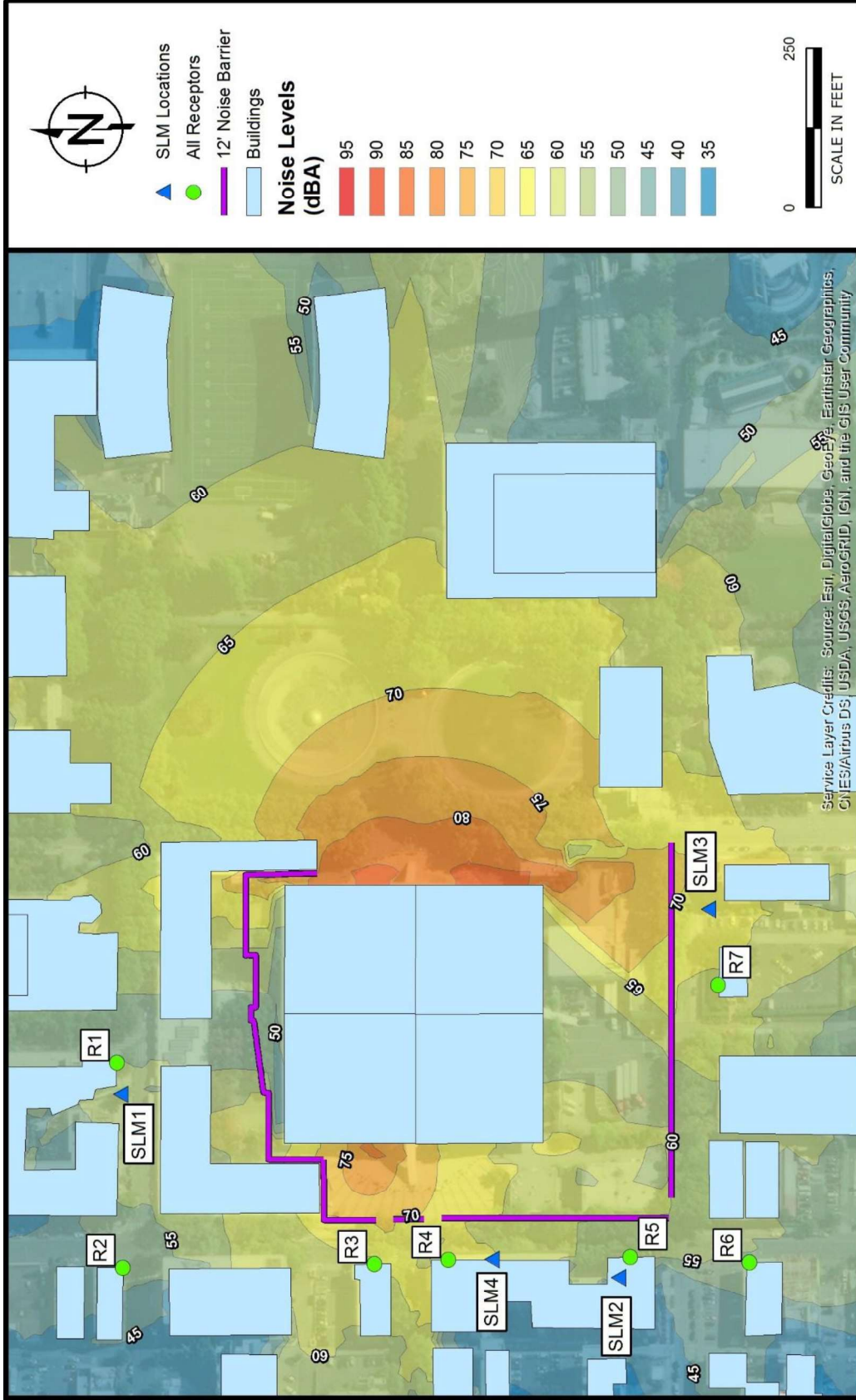
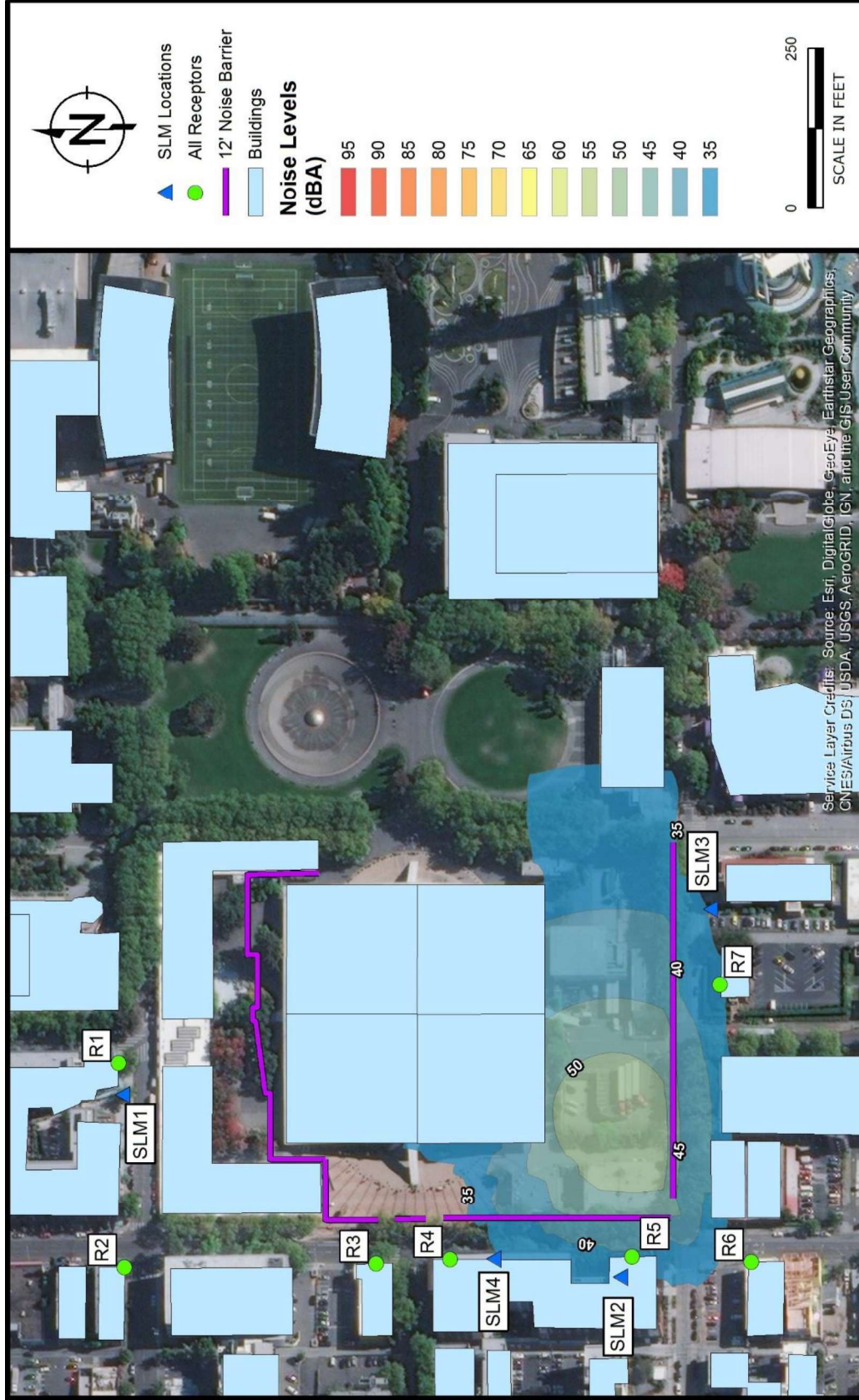


FIGURE 11

Period 2, Scenario 3 Results
 Seattle Arena Construction
 Seattle, Washington

DRAFTED BY: KAR | DATE: 8/30/2018 | PROJECT: 1690008717

Figure 11. Period 2, Scenario 3, 60-foot Elevation



RAMBOLL DRAFTED BY: KAR DATE: 8/30/2018

Period 2, Scenario 4, 5, & 6 Results
Seattle Arena Construction
Seattle, Washington

FIGURE 12 PROJECT: 1690008717

Figure 12. Period 2, Scenarios 4, 5, and 6, 60-foot Elevation

7.4 Additional Required Nighttime Mitigation

The contractor will do the following to minimize nighttime construction noise, between 10 PM and 7 AM weekdays and 10 PM and 9 AM weekends and legal holidays, as defined in SMC 25.08.110. Following are the required minimum mitigation measures included in our assumptions and modeling results to maintain construction noise levels at or below the proposed modified nighttime noise limits established in the MPPCNV:

- In lieu of pure-tone, mobile equipment backup alarms, use strobe warning lights or flaggers when possible. When the use of strobe warning lights or flaggers is not feasible, the construction contractor will use broadband backup alarms. Also, create site logistics that minimize the need for mobile equipment to reverse.
- Conduct continuous noise monitoring representing sensitive receivers in vicinity of site to ensure nighttime construction activities comply with the proposed modified nighttime construction noise limits under the terms of the MPPCNV

7.5 Mitigation in Response to Nighttime Impacts at Residential Uses

Noise mitigation measures will be offered for locations where bedroom/sleeping room windows would be exposed to levels over the 60-dBA standard nighttime limit due to nighttime construction.

- For buildings more than 20 years old, new bedroom/sleeping room windows will be offered. Current construction plans and predictive noise modeling indicate the following older buildings may receive nighttime construction sound levels in excess of 60 dBA:
 - The Dalmasso apartments facing 1st Avenue N and the construction site
 - The Sacred Heart women's shelter facing the construction site
- For buildings without air conditioning or ventilation systems (The Astro apartments have air conditioning), offer to purchase portable or window air conditioning units for bedrooms/sleeping rooms where predicted levels under Scenarios 4 through 6 exceed 60 dBA. Scenarios 1 through 3 would occur between October 2018 and February 2019, when windows would not need to remain open for cooling purposes. Current construction plans and predictive noise modeling indicate the following buildings may receive nighttime construction sound levels in excess of 60 dBA:
 - Portions of The Expo apartments facing Republican Street
 - The Dalmasso apartments facing 1st Avenue N
 - The Sacred Heart women's shelter facing the construction site

7.6 Mitigation for Adjacent, On-site Uses

KEXP and other occupants of the Northwest rooms are the nearest receivers to the proposed construction activities and have the greatest potential to be exposed to daytime construction noise levels disruptive to their uses. OVG is in separate discussions with these uses to identify mitigation measures unique to their uses/locations that will allow them to continue operating in their current locations over the construction period.

7.7 Potential Additional Mitigation Measures

The construction contractor will use the following standard best practices during all construction:

The construction contractor will use the following standard best practices during daytime and nighttime construction:

- Perform construction activity within the existing building shell to provide shielding to noise-sensitive receiver locations.
- Reduce ramp grades from maximum possible slopes to reduce vehicle engine power needed to ascend roadways.
- Prohibit compression brakes
- Construct enclosures around stationary equipment that is outside the existing shell of the arena
- Perform particularly noisy operations during daytime hours and/or schedule several noisy operations to occur concurrently rather than separately
- Employ time constraints for noisy operations to reduce potential impacts during sensitive time periods
- Provide training to supervisors to increase awareness of construction noise as it relates to the noise-sensitive surroundings and the requirements of the NMMP
- Use properly sized and maintained mufflers, engine intake silencers (if feasible), and engine enclosures (if feasible)
- Turn off idle equipment after no more than five minutes
- To reduce noise during loading of heavy materials such as concrete debris into haul truck trailers, employ one of the following mitigation measures:
 - Line truck beds with rubberized, shock and noise-absorbing material. Load large concrete pieces using progressive link excavator buckets or similar, and ensure that loading is performed by a skilled operator to minimize the potential for impact-type noises during loading activities, or
 - Carefully load truck beds first with soils and/or fine gravels followed by larger pieces of concrete debris using excavator equipped with progressive link excavator buckets or similar. Ensure that loading is performed by a skilled operator to minimize the potential for impact-type noises during loading activities.
- Maintain and/or lubricate material conveyors to ensure they do not squeak
- Provide 24-hour construction noise monitoring system to log construction site noise
- Use broadband backup alarms, in lieu of pure-tone alarms, during daytime hours
- Restrict truck hauling during the AM and PM peak traffic hours (i.e., between 7 and 9 AM and between 3 and 7 PM, Monday through Friday)
- Coordinate schedules with nearby sensitive receptors (e.g., KEXP, theaters, venues)

8. COMPLIANCE MONITORING AND REPORTING

Director's Rule 3-2009, Section C.2, indicates that monitoring and reporting of nighttime construction noise needs to be conducted to ensure that the variance and proposed mitigation measures are effective, and whether the NMMP should be adjusted. The rule indicates that the monitoring staff be impartial and suggests that OVG provide for an Independent Noise Monitor (INM). The INM may be an individual, firm, or contracted staff member within SDCI independent from the contractor whose responsibility is to oversee the monitoring of sound levels from construction covered by the MPPCNV and to report directly to the SDCI Coordinator for Noise Abatement.

The INM will coordinate with SDCI, gather continuous noise data, and take periodic noise measurements of the activities.

8.1 Noise Monitoring Locations

The applicant will establish three (3) permanent (i.e., long-term) noise monitoring terminals (NMTs) in the immediate vicinity of the project. The location of the NMTs will be finalized once permissions and access are granted, but are anticipated to be approximately within the general vicinity of the long-term measurement locations that are identified in Section 4.3, as indicated by SLM1, SLM2, and SLM3, and as is illustrated in [Figure 1](#) on page 12.

The microphones of the equipment will be placed at least 5 feet above the surface of the monitoring location (i.e., above the deck or roof-top), will have a clear line of sight to construction activities and will be at least 15 feet from any nearby walls to prevent the influence of noise reflections.

The equipment will be located as far from very nearby existing ambient sources as is possible, such as rooftop gathering areas, so as to minimize the potential for false-positive noise alerts.

The equipment will be installed permanently so that it does not require continuous adjustment or checks.

8.2 Noise Monitoring Equipment

Automated noise monitoring equipment will meet the International Organization for Standardization (ISO) requirements for a Class 1 sound level meter (i.e., equivalent but superseding the American National Standards Institute (ANSI) Type 1 meter requirements). The noise monitoring equipment will be factory calibrated within the previous 12 months prior to deployment, and will undergo annual factory calibration every 12 months thereafter. The equipment also will be programmed to undergo daily charge-injection calibration to ensure the equipment continues to function properly and accurately.

Noise monitoring equipment will have the capability to log L_{eq} on a 1-second and hourly basis, and to initiate a recording of audio files when the L_{eq} sound-level thresholds are exceeded (i.e., threshold-triggered audio recordings). The sound level thresholds will be set at 3-dBA below the MPPCNV nighttime L_{eq} noise levels limits that are established for each monitoring location. Threshold-triggered audio recordings will be set to record at least 10 seconds before the threshold-exceeding event to allow for easier source identification.

8.3 Remote Access to Noise Data

The noise measurement equipment will allow for remote access to historical and real-time noise data, as well as threshold-triggered audio recordings. These data and the audio recordings will be available to SDCI, the contractor, and the applicant. If necessary and/or if requested to do so, limited access to data (i.e., viewing only) will be available to members of the public through an online web-based portal.

8.4 INM Duties

If the monitoring equipment detects an exceedance of the MPPCNV nighttime noise level limits, or if a caller to the hotline has a noise-related complaint and requests additional information, the INM will be notified. If the INM receives a complaint call during nighttime work hours, the INM will notify the contractor, perform a site inspection within 30 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 contractor's night time 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.

8.5 Reporting Requirements

The INM will generate weekly and annual reports that are required as part of Director's Rule 3-2009. The reports will be provided to SDCI and will include any monitored L_{eq} and L_1 exceedances, noise complaints logged in the program database, and work modifications completed to resolve complaints. The weekly reports will be publicly available on-line.

9. PUBLIC OUTREACH AND COMMUNITY INVOLVEMENT

9.1 Contact Persons

9.1.1 Construction Project Manager

The Construction Contractor will designate a project manager to fill the position of “Construction Project Manager” to address comments regarding on-going operations and schedule.

The Construction Project Manager will:

- Act as the initial point of contact for general construction information or for non-emergency concerns related to construction
- Attend meetings of the affected neighbors with OVG Community Liaison
- Manage a construction hot line, including logging calls and coordinating with the OVG Community Liaison to generate appropriate responses
- Assemble and maintain a Construction Notification List.
- Prepare and distribute monthly construction bulletins describing general progress and schedule related information for distribution via email to the Construction Notification List

9.1.2 OVG Community Liaison

As of June 2018, OVG has retained an “OVG Community Liaison” to communicate with Seattle Center and its resident organizations and with the community and Project neighbors regarding process and schedule for the Project. OVG Community Liaison will work with each group in coordination with the Construction Project Manager to ensure any comments are addressed.

The OVG Community Liaison will:

- Collect and distribute general information about the Project
- Schedule and attend meetings with neighbors and Construction Project Manager in advance of start of construction and as desired by neighbors during construction. Should periodic neighborhood-wide meetings be scheduled, the OVG Community Liaison will coordinate with the City and Construction Project Manager in advance.
- Assemble contact names for the Construction Notification List and keep it up to date
- Act as a point of contact for people seeking information about the project
- Maintain the OVG construction media website which will include general information about the project, construction updates, and periodic special updates on construction activity
- Attend regular meetings with OVG and City project management teams

9.2 Communication Methods

9.2.1 Monthly Bulletins

The Construction Project Manager will prepare monthly construction update bulletins, beginning September 2018 (assuming an October 2018 start of site preparation and start of utility work) and continue at least through completion of construction (October 2020). These bulletins will cover general construction updates, notices for street and sidewalk closures, noise and work hour variances, and other construction activities that may affect the surrounding neighborhood. Bulletins will be distributed

in-person or by email and/or mailings to the immediately surrounding neighborhoods. The current list includes the following:

- Seattle Center
- SDOT
- King County
- Residences / Businesses within 300 feet of the project site

Construction alerts will be sent electronically and distributed in person as necessary. Alerts will contain immediate changes or updates on specific activities and locations. Flyers with project information will be distributed to an outreach list and posted in the lobby/elevator of apartment residences within 300 feet of the project site.

9.2.2 Construction Hotline

A construction hotline, managed by the Construction Project Manager, will serve as the primary access point for Project information. Complaints received by the OVG Community Liaison or the Construction Project Manager including noise, dust, traffic, parking, lighting, construction personnel, schedule or any items pertaining to construction, will be acknowledged and a response coordinated on a case by case basis. The intent is that a response to any complaints (during regular or after hours) will be provided within 30 minutes. Coordination meetings will be held as needed depending on the nature and implications of the complaint. The General Contractor shall implement commercially reasonable modifications to the construction practices to eliminate or mitigate the concerns relayed in the complaints.

9.2.3 Construction Website

OVG will maintain a construction media website that will include general information about the project, design, construction updates, and periodic special updates on construction activity. The website will also contain links to real-time noise monitoring data.

9.2.4 Special Project Updates

The Construction Project Manager will provide the Construction Notification List managers with an additional Project update if there is to be any construction activity beyond the usual day to day work that will affect the surrounding neighbors. Notices will be sent out at least 10 days prior to each phase of construction and at least 10 days prior to any one-day or several-day mobility impact that is not a part of the day-to-day construction activities such as street or sidewalk closures, and noise and work hour variances. This notification will be in addition to the Project updates.

9.2.5 Public Engagement Events

OVG and the City will provide public engagement events, including campus coordination meetings, communication committee meetings, and event collaboration meetings.

OVG will host Bi-weekly (every other week) meetings to coordinate with community, city, and resident organizations on mitigating construction impacts and advance efforts to support ongoing activities at

Seattle Center and in the adjacent communities. Participants will include OVG, contractor, and City representatives including SDOT and SDCI, as needed.

City and OVG will staff a monthly Community Coordination Committee that will ensure frequent communications between OVG, communities/resident organizations and Seattle Center regarding construction activities, impact mitigation and on-going operations of the Arena. The Committee membership will include all affected organizations both in the community and on the Seattle Center campus.

OVG will work with the community to jointly sponsor events on campus and off-campus that promote small businesses in the area and arts and culture in the respective communities. These events can be new or existing events to host and/or promote. The intent is to activate the neighborhood and provide incentives for customers to continue to support the Uptown businesses and organizations during the construction period.

9.2.6 Project Sign

A project sign will be in place prior to construction with the name of the Project, a 24-hour hotline with contact information, and the duration of the Project. Signage will also be provided listing the website .url and contact information for 24-hour staff representatives, including the INM, the OVG Community Liaison, and the Seattle Center Ombudsman.

9.2.7 9-1-1 Emergency

Contact the appropriate public authority using 9-1-1 for any emergency requiring immediate assistance.

9.2.8 Notification Timing and Tracking

When	Action
4 months (June 2018) prior to construction	Letters to neighboring property owners introducing the Project and proposed permit actions (in connection with permit notice standards). Notice will include advance notice of construction activities and potential detour routes.
10 weeks prior to construction	Letters to affected parties within 2 block radius.
6 weeks prior to construction	Provide construction information on the project website.
4 weeks prior to construction	Post flyers at nearby community gathering spaces.
72 hours prior to construction	Place no-park signs for lane closures as needed; place signs for pedestrian and business access notices.
Ongoing activities	Web and email updates to Construction Notification List and others as requested.

APPENDIX A: SOUND LEVEL MEASUREMENT DATA

Seattle Arena Redevelopment Project
 Noise Management and Mitigation Plan
 Appendix A: Sound Level Measurement Data

Day/Time	SLM1 Expo		SLM2 Astro		SLM3 Expo	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
6/11/18 2:00 PM	62.4	80.3	60.8	77.4	60.4	80.5
6/11/18 3:00 PM	60.5	76.0	59.0	82.2	57.7	80.9
6/11/18 4:00 PM	59.1	77.7	59.2	76.4	57.7	76.6
6/11/18 5:00 PM	58.4	70.2	59.4	79.8	56.2	72.5
6/11/18 6:00 PM	58.4	77.2	59.0	73.7	56.7	75.0
6/11/18 7:00 PM	58.2	78.8	58.4	72.6	55.8	71.2
6/11/18 8:00 PM	57.1	68.4	58.4	81.7	54.3	75.1
6/11/18 9:00 PM	57.2	75.6	57.9	70.1	54.6	73.6
6/11/18 10:00 PM	58.1	86.7	58.8	76.6	56.3	72.3
6/11/18 11:00 PM	58.1	78.4	59.6	73.1	63.5	86.7
6/12/18 12:00 AM	57.7	83.6	58.6	89.6	53.2	70.6
6/12/18 1:00 AM	54.7	79.8	55.0	73.1	51.5	76.4
6/12/18 2:00 AM	54.5	73.8	55.2	77.6	56.0	79.5
6/12/18 3:00 AM	52.8	70.4	53.1	75.0	56.5	87.0
6/12/18 4:00 AM	54.9	76.7	54.0	68.4	52.7	76.8
6/12/18 5:00 AM	62.6	84.4	60.6	85.4	60.2	81.0
6/12/18 6:00 AM	58.6	77.0	57.9	74.3	53.9	75.0
6/12/18 7:00 AM	62.0	78.9	61.3	83.4	59.2	77.3
6/12/18 8:00 AM	58.8	75.7	59.4	79.2	59.9	74.5
6/12/18 9:00 AM	65.3	97.0	60.1	74.6	59.5	82.8
6/12/18 10:00 AM	60.2	77.4	60.4	75.3	59.9	86.3
6/12/18 11:00 AM	59.2	77.6	59.8	80.2	58.9	78.2
6/12/18 12:00 PM	59.2	84.8	55.9	73.2	58.5	80.7
6/12/18 1:00 PM	61.3	80.0	60.7	75.7	58.9	81.5
6/12/18 2:00 PM	59.2	72.2	60.8	80.9	59.3	89.5
6/12/18 3:00 PM	58.3	72.6	59.2	74.4	55.9	78.2
6/12/18 4:00 PM	59.5	78.7	60.2	79.3	58.1	79.8
6/12/18 5:00 PM	58.8	76.5	60.5	76.6	58.5	77.6
6/12/18 6:00 PM	58.0	72.1	59.7	80.6	56.5	75.4
6/12/18 7:00 PM	60.0	86.1	59.2	78.2	56.8	78.3
6/12/18 8:00 PM	57.9	75.6	59.8	88.3	55.3	75.2
6/12/18 9:00 PM	56.9	76.4	59.8	81.3	58.1	88.4
6/12/18 10:00 PM	55.8	72.6	57.4	70.5	53.5	75.1
6/12/18 11:00 PM	54.9	67.8	56.5	71.2	50.2	67.2
6/13/18 12:00 AM	54.8	69.0	55.7	72.8	50.3	75.9
6/13/18 1:00 AM	53.3	70.7	54.5	70.3	54.4	78.0
6/13/18 2:00 AM	53.1	62.2	52.7	68.1	52.6	76.5
6/13/18 3:00 AM	54.5	92.2	53.4	73.6	51.2	68.8
6/13/18 4:00 AM	55.1	88.6	55.2	75.9	54.8	75.4

Seattle Arena Redevelopment Project
 Noise Management and Mitigation Plan
 Appendix A: Sound Level Measurement Data

Day/Time	SLM1 Expo		SLM2 Astro		SLM3 Expo	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
6/13/18 5:00 AM	66.9	109.7	56.8	84.8	55.1	71.9
6/13/18 6:00 AM	67.5	105.6	59.5	95.8	57.6	85.7
6/13/18 7:00 AM	68.4	107.5	60.3	74.7	59.4	78.5
6/13/18 8:00 AM	63.6	84.7	65.6	90.8	59.9	77.9
6/13/18 9:00 AM	63.1	78.9	59.6	79.4	59.2	80.3
6/13/18 10:00 AM	60.6	84.8	64.9	95.5	60.0	89.3
6/13/18 11:00 AM	61.8	83.9	62.2	85.9	64.0	86.4
6/13/18 12:00 PM	58.8	85.2	60.3	87.3	59.0	82.3
6/13/18 1:00 PM	59.5	76.2	59.9	82.8	59.8	82.8
6/13/18 2:00 PM	64.0	85.4	61.2	76.9	63.3	77.4
6/30/18 1:00 PM	61.4	84.2	62.5	87.1	59.7	86.1
6/30/18 2:00 PM	65.1	89.2	65.9	92.4	63.1	89.5
6/30/18 3:00 PM	64.3	82.3	62.1	85.6	60.0	79.6
6/30/18 4:00 PM	65.5	85.8	62.5	82.8	59.7	78.7
6/30/18 5:00 PM	64.9	86.7	67.6	96.3	67.6	81.6
6/30/18 6:00 PM	61.1	76.8	62.6	77.4	57.4	75.3
6/30/18 7:00 PM	62.8	74.7	64.5	85.4	60.7	74.5
6/30/18 8:00 PM	60.9	74.8	63.7	77.1	58.3	76.1
6/30/18 9:00 PM	64.3	83.6	61.4	75.2	61.5	77.9
6/30/18 10:00 PM	58.1	77.0	60.2	94.7	57.3	78.4
6/30/18 11:00 PM	57.0	76.1	58.9	82.0	53.6	77.8
7/1/18 12:00 AM	55.0	73.5	58.5	82.6	52.8	80.3
7/1/18 1:00 AM	54.9	72.3	57.2	74.6	49.7	70.8
7/1/18 2:00 AM	53.2	71.1	55.7	72.8	52.6	78.0
7/1/18 3:00 AM	52.0	63.9	53.8	71.3	49.6	71.0
7/1/18 4:00 AM	54.4	72.4	58.0	86.3	53.7	83.6
7/1/18 5:00 AM	58.2	88.8	55.3	71.5	52.6	71.8
7/1/18 6:00 AM	55.5	78.0	56.5	73.7	60.5	93.8
7/1/18 7:00 AM	57.4	72.4	59.4	88.4	52.1	72.5
7/1/18 8:00 AM	59.4	85.7	60.2	83.1	65.6	90.9
7/1/18 9:00 AM	61.8	77.2	60.4	75.5	61.0	94.1
7/1/18 10:00 AM	61.6	80.3	62.3	77.4	65.8	82.6
7/1/18 11:00 AM	61.0	82.5	62.1	87.8	62.1	92.9
7/1/18 12:00 PM	59.9	83.2	60.6	77.4	60.4	83.7
7/1/18 1:00 PM	59.5	74.8	63.9	93.2	72.3	103.8
7/1/18 2:00 PM	59.3	81.1	61.2	81.2	60.8	83.1
7/1/18 3:00 PM	59.8	74.5	61.4	76.8	57.9	80.2
7/1/18 4:00 PM	59.6	80.7	61.0	74.9	58.4	76.2

Seattle Arena Redevelopment Project
Noise Management and Mitigation Plan
Appendix A: Sound Level Measurement Data

Day/Time	SLM1 Expo		SLM2 Astro		SLM3 Expo	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
7/1/18 5:00 PM	58.7	78.0	62.1	77.6	65.8	80.6
7/1/18 6:00 PM	59.4	81.3	61.3	74.6	58.8	76.5
7/1/18 7:00 PM	58.1	79.9	60.3	78.9	57.2	86.4
7/1/18 8:00 PM	58.1	76.0	61.7	78.6	55.9	78.8
7/1/18 9:00 PM	56.5	70.9	59.4	73.3	53.6	79.8
7/1/18 10:00 PM	56.9	74.6	59.7	79.2	55.0	72.8
7/1/18 11:00 PM	54.9	72.2	57.9	72.7	50.6	67.6
7/2/18 12:00 AM	53.3	66.8	56.8	73.2	49.9	71.8
7/2/18 1:00 AM	53.9	72.4	55.1	72.7	49.0	68.5
7/2/18 2:00 AM	52.9	87.9	56.9	89.2	51.7	79.1
7/2/18 3:00 AM	53.6	82.3	55.2	71.2	51.1	77.8
7/2/18 4:00 AM	54.5	76.4	54.3	70.4	50.0	68.9
7/2/18 5:00 AM	55.2	67.4	56.6	74.6	54.5	81.0
7/2/18 6:00 AM	57.3	75.6	60.0	81.7	59.6	82.7
7/2/18 7:00 AM	58.7	77.1	60.7	86.2	59.6	94.1
7/2/18 8:00 AM	58.7	77.9	61.1	78.5	61.3	91.7
7/2/18 9:00 AM	61.8	84.6	60.9	82.8	61.4	86.1
7/2/18 10:00 AM	59.2	78.2	62.0	78.8	58.9	82.9
7/2/18 11:00 AM	60.6	86.2	61.6	78.1	59.6	83.7
7/2/18 12:00 PM	61.9	80.3	61.0	81.2	58.0	78.0
7/2/18 1:00 PM	58.7	71.7	59.9	74.4	56.9	75.6
7/2/18 2:00 PM	58.3	78.7	60.7	78.7	58.1	82.3
7/2/18 3:00 PM	58.8	78.4	61.2	79.9	58.4	88.7
7/2/18 4:00 PM	58.9	79.2	61.4	81.6	61.6	90.6
7/2/18 5:00 PM	57.8	78.2	61.4	83.4	56.2	73.0
7/2/18 6:00 PM	61.6	91.3	67.4	98.1	57.4	77.3
7/2/18 7:00 PM	57.0	72.2	59.7	76.0	56.0	75.5
7/2/18 8:00 PM	57.6	74.0	59.6	76.2	56.0	74.5
7/2/18 9:00 PM	57.0	77.0	59.9	76.6	58.1	82.1
7/2/18 10:00 PM	58.3	79.8	60.4	74.3	62.3	84.8
7/2/18 11:00 PM	55.9	69.2	60.5	81.4	54.3	87.4
7/3/18 12:00 AM	53.7	74.5	56.4	74.8	50.5	67.7
7/3/18 1:00 AM	52.4	77.7	55.0	71.7	51.6	73.1
7/3/18 2:00 AM	50.7	60.9	53.0	70.5	50.7	70.8
7/3/18 3:00 AM	51.1	65.0	53.1	73.5	56.5	83.8
7/3/18 4:00 AM	55.0	77.3	56.3	71.9	53.2	74.5
7/3/18 5:00 AM	57.5	84.1	58.0	74.2	52.9	79.2
7/3/18 6:00 AM	56.3	77.9	58.6	81.4	56.8	85.5
7/3/18 7:00 AM	56.9	73.5	61.8	86.4	59.2	84.1
7/3/18 8:00 AM	59.1	79.4	63.2	85.4	64.7	96.2

Seattle Arena Redevelopment Project
Noise Management and Mitigation Plan
Appendix A: Sound Level Measurement Data

Day/Time	SLM1 Expo		SLM2 Astro		SLM3 Expo	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
7/3/18 9:00 AM	59.7	76.8	63.5	76.6	59.5	80.8
7/3/18 10:00 AM	64.0	94.3	61.2	82.6	59.2	83.1
7/3/18 11:00 AM	59.5	77.0	59.5	73.0	61.6	78.8
7/3/18 12:00 PM	63.4	85.1	62.8	85.3	60.0	76.8
7/3/18 1:00 PM	61.2	80.9	60.3	76.8	58.4	79.6
7/3/18 2:00 PM	59.8	82.5	61.9	81.1	60.2	81.6
7/3/18 3:00 PM	58.8	81.6	61.7	87.5	59.3	79.9
7/3/18 4:00 PM	58.6	78.1	61.7	79.1	59.3	76.3
7/3/18 5:00 PM	58.2	72.2	61.8	80.7	59.3	81.1
7/3/18 6:00 PM	59.6	83.7	64.7	93.8	58.6	84.0
7/3/18 7:00 PM	58.0	76.6	59.7	73.7	55.4	77.6
7/3/18 8:00 PM	58.5	84.4	59.8	74.1	56.7	80.5
7/3/18 9:00 PM	58.0	77.7	60.1	75.8	57.9	83.3
7/3/18 10:00 PM	57.7	77.7	59.4	71.9	55.6	82.9
7/3/18 11:00 PM	57.1	88.9	60.1	84.9	53.9	77.4
7/4/18 12:00 AM	55.2	88.4	57.7	79.5	52.9	76.5
7/4/18 1:00 AM	54.3	85.9	57.2	89.0	54.1	80.7
7/4/18 2:00 AM	51.9	67.3	54.7	73.3	49.8	70.1
7/4/18 3:00 AM	51.1	68.9	53.5	71.1	47.9	66.9
7/4/18 4:00 AM	54.9	74.7	57.0	93.9	53.8	76.6
7/4/18 5:00 AM	56.0	83.0	69.3	87.9	60.6	97.4
7/4/18 6:00 AM	55.8	70.9	58.1	73.9	53.6	77.9
7/4/18 7:00 AM	59.8	89.3	62.9	93.8	56.0	83.8
7/4/18 8:00 AM	57.3	77.5	59.4	78.9	55.8	77.9
7/4/18 9:00 AM	57.6	73.0	59.2	73.3	55.7	78.1
7/4/18 10:00 AM	58.5	77.7	60.7	80.0	56.9	76.8
7/4/18 11:00 AM	60.0	85.9	65.0	93.3	57.6	75.3
7/4/18 12:00 PM	60.0	82.2	60.7	75.0	58.6	81.2
7/4/18 1:00 PM	60.5	92.6	60.2	75.6	60.4	89.3
7/4/18 2:00 PM	58.4	78.5	61.8	89.9	59.4	81.7
7/4/18 3:00 PM	57.2	75.9	60.7	82.2	56.0	80.0
7/4/18 4:00 PM	57.0	74.5	61.0	81.9	56.7	80.0
7/4/18 5:00 PM	57.9	73.3	62.3	84.9	57.1	81.0
7/4/18 6:00 PM	58.4	79.8	61.2	77.8	54.8	74.2
7/4/18 7:00 PM	59.3	86.0	64.7	93.7	59.3	98.4
7/4/18 8:00 PM	59.1	85.0	62.2	91.0	54.6	82.9
7/4/18 9:00 PM	60.3	83.4	61.3	86.1	56.7	79.3
7/4/18 10:00 PM	64.5	94.6	69.2	95.8	62.1	84.9
7/4/18 11:00 PM	59.7	89.4	62.4	94.4	60.0	97.6
7/5/18 12:00 AM	53.8	79.1	57.9	81.5	52.9	76.7
7/5/18 1:00 AM	57.5	83.3	58.9	82.2	56.5	80.4

Seattle Arena Redevelopment Project
Noise Management and Mitigation Plan
Appendix A: Sound Level Measurement Data

Day/Time	SLM1 Expo		SLM2 Astro		SLM3 Expo	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
7/5/18 2:00 AM	51.5	68.9	54.1	73.3	49.2	70.9
7/5/18 3:00 AM	52.3	69.9	54.0	71.7	50.8	73.2
7/5/18 4:00 AM	52.5	72.2	53.7	69.7	52.5	78.9
7/5/18 5:00 AM	55.3	80.4	57.8	84.0	58.5	92.7
7/5/18 6:00 AM	55.7	69.8	58.8	85.6	57.2	82.0
7/5/18 7:00 AM	58.1	82.3	59.4	74.9	60.6	87.0
7/5/18 8:00 AM	57.3	71.2	60.2	78.3	58.5	80.9
7/5/18 9:00 AM	58.1	73.5	61.3	83.1	61.0	85.0
7/5/18 10:00 AM	63.3	86.0	65.2	96.3	66.4	88.0
7/5/18 11:00 AM	65.8	96.9	66.9	97.8	58.6	87.7
7/5/18 12:00 PM	58.9	77.7	60.6	84.9	59.0	79.7
7/5/18 1:00 PM	58.7	76.3	61.4	84.6	59.0	83.2
7/5/18 2:00 PM	58.7	78.8	60.9	80.5	58.4	79.8
7/5/18 3:00 PM	59.6	77.4	63.9	92.7	68.9	102.9
7/5/18 4:00 PM	59.9	80.6	62.3	85.3	58.3	84.2
7/5/18 5:00 PM	60.5	82.9	63.4	88.1	60.3	83.7
7/5/18 6:00 PM	58.6	72.4	61.3	82.6	58.4	79.3
7/5/18 7:00 PM	58.3	81.2	63.3	91.6	55.0	76.9
7/5/18 8:00 PM	58.2	77.5	59.1	73.8	62.3	95.1
7/5/18 9:00 PM	57.2	75.3	59.5	78.9	55.3	83.6
7/5/18 10:00 PM	56.8	70.2	58.7	76.9	53.0	70.0
7/5/18 11:00 PM	55.1	69.2	58.4	77.6	60.9	95.2
7/6/18 12:00 AM	53.6	67.9	57.2	72.3	60.5	82.5
7/6/18 1:00 AM	52.6	70.5	56.0	72.4	52.1	66.2
7/6/18 2:00 AM	52.2	72.2	55.0	70.1	54.5	85.4
7/6/18 3:00 AM	51.4	63.6	54.3	70.0	51.6	67.1
7/6/18 4:00 AM	53.5	67.4	55.2	73.1	53.2	72.0
7/6/18 5:00 AM	55.9	77.7	57.1	78.7	54.7	82.7
7/6/18 6:00 AM	57.1	75.0	58.8	75.2	55.7	74.1
7/6/18 7:00 AM	57.7	73.1	59.8	73.9	61.9	83.2
7/6/18 8:00 AM	59.4	80.4	62.8	81.6	63.9	95.3
7/6/18 9:00 AM	62.6	79.7	61.4	77.9	60.5	81.2
7/6/18 10:00 AM	59.4	87.1	61.7	86.6	59.1	89.4
7/6/18 11:00 AM	67.2	88.1	64.3	85.8	62.7	87.8
7/6/18 12:00 PM	61.0	80.3	62.8	82.7	58.5	80.0
7/6/18 1:00 PM	58.8	75.7	61.0	76.6	58.9	78.2
7/6/18 2:00 PM	60.2	78.4	61.6	77.3	60.4	80.0
7/6/18 3:00 PM	60.2	90.0	60.7	77.4	58.0	76.2
7/6/18 4:00 PM	60.1	81.0	61.2	79.7	58.9	80.3
7/6/18 5:00 PM	60.7	79.0	62.4	83.2	59.4	76.4
7/6/18 6:00 PM	62.7	78.2	61.6	86.7	59.2	77.6

Seattle Arena Redevelopment Project
Noise Management and Mitigation Plan
Appendix A: Sound Level Measurement Data

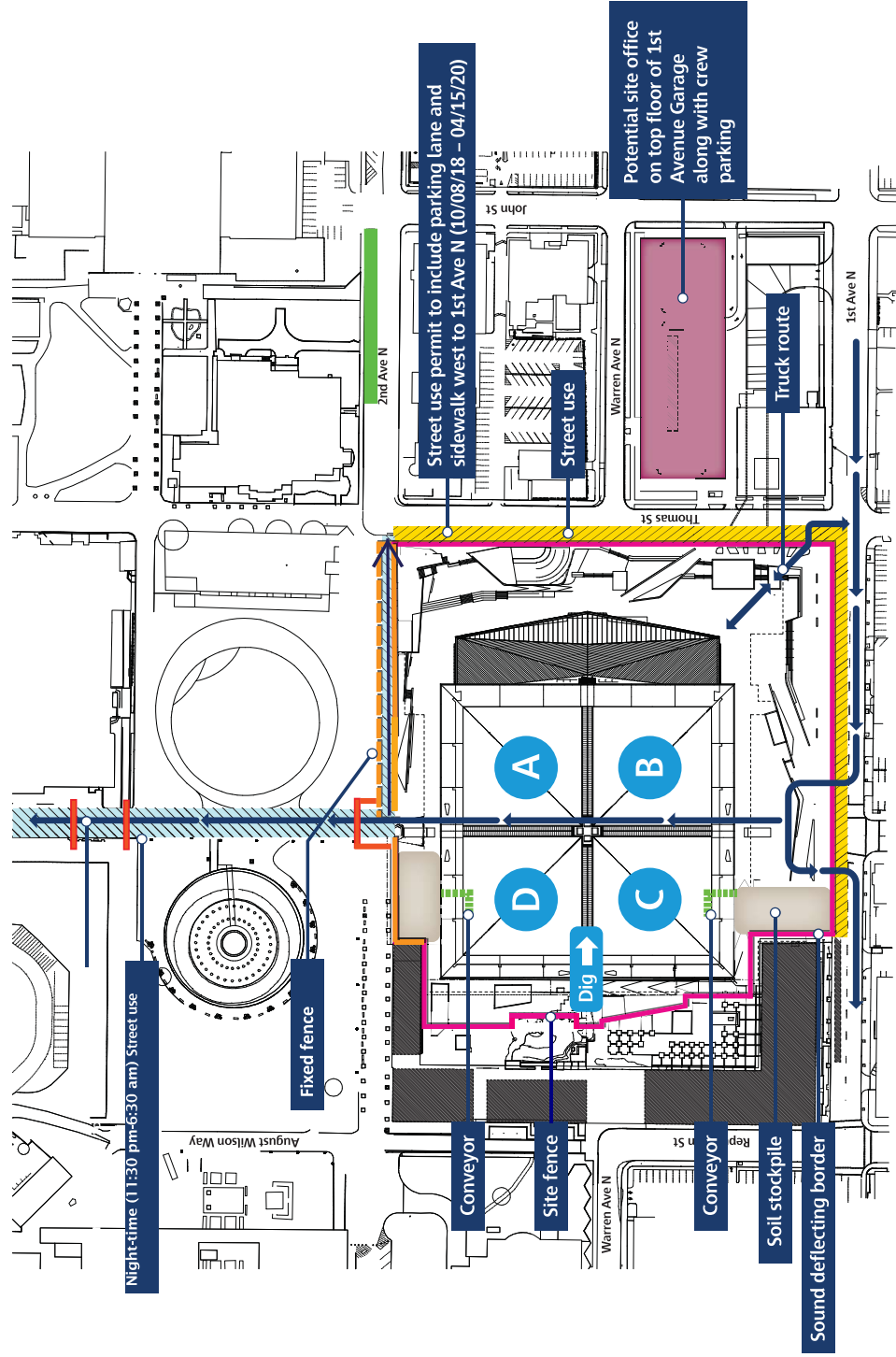
Day/Time	SLM1 Expo		SLM2 Astro		SLM3 Expo	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
7/6/18 7:00 PM	63.3	78.7	61.1	74.3	58.6	77.8
7/6/18 8:00 PM	62.1	84.3	65.4	95.0	57.1	80.5
7/6/18 9:00 PM	61.3	83.5	60.5	82.6	57.9	77.3
7/6/18 10:00 PM	58.0	71.3	59.4	77.6	57.2	76.9
7/6/18 11:00 PM	57.8	77.9	59.6	77.4	57.7	79.8
7/7/18 12:00 AM	57.4	74.0	58.6	75.4	55.8	79.5
7/7/18 1:00 AM	56.2	81.9	57.6	78.1	53.8	75.3
7/7/18 2:00 AM	53.5	68.0	56.3	73.2	54.1	77.6
7/7/18 3:00 AM	53.2	68.5	56.5	76.0	70.9	81.6
7/7/18 4:00 AM	53.7	70.7	54.8	73.3	72.3	81.9
7/7/18 5:00 AM	54.6	67.8	57.1	74.8	67.4	82.7
7/7/18 6:00 AM	55.5	70.2	59.4	79.8	68.1	87.9
7/7/18 7:00 AM	57.0	84.4	59.2	80.7	68.2	104.5
7/7/18 8:00 AM	57.0	76.0	59.9	76.0	67.4	98.6
7/7/18 9:00 AM	64.0	85.7	65.0	84.6	65.8	85.4
7/7/18 10:00 AM	59.5	82.7	62.6	87.8	70.8	100.4
7/7/18 11:00 AM	61.9	87.4	68.6	95.8	62.3	89.2
7/7/18 12:00 PM	61.1	84.8	62.2	81.2	60.4	78.1
7/7/18 1:00 PM	59.9	82.8	62.2	80.1	63.1	78.3
7/7/18 2:00 PM	59.9	82.2	62.3	83.1	61.7	80.9
7/7/18 3:00 PM	62.4	87.7	67.1	95.9	62.1	81.2
7/7/18 4:00 PM	59.7	74.6	62.3	85.8	63.3	80.7
7/7/18 5:00 PM	61.1	77.0	63.0	76.1	67.8	80.6
7/7/18 6:00 PM	64.6	90.9	62.5	81.7	64.1	79.6
7/7/18 7:00 PM	60.9	77.9	62.4	80.0	64.0	83.2
7/7/18 8:00 PM	61.8	92.7	62.0	81.0	62.5	82.6
7/7/18 9:00 PM	60.3	73.6	62.4	80.2	62.7	81.9
7/7/18 10:00 PM	59.8	79.0	60.7	80.6	60.6	73.8
7/7/18 11:00 PM	60.3	79.8	62.2	77.8	60.4	85.3
7/8/18 12:00 AM	57.2	72.6	60.6	76.5	57.8	90.1
7/8/18 1:00 AM	55.4	89.4	60.7	83.8	57.4	81.1
7/8/18 2:00 AM	55.2	72.4	59.3	79.1	52.0	68.7
7/8/18 3:00 AM	54.3	69.7	56.1	70.1	51.4	76.7
7/8/18 4:00 AM	54.9	71.6	56.6	78.3	51.5	75.5
7/8/18 5:00 AM	59.6	82.6	56.8	72.2	53.1	69.5
7/8/18 6:00 AM	57.0	71.9	58.0	75.4	53.9	76.2
7/8/18 7:00 AM	57.3	72.0	58.4	76.7	54.3	73.3
7/8/18 8:00 AM	58.6	85.8	61.4	89.7	66.0	85.3

APPENDIX B: SITE LOGISTICS PLAN

Phase 1

Legend

- Site fence
- Fixed fence (at C/L of vacated 2nd Ave N)
- Sound deflecting border
- Potential site office with parking
- Dig order
- Truck route
- Street use on Seattle Center property
- Street use
- Soil stockpile
- Conveyor
- Potential truck queue to enter the site during night-time hauling
- Crosswalk with flagger to control pedestrian flow



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Seattle Center Arena

Phase 1
Excavation/Demolition (Interior)
10/2018 – 03/2019

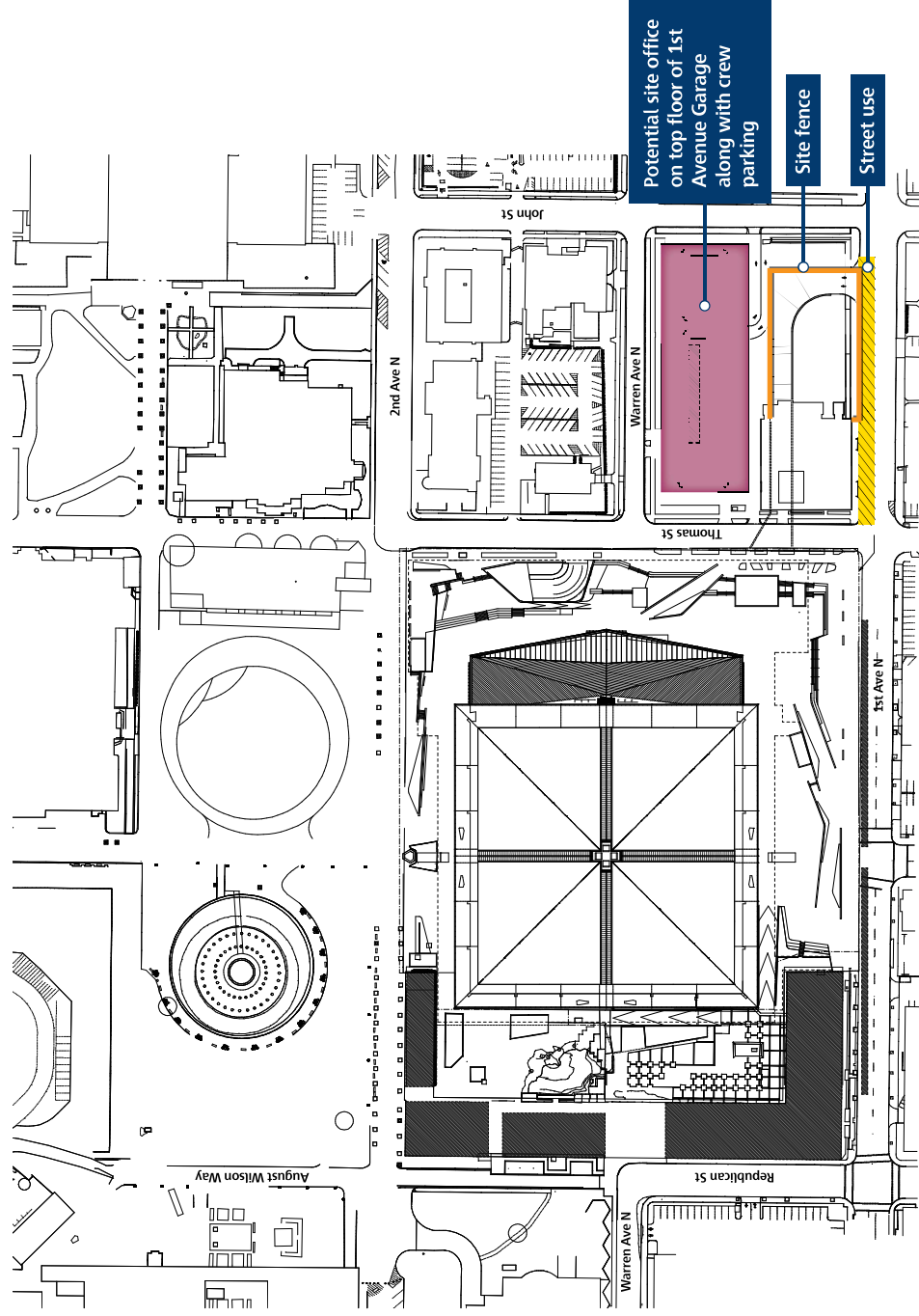


Scale: NTS

Phase 2

Legend

- Site fence
- Potential site office with parking
- Street use



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Seattle Center Arena

Phase 2
Tunnel
12/2018 – 07/2019

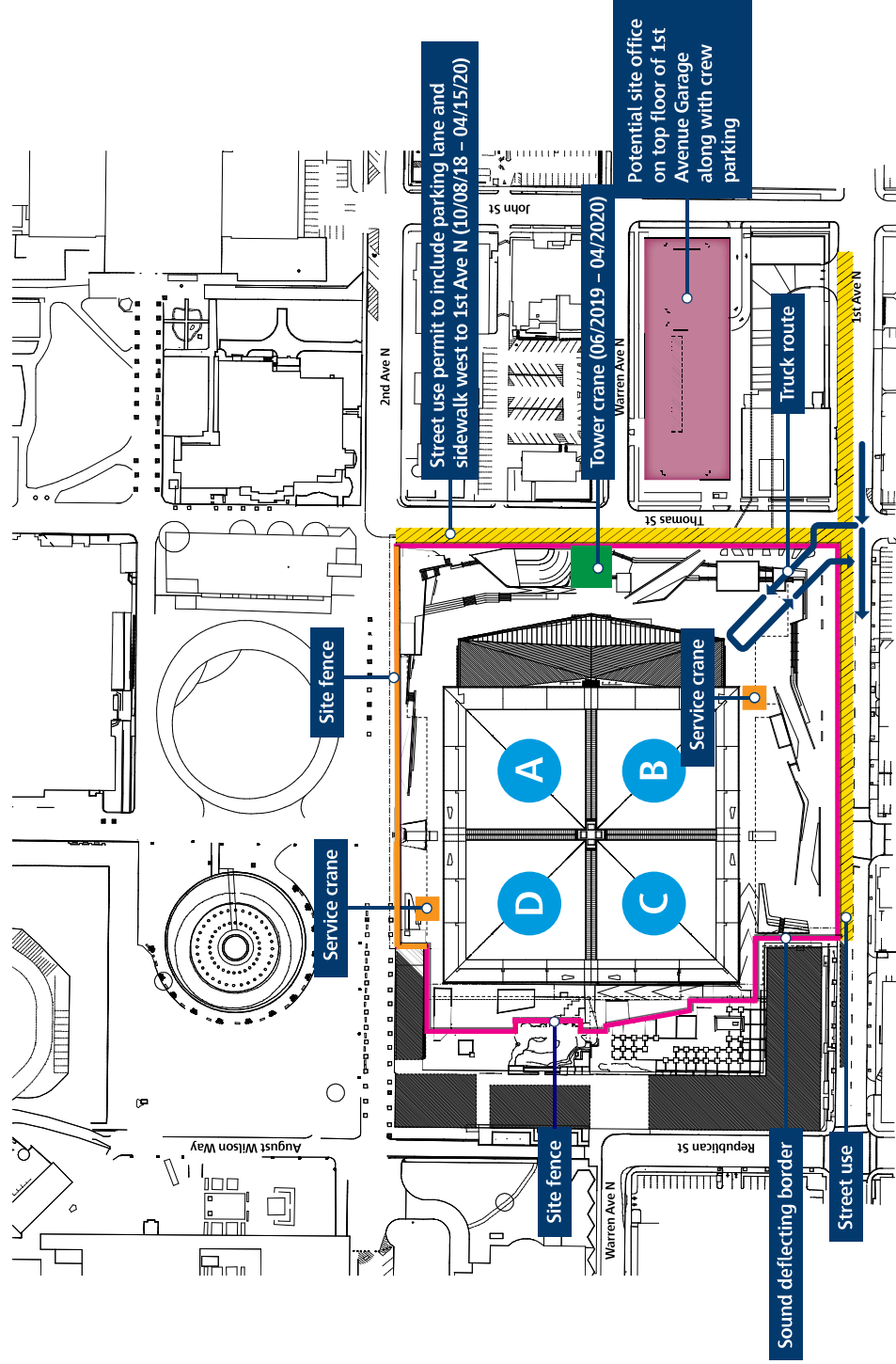


Scale: NTS

Phase 3

Legend

- Site fence
- Sound deflecting border
- Potential site office with parking
- Ⓐ Dig order
- ↑ Truck route
- Service crane
- Tower crane
- Street use



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Seattle Center Arena

Phase 3
Structure I
01/2019 – 08/2019

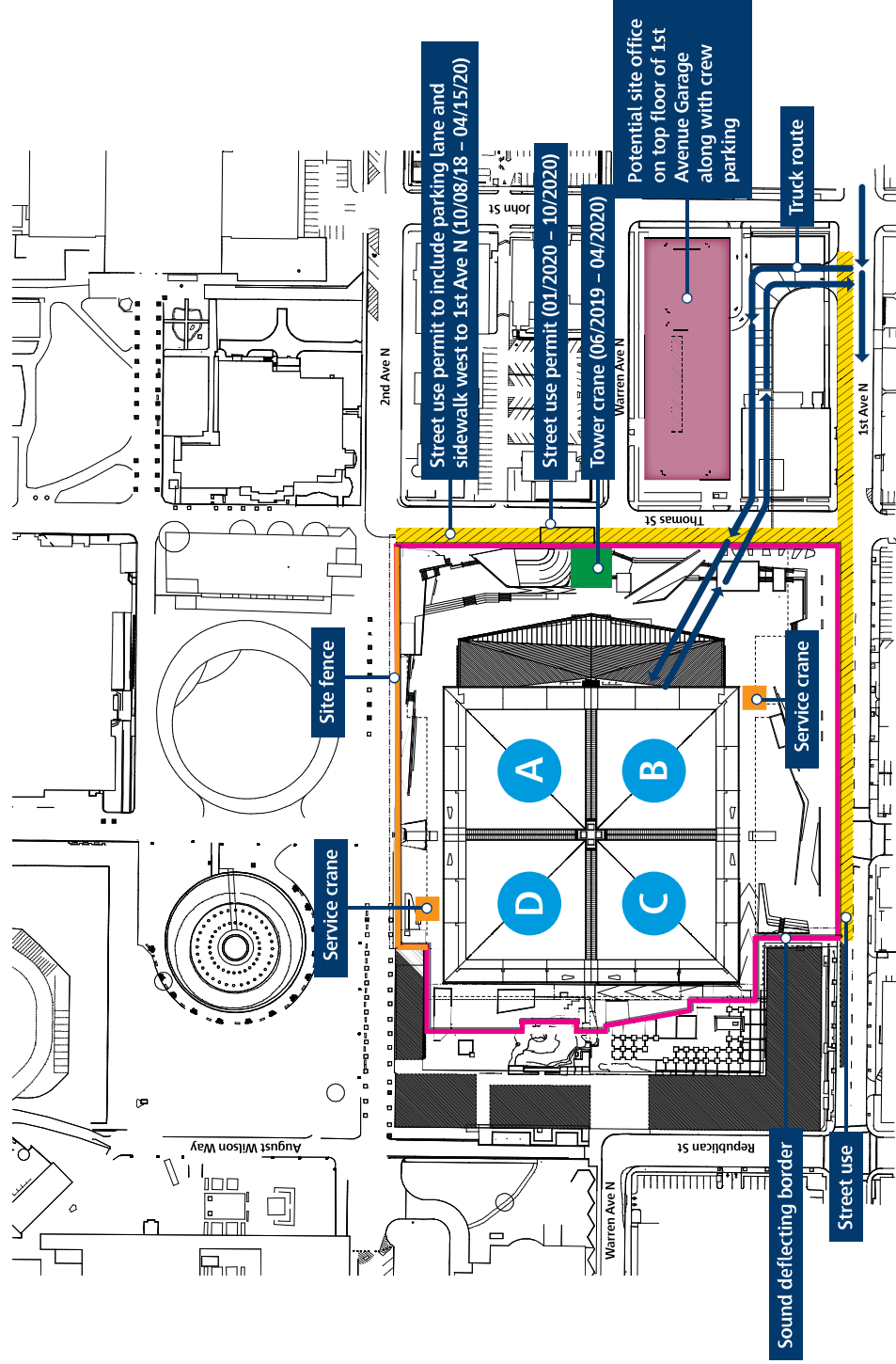


Scale: NTS

Phase 4

Legend

- Site fence
- Sound deflecting border
- Potential site office with parking
- Dig order
- ↑ Truck route
- Service crane
- Tower crane
- Street use



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Seattle Center Arena

Phase 4
Structure II and Interiors
09/2019 - 09/2020



Scale: NTS