SOUNDTRANSIT
Central Puget Sound
Regional Transit Authority

TECHNICAL NOISE VARIANCE APPLICATION

FOR NIGHTTIME CONSTRUCTION NOISE

Sound Transit University Link Light Rail

For Tunnel Construction at the University of Washington Site

University Link Contract U220

December 2, 2008

Revised March 16, 2009
(Sections 5 and 6)

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1.0 INTRODUCTION/OVERVIEW

Sound Transit is seeking a Technical Noise Variance ("TNV") from the City of Seattle's Noise Ordinance to allow for aboveground construction activities in support of tunneling operations, including truck hauling activities, during the nighttime hours for the University Link Light Rail Project at the University of Washington Station ("UWS") site (hereinafter, "the Site"). This work will be performed under Sound Transit Contract U220. Sound Transit requires a variance from the nighttime noise limits from the Seattle Municipal Code ("SMC"), Chapter 25.08, Noise Control, Section 25.08.425, in order to allow aboveground construction activities in support of tunnel construction to proceed in a safe and timely manner. The TNV would permit certain construction activities during nighttime hours from 10 p.m. to 7 a.m. on weekdays, and from 10 p.m. to 9 a.m. on weekends and/or holidays as summarized in Section 2.0 of the TNV application.

The University Link Project encompasses approximately 3.15 miles of double-track light rail transit alignment extending from the existing Pine Street Stub Tunnel ("PSST") northward to the University of Washington campus next to Husky Stadium. The University Link alignment is routed in twin-bored tunnels with two underground cut-and-cover stations: one at Capitol Hill at Broadway and E. John Street, near Seattle Central Community College and the other at the University of Washington near Husky Stadium and the Medical Center (the site of this application). The tunnels will be mined using closed face Tunnel Boring Machines ("TBM") in four separate drives: two drives starting from the Capitol Hill Station ("CHS") site and ending at the PSST; and two from the UWS site ending at the CHS site. Site excavation and construction of the tunnel at the UWS site will be performed under Sound Transit Contract U220. It is anticipated that site excavation will start in early 2010 with tunnel construction beginning 12 -15 months later for a period of approximately 24 months. Anticipated completion and revenue start-up of University Link light rail service is expected in 2016.

The TBMs need to be operated on a 24-hour basis, not only for purposes of economy, but also to minimize surface settlements, most probably with one week-end day stopped for necessary machine maintenance. As a secondary benefit, granting the variance will permit the project to be completed more quickly, reducing the overall construction time and associated impacts. Conditions imposed as part of the variance process will ensure that the public and those likely to be affected by the noise will be appropriately protected, and that noise impacts will be minimized. Many of these noise control conditions will also provide noise reduction benefits during all hours of construction.

Sound Transit's application includes a detailed technical noise analysis and proposed noise mitigation measures to effectively reduce sound levels to nonsignificant levels. Sound Transit completed a technical noise analysis as part of the April 2006 Final Supplemental Environmental Impact Statement ("FSEIS") for North Link. An updated noise analysis was recently prepared for Sound Transit by the Greenbusch Group for the U220 Contract in a report titled *Technical Noise Analysis and Recommended Mitigation Plan* ("Greenbush Report") dated December 2, 2008. A summary of the Greenbusch

Report is provided in Section 3 of this TNV application. The entire Greenbusch Report is attached to this application in Appendix 1.

2.0 REQUEST FOR TECHNICAL NOISE VARIANCE

2.1 Summary of Request

Sound Transit requests a TNV to allow nighttime noise during construction of the University Link tunnel at the UWS site. Specifically, the TNV is required to exceed the allowable nighttime construction noise limit of 45 dBA specified in SMC 25.08.(Note: The underlying zoning of the construction site is Residential, Multifamily Midrise (MR). The site is also within the University of Washington Major Institution Overlay (MIO) District) The tunnel construction will generate above-ground noise emanating from on-site equipment used to support the underground tunneling and from on-site truck hauling operations involved in the transporting of spoils (also referred to as "muck") from the tunnel excavation. A map showing the location of the project site area and the immediate surrounding land uses is shown on Figure 1. The variance would apply to above-ground tunnel construction activities, including associated truck hauling within the site, weekdays between the hours of 10 p.m. and 7 a.m. and weekends and/or holidays between the hours of 10 p.m. and 9 a.m. This application for a TNV is made pursuant to SMC Sections 25.08.560 through .650. Daytime construction activities are not subject to this variance.

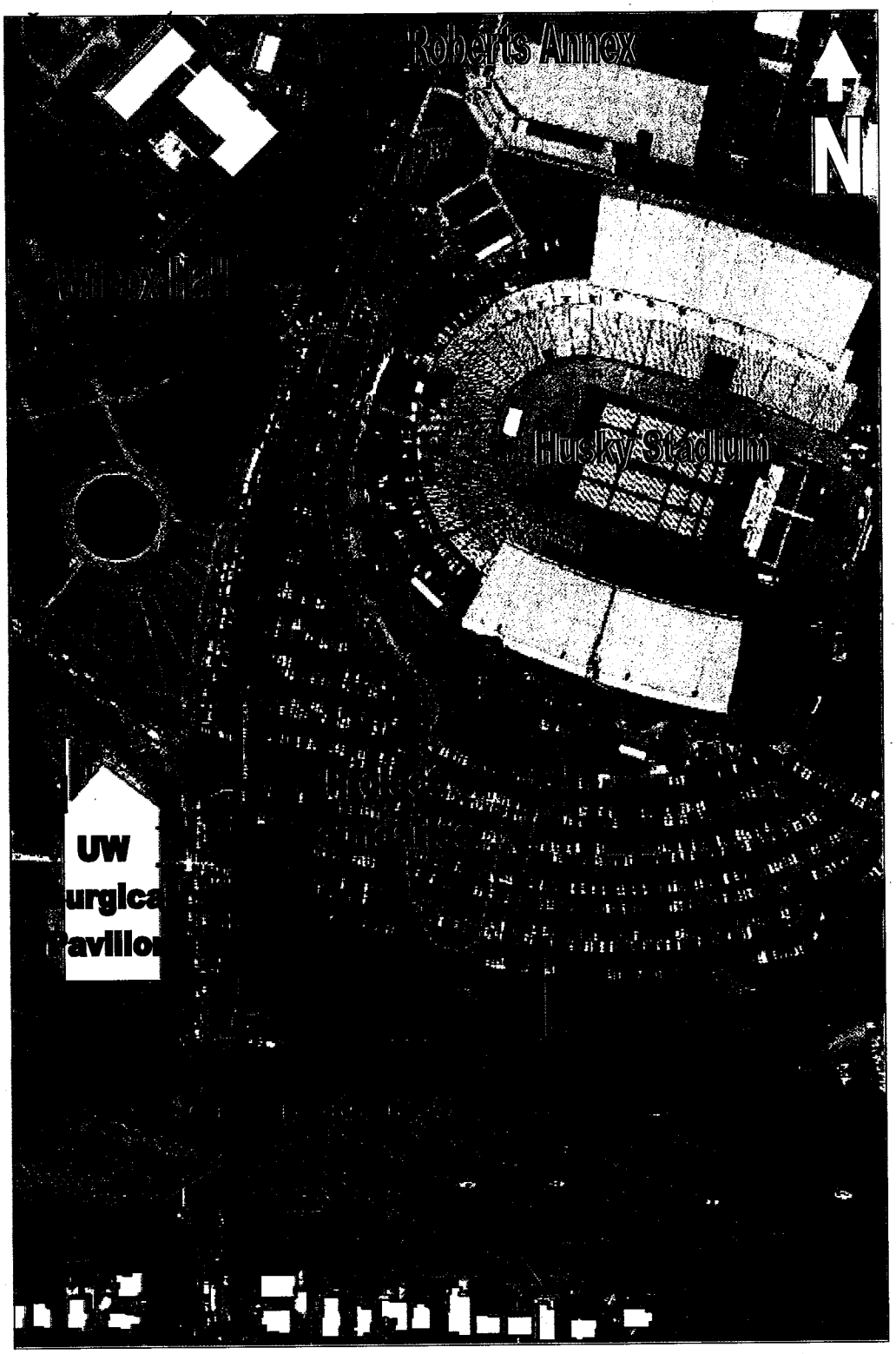
Sound Transit recommends that Seattle's Department of Planning and Development ("DPD") adopt the proposed mitigation measures and public outreach programs stated in this TNV application as conditions of approval of the noise variance, specifically Section 4 (Contractor Requirements), Section 5 (Noise Variance Compliance Tracking) and Section 6 (Public Outreach and Community Involvement). As stated in Section 4.5 of this application, prior to commencement of nighttime construction at the site, Sound Transit's Contractor would prepare a Construction Noise Management and Mitigation Plan ("The Plan") which would include prescriptive specifications for noise mitigation, noise management, and noise monitoring at the construction site. Sound Transit will require its Contractor to implement these measures to ensure compliance with the nighttime noise limits established in the approved noise variance and the Plan. The Plan would also be subject to review and approval by DPD prior to commencement of nighttime construction activities. The Plan could be updated on an as-needed basis during the duration of the construction period.

The preparation, implementation and maintenance of the Plan provide many benefits, including:

- Identifies noise sensitive land uses that would be affected during nighttime construction activities.

- Measures existing sound levels at the construction site and describes the expected characteristics of the construction noise.

Figure 1 Project Site Plan



Source: Northlink Transit Partners

- Allows comparison of anticipated nighttime noise limits with existing ambient sound levels.

- Describes the activities that would occur and equipment that would be used during different types of major construction activities.

- Implements measures to enforce and monitor the Contractor's activities during the life of the Project.

- Implements measures to control and minimize potential noise and vibration impacts that would be specified in the Contract.

- Implements a program for public complaint monitoring and resolution for Sound Transit and the Contractor.

A technical noise variance is available under the SMC where the applicant demonstrates that the noise will not "endanger public health or safety" and where i) there are "no practical means known or means available for the adequate prevention, abatement or control of the noise involved"; and ii) "alternative measures" for controlling noise will be undertaken. This application includes the required demonstrations and detailed alternative measures for controlling noise. A public hearing is required pursuant to SMC 25.08.590, following appropriate public notice, before a TNV may be granted by DPD.

2.2 Extent and Duration of the Variance

The TNV would be in effect for the duration of the construction activity for the tunneling operations at the UWS site. According to the latest anticipated project construction schedules for the U220 Contract, construction of the tunnel will take approximately twenty-four (24) months to complete, extending from approximately early to mid- 2011 until early to mid- 2013. Contractors for Sound Transit, the City of Seattle, public and private utilities, or other project participants may perform nighttime construction work if the work is performed within the UWS construction site covered by this TNV.

Advance utility work, demolition of structures, excavation of the station box, crossover facility and construction of station finishes at the UWS site are all expected to occur during daytime hours and will not be included in this technical variance. Seattle City Light utility ductbank work occurring outside the limits of the main construction staging area for the tunnel work tunnel construction site may occur at night. However, because of the short duration of time needed to complete this work, this construction activity would also not be covered by this technical variance. Temporary noise variances, if required for such nighttime construction activities, will be separately obtained where needed for this off-site work by the different contractors performing the work.

2.3 Public Benefits

The prime benefit of constructing the tunnel on a continuous 24 hours-a-day basis is to allow excavation and support of the tunnel in the safest way practical, and to minimize

surface settlements and potential resulting damage to the built environment. Specifically, the variance to the noise ordinance is required to allow the necessary surface-level support work for the continuous underground tunneling operations. However, an additional benefit is that the continuous tunneling operations will result in earlier completion of the Project which will also bring major public transportation and other benefits to all of the populations it serves. These benefits are described in the Central Link Light Rail Project Final EIS, published November 1999 and the North Link Final SEIS, published in April 2006. The sooner the Project is completed, the sooner these benefits are available to the public.

Another important public benefit to consider is the allowance for nighttime truck hauling of tunnel spoils that must be disposed off-site. Due to transportation safety considerations, existing and proposed alternative site access issues, and current levels of service in the Montlake Boulevard corridor, Sound Transit has concluded the safest and most efficient way to allow truck movements in and out of the site is to do so during non-peak hour traffic.

The variance will also save substantial construction time by allowing for nighttime work. Saving time produces certain benefits, including:

Substantial cost savings for the public. A shorter construction period has clear effects on costs: reduced administrative expenses, reduced length of construction time needed for equipment and personnel, and savings on the inflation that would otherwise compound the cost of construction in later years.

Reduction of overall construction inconvenience. The variance would allow for a condensed construction schedule, which would not only lessen duration of construction impacts in and around the University campus area, but other associated environmental impacts such as traffic and noise on nearby residents, businesses, and other affected entities.

Reduction of certain disruptions associated with peak-hour daytime work. With the approval and issuance of a technical noise variance, some of this work can be shifted to off-peak hours, reducing overall impacts.

In addition, the noise control mitigation measures established for nighttime construction activities will also provide a direct benefit to the University and adjacent property owners by reducing the overall level of construction noise coming from the construction site. The mitigation measures proposed, such as the construction screening walls and quiet equipment, will be in place 24 hours per day, 7 days a week. This is a benefit that would not otherwise be obtained without the variance.

2.4 No Endangerment to Public Health and Safety

The land uses immediately adjacent to the construction site are all within the University of Washington campus and include Husky Stadium to the east, educational buildings and other University athletic facilities to the north, an underground parking facility and plaza to the west, surface parking to the southeast, and the University Medical Center and

Surgery Pavilion to the southwest. Residential land uses are located to the south, south of the Lake Washington Ship Canal. See Figure 1.

Before granting a variance, the City must determine that the sound levels allowed by the variance will not endanger public health and safety. The nighttime sound levels allowed by the variance will be below the Occupational Safety and Health Act (OSHA) limit of 90 dBA for hearing damage, and under 85 dBA, the threshold of risk for potential hearing loss identified by U.S. Environmental Protection Agency. As described in this application, the nighttime sound level limits are well below the threshold of federal concern. For example, nighttime noise limits are expected to be 65 dBA near the University of Washington Medical Center and between 56 and 59 dBA near the closest residences to the UWS site.

3.0 SUMMARY OF TECHNICAL NOISE ANALYSIS

The following is a summary of the technical noise analysis contained in the December 2, 2008 Greenbusch Report, including a description and analysis of: 1) existing ambient sound levels adjacent to the project site area; 2) proposed nighttime, construction activities; and 3) predicted sound levels for nighttime construction activities.

3.1 Existing Ambient Conditions

The object of measuring existing sound levels is twofold. First, the measurements provide baseline information, which is required in establishing the noise environment to which a community is currently exposed. Second, existing sound level measurements are used as a baseline against which the surface level construction-generated noise will be assessed in the Technical Noise Variance.

The existing sound level measurements and data used for this technical noise variance application were obtained from the September 27, 2005 *North Link Construction Noise Study* (2005 Noise Study) prepared by the Puget Sound Consultants which was a technical back-up report included in the April 2006 Final Supplemental Environmental Impact Statement (FSEIS) for North Link. This study was also included as a Technical Background Report in the North Link Final Supplemental Impact Statement published by Sound Transit in April 2006.

The 2005 Noise Study measured existing ambient sound levels at each of the three University Link construction sites (Capitol Hill Station, University Station and Pine Street Staging Area) at representative nighttime noise sensitive land uses close to each construction site during November and December of 2004. Twenty-four hour existing sound level measurements were conducted on two consecutive days at each measurement site. Ambient sound level measurements for the area surrounding UWS site were taken at the following locations and dates:

- UW Surgical Pavilion (December 15-16, 2004)
- Single family residence located at 1882 Shelby Street (November 10-11, 2004)

The measured ambient sound levels reported in the Greenbusch Report are summarized in Table 3.1 below. This table lists both the existing average nighttime sound levels between 10:00 p.m. and 7:00 a.m.("nighttime hours" as defined by the Seattle Noise Code) and the average sound levels between 12:00 a.m. and 5:00 p.m., a slightly more quieter time period. For purposes of analysis in this variance application, the quieter time period between 12:00 a.m. and 5:00 a.m. is used described the existing ambient nighttime conditions. The approximate locations of where these measurements were taken, relative to the proposed U220 Construction site configuration, are shown in Figure 1. Full hourly measurement data is included in Appendix Tables A1 and A2 of the Greenbusch Report.

It is important to note that existing Ambient Sound levels measured at nighttime exceed the Seattle Noise Code Limits of 45 dBA as provided in S.M.C. 25.08.420 at both receptor locations. A full discussion of Seattle Noise Code limits is provided in Section 4 of the Greenbusch Report.

Table 3.1. Pre-Construction Ambient Sound Levels-University of Washington Station, L_{eq}, dBA re: 20 µPa

Location	**Average Daytime Noise Level (7:00 a.m. – 10:00 p.m.) L_{eq}[1]**	**Average Nighttime Noise Level (10:00 p.m. – 7:00 a.m.) L_{eq}[1]**	**Average Nighttime Noise Level (12:00 a.m. – 5:00 a.m.) L_{eq}[1]**
UW Surgical Pavilion, top floor	70.0	65.6	62.0
1882 Shelby Street,ground floor	61.0	56.6	54.0

1. Average values calculated by The Greenbusch Group from hourly data reported by Puget Sound Transit Consultants.
Source: North Link Construction Noise Study, September 27, 2005; Puget Sound Transit Consultants

3.2 Proposed Nighttime Construction Equipment and Activities

All proposed nighttime construction activities at the UWS site are related to the construction of the underground tunnel from UWS to Capitol Hill (referred to as Phase 2B in the Greenbusch Report). Excavated material, commonly referred to as "muck", generated by the TBMs will be transferred from the tunnel portal (south wall of the U220 excavation) to muck bins east of the U220 Excavation at the lowered ground surface level at the elevation of 53 feet. The most likely muck transfer approach to be used on the site will deliver the muck from the tunnel to the elevation 53 feet level using muck cars running on rails. The muck cars would be lifted from the excavation using vertical hoist cranes and their contents dumped into two muck bins at the elevation 53 surface level. Two loaders would be used to load muck into the haul trucks for removal from the site. This approach was analyzed in the Greenbusch Report as a "worst case scenario for the purposes of the noise analysis. The muck transferal system is a Contractor means and methods alternative and will not be specified in the contract documents by Sound Transit.

The equipment included and analyzed in the Greenbusch Report for Nighttime Phase 2B work is outlined in Table 3.2 below with locations of the sound generating equipment and the work being done shown in Figure 2. The location of equipment near the southern end of the site is considered a conservative evaluation of sound pressure levels generated by the project.

Table 3.2 Nighttime (Phase 2B) Construction Equipment

Equipment[2]	Specification 721.560 Sound Level, dBA	Acoustical Usage Factor[3], %	Impact Device[4]?
Mounted impact hammer	90	20	Yes
Auger drill rig	85	20	No
Hydromill[5]	82	50	No
Small backhoe	80	40	No
Dozer	85	40	No
Front-end loader	85	40	No
Excavator	85	40	No
Crane	85	16	No
Air compressor	80	40	No
Generator	82	50	No
Dump truck	84	40	No
Drill rig truck	84	20	No
Concrete mixer truck	85	40	No
Concrete pump truck	82	20	No
Concrete batch plant	83	15	No
Slurry plant	78	100	No
Concrete saw	90	20	No
Pumps	77	50	No
Ventilation fans (6)	70[6]	100	No
Backup warning alarm	85	5	No

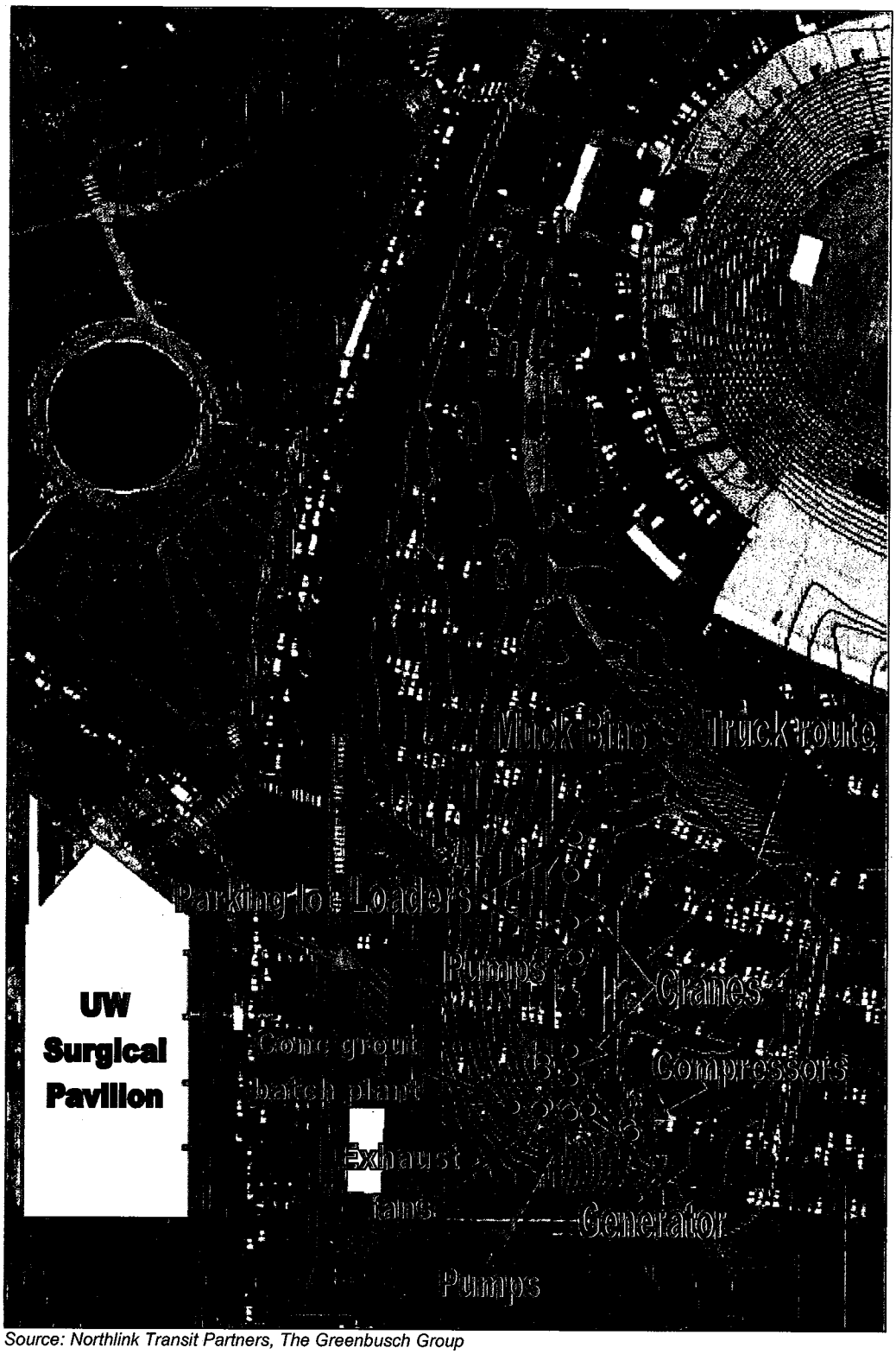
1. "Slow" time weighting at a distance of 50'
2. Generic equipment titles are listed, specific equipment descriptions are provided in Section 6.3.
3. Percent of time in each hour equipment generates sound.
4. Creates impact sound subject to additional Code limits delineated in SMC 25.08.425.
5. Used sound level for "Slurry Trenching Machine."
6. Calculated from sound power level provided by fan manufacturer, did not use FHWA spec sound pressure level.

Source: FHWA Specification 721.560

3.3 Predicted Sound Levels for Nighttime Construction Activities

The Greenbusch Report contains computer-generated noise model results for the proposed nighttime construction activities and equipment as described in Section 3.2

Figure 2 Nighttime Noise Model Equipment Locations (Phase 2B)



Source: Northlink Transit Partners, The Greenbusch Group

above. Model outputs for Sound Levels expected at each of the 5 receptors indicated in Figure 1 were tabulated and averaged into Predicted Sound Levels. These 5 locations represent worst case receptors for the project, all of which are shown in Figure 1.

Existing ambient sound levels, predicted average construction sound levels, and the nighttime Code limits for Phase 2B activities are summarized in the tables below. Table 3.3 includes all proposed nighttime construction activities, including on-site trucking which is the largest single contributor to predicted nighttime construction sound levels. In an effort to identify the magnitude of this specific activity, the Greenbusch Report included two different model results for the nighttime activities for Phase 2B. Table 3.3 presents nighttime ambient sound levels, predicted average nighttime construction sound levels, excluding the contribution of ambient sound, for all on-site construction activities including on-site trucking, and the nighttime Code limits. Table 3.4 presents the same information except that the prediction is specific to the sound generated by the on-site trucking only.

Table 3.3 Predicted Nighttime Site Construction Activity Sound Levels, dBA re: 20 µPa

Receiving Property	Existing Ambient Level	Predicted Project Nighttime Sound Level	Nighttime Code Limit
UW Surgical Pavilion	62[1]	65	45
1882 E Shelby St.	54[1]	56	45
2132 E Shelby St.	54[2]	59	45
2907 E Montlake Blvd. NE	54[2]	56	45
2908 E Montlake Blvd. NE	54[2]	59	45

1. Calculated from hourly sound levels between 12:00 a.m. and 5:00 a.m. documented in the Construction Noise Study completed by Puget Sound Transit Consultants, dated 09/27/05

2. Existing ambient levels at this location have been assumed to be similar to the measured levels at 1882 E Shelby St

Source: The Greenbusch Group, Puget Sound Transit Consultants

Table 3.4 Predicted Nighttime On-Site Trucking Sound Levels, dBA re: 20 µPa

Receiving Property	Existing Ambient Level	Predicted Project Nighttime Sound Level	Nighttime Code Limit
UW Surgical Pavilion	62[1]	63	45
1882 E Shelby St.	54[1]	54	45
2132 E Shelby St.	54[2]	54	45
2907 E Montlake Blvd. NE	54[2]	53	45
2908 E Montlake Blvd. NE	54[2]	55	45

1.Calculated from hourly sound levels between 12:00 a.m. and 5:00 a.m. documented in the Construction Noise Study completed by Puget Sound Transit Consultants, dated 09/27/05

2.Existing ambient levels at this location have been assumed to be similar to the measured levels at 1882 E Shelby St

Source: The Greenbusch Group, Puget Sound Transit Consultants

Both Tables 3.3 and 3.4 indicate that the nighttime Code limit of 45 dBA are predicted to be exceeded during Phase 2B nighttime construction activities. However, they also show that the predicted sound levels at the receptors are generally consistent with existing average nighttime ambient sound levels between 10:00 p.m. and 7:00 a.m., and only slightly higher between 12:00 a.m. and 5:00 a.m. For this reason it will be very difficult to demonstrate compliance with the Noise Code primarily due to the fact that all measurements will show an exceedence. Using the quieter period between 12:00 a.m. and 5:00 a.m., the predicted construction sound levels without combining original ambient levels range between 2 and 5-dBA above ambient conditions. Combining the original ambient levels with the construction sound would result in approximately a maximum of 6-dBA increase at one of the receiving sites between 12:00 a.m. and 5:00 a.m. A 5-dBA increase has historically been considered a "slight impact" by the Environmental Protection Agency (EPA). A 6-dBA increase is considered a "significant impact" by EPA. (Note: For example, combining 54 and 59-dBA at 2908 Montlake Blvd. NE results in a total combined sound level of 60-dBA which is a 6-dBA increase. See Section 3.0 of the Greenbusch Report for discussion on addition of decibel levels.)

For detailed results of the model runs for Nighttime Phase 2B Construction Activity, see Figure 3 prepared by the Greenbusch Group which includes sound levels contours for Phase 2B nighttime activities.

4.0 CONTRACTOR REQUIREMENTS FOR NOISE MITIGATION

Sound Transit proposes that following requirements be implemented by the Contractor to mitigate construction noise for all nighttime activities that are authorized under this technical noise variance application. Sound Transit will incorporate the mitigation requirements stated below as mandatory contract specifications. Sound Transit requests that DPD adopt these mitigation requirements as a condition of TNV approval.

4.1 Mandatory Noise Control Measures

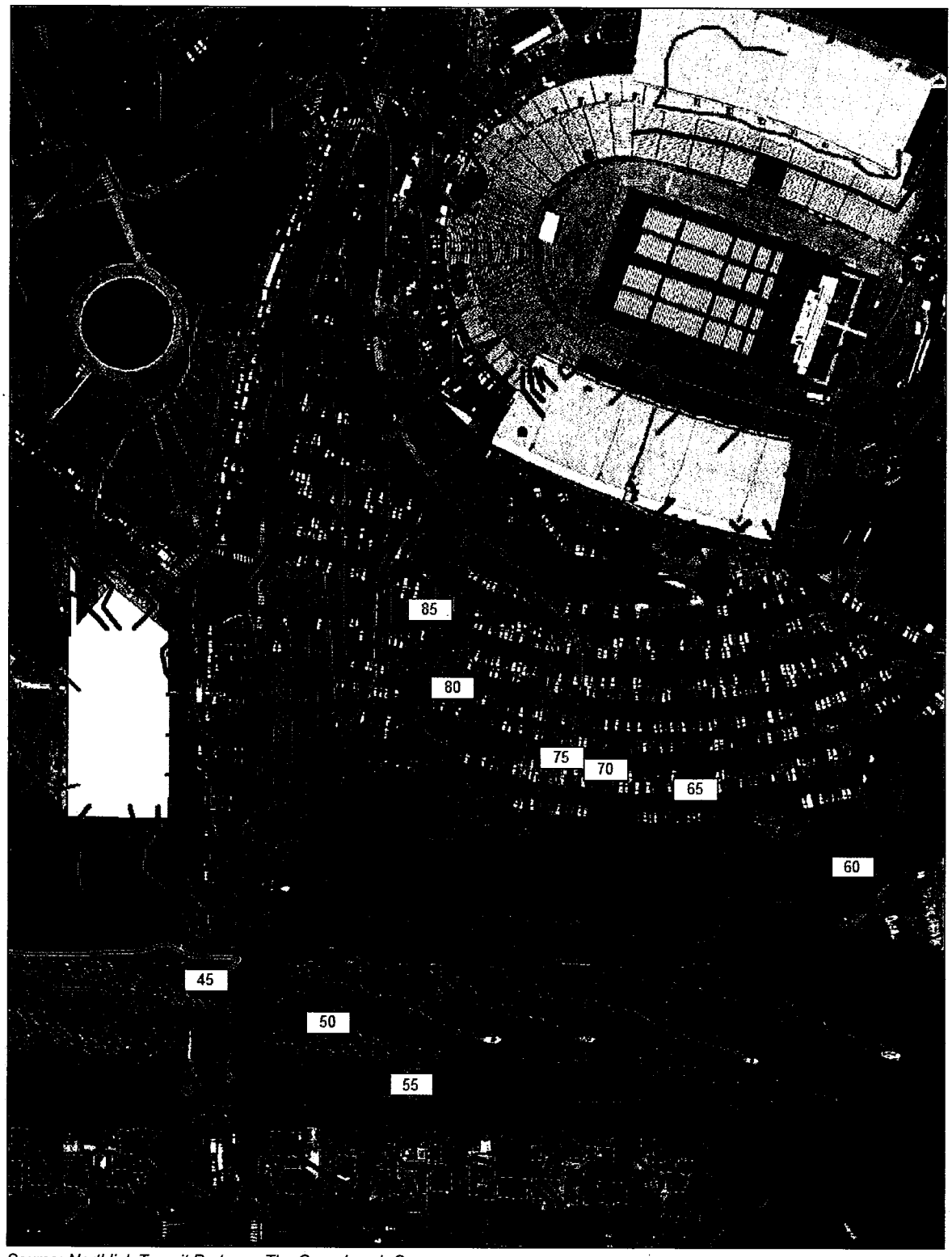
4.1.1 Construction Screening Wall

Prior to the commencement of nighttime construction activities at the UWS site, the Contractor shall construct the following construction screening walls:

- A solid 8-foot high wall made of 1/2" exterior grade plywood along the western side of the construction site and a portion of the southern site boundary as shown on Figure 4

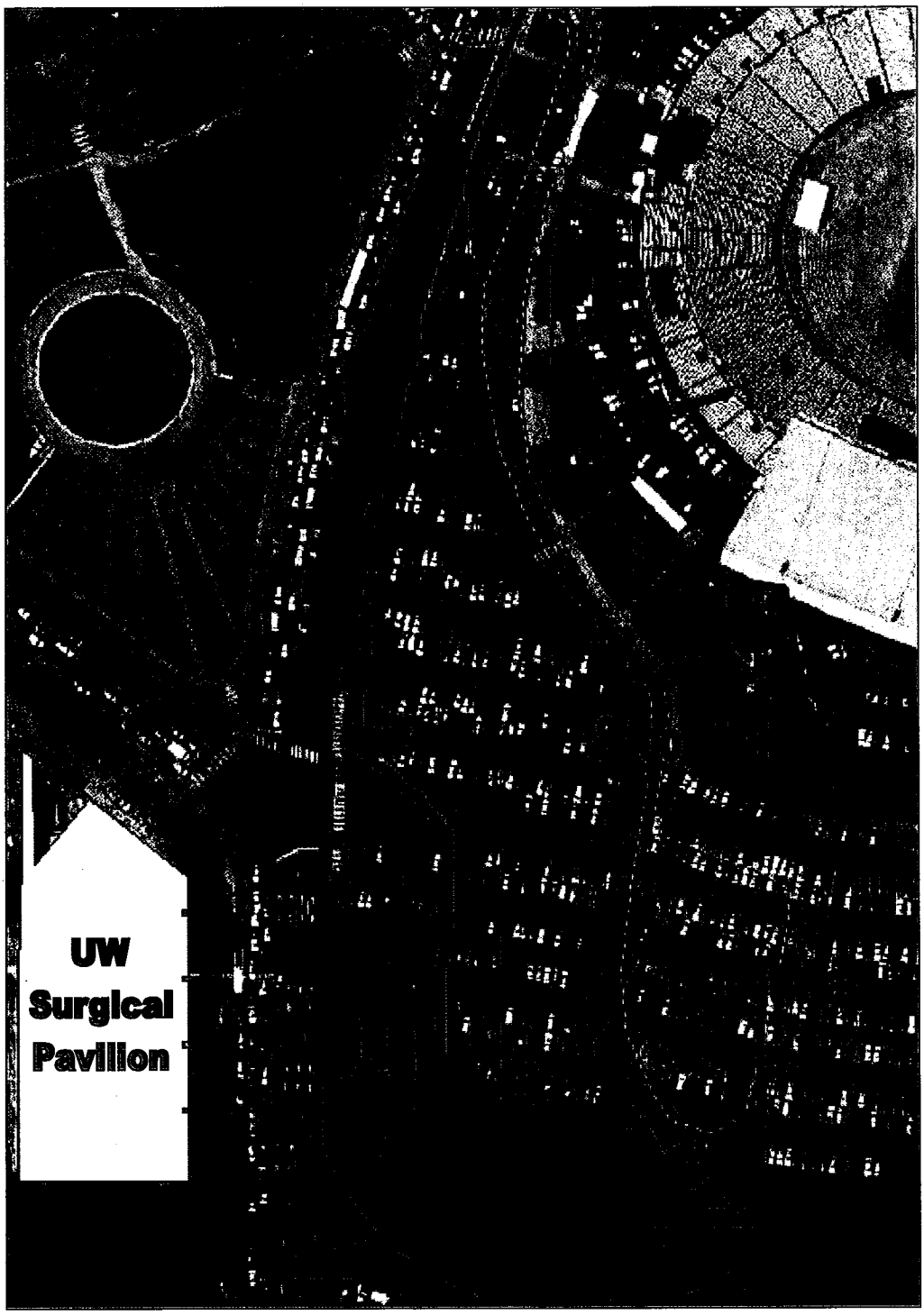
- A solid 12-foot high wall made of 1/2" exterior grade plywood south of the southern access road as shown in Figure 4

Figure 3 Nighttime Sound Level Contours (Phase 2B)



Source: Northlink Transit Partners, The Greenbusch Group

Figure 4 Solid Construction Walls



Source: Northlink Transit Partners

The construction screening walls described above will be constructed of material that will last for the duration of construction of the U220 Contract.

Gates and/or doors in the walls either hinged or rolling, shall be constructed of the same or equally effective material as the construction screening wall. Edges of the gates and doors shall overlap the wall to eliminate gaps. During nighttime hours, gates and doors will be kept closed, except for brief periods of time to allow truck and other vehicle ingress and egress to the construction site.

4.1.2 Nighttime Truck Operations

To minimize sound generated by nighttime haul trucks, the following mandatory contract requirements will be implemented:

- No compression (jake) brakes shall be used between the construction site and SR520 pursuant to SMC 11.84.070.
- All muck haul truck bins shall be lined with an appropriate damping compound to reduce impact sound from debris as it is loaded into the bins.
- No tonal backup alarms shall be used. Broadband backup alarms will be installed on all muck haul trucks used on site during both daytime and nighttime operations.
- Engines shall not idle for longer than 5 minutes while on site.

4.1.3 Nighttime Construction Site Equipment Vehicles

To minimize sound generated by construction vehicles operated during nighttime hours, the following mandatory contract requirements will be implemented:

- No tonal backup alarms shall be used. Broadband backup alarms will be installed on all site construction vehicles in operation both during daytime and nighttime hours.
- Equipment shall not idle un-used for longer than 5 minutes.

4.2 Nighttime Construction Sound Level Limits

The Greenbusch Report predicts that nighttime mucking operation sound levels will exceed City of Seattle nighttime Code limit of 45 dBA. The implementation of the proposed mitigation summarized in this TNV application will reduce project construction sound levels resulting in predicted sound levels that are generally consistent with documented ambient levels during the nighttime hours of 10:00 p.m. and 7:00 a.m. as defined by the Seattle Noise Code. Sound Transit is requesting a variance from permissible sound levels for nighttime mucking operations associated with the tunnel

construction based on existing ambient sound levels, as summarized in Table 4.1 below.(Note: for purposes of establishing the existing ambient nighttime sound level at receiving sites, the more quieter time period between 12:00 a.m. and 5:00 a.m. will be used.) Sound Transit proposes that the nighttime sound level limit for construction activities established under this TNV combined with existing nighttime ambient sound levels will not exceed the existing average ambient nighttime sound level (prior to construction) at each receiving property by more than 6 dBA, with a maximum sound level (Lmax) of 10-dBA over the proposed sound level requested in this TNV application.

The Contractor shall not exceed the nighttime sound level limits at the measurement locations specified below. The Contractor will be required to measure the existing nighttime sound levels (between 12:00 a.m. and 5:00 a.m.) at the receiving sites at least one month before nighttime construction begins. The locations of the receiving properties and sound level limits will be determined by DPD prior to the noise measurements of the pre-construction ambient nighttime sound levels. Based on the results of the measured data, the sound level limits will be finalized by DPD and applied to the average of the ambient nighttime sound levels.

Table 4.1. Proposed Variance for Nighttime Hourly Sound Level, L_{eq}, dBA re: 20 µPa

Location	Code Level	Predicted Sound Level, L_{eq}	Average Existing Nighttime Sound Level[1], L_{eq}	Proposed Variance Sound Level[2], L_{eq}	Proposed Variance Sound Level, L_{max}
UW Surgical Pavilion	45	65	62	68	78
Southern residences	45	59	54	60	70

1. Average values calculated by The Greenbusch Group from hourly data between 12:00 a.m and 5:00 a.m reported by Puget Sound Transit Consultants.

Source: North Link Construction Noise Study, September 27, 2005; Puget Sound Transit Consultants, The Greenbusch Group

2. This value is derived from an increase of 6 dBA above ambient

4.3 Contract Specifications

The contract specifications shall require that the Contractor perform construction operations in a manner to minimize noise at sensitive receptors. The contractor shall comply with the requirements of the City of Seattle's Noise Code and any conditions of approval as specified by DPD in the Technical Noise Variance. Additionally, the Contractor shall be required to prepare, implement and maintain a Construction Noise Management and Mitigation Plan (as specified in Section 4.5 below) which will effectively incorporate and implement all required environmental protection precautions. The proposed contract specifications for construction noise control is attached as Appendix 2.

4.4 Acoustical Specialist

Within 45 days of Notice To Proceed (NTP) (which is currently anticipated in June 2009), the Contractor is required to submit to Sound Transit and the Noise Abatement Section of DPD, the name, address, and qualifications of the Acoustical Specialist responsible for preparing and overseeing the implementation of the Construction Noise Monitoring and Mitigation Plan.

The Acoustical Specialist shall be recognized by membership in the National Council of Acoustical Consultants, Institute of Noise Control Engineering or Acoustical Consultants. In addition to this membership requirement, the Acoustical Specialist must demonstrate substantial and responsible experience in preparing and implementing construction noise management and mitigation plans on construction projects conducted in an urban setting, including qualifications to provide noise-monitoring as specified in Section 5.1 below.

4.5 Construction Noise Management and Mitigation Plan Guidelines

The Contractor is required to submit a Construction Noise Management and Mitigation Plan (the "Plan") to Sound Transit for review and approval at least 90 days prior to the commencement of nighttime construction activities at the Site. Once approved by Sound Transit, the Plan will be submitted to DPD for review and approval prior to commencing any nighttime work on the Site. The Plan would be updated on an as-needed basis by the Contractor, resubmitted and approved for each new phase of work activity. A copy of the Plan shall be maintained at all times in the Contractor's field office.

At a minimum, the Plan should:

- Specify the construction activities, monitoring locations, equipment, procedures, describe the characteristics of the noise produced with equipment usage, schedule of measurements and reporting methods to be used.
- Identify measures to mitigate sound generated by the proposed construction.
- Update and modify the above list of identified mitigation whenever major activity changes or different equipment is mobilized on the Site from the equipment previously submitted.
- Submit a list of identified mitigation for the Site and for each change in activities to be performed at the Site.
    - At a minimum, include the following:
        - Identification of equipment.
        - Proposed sound mitigation (if any) for each piece of equipment.
        - Layout of equipment.
        - Hours of work operation.
        - Hours of operation of each piece of equipment.
    - Any additional mitigation not related to a specific piece of equipment (e.g., barrier around entire site or around several pieces of equipment).
- Be consistent with the approved Technical Noise Variance issued by the City of Seattle, DPD Noise Abatement Program.

The Plan shall be implemented and supervised by the Contractor's Site Supervisor. In the event that Sound Transit, regulatory agencies, or jurisdictions determine the Plan to be inadequate to protect the environment, a Notice of Deficiency will be issued. At such time, the following steps shall occur:

- Stop the work in progress until adequate environmental protection measures are implemented.
- Modify the Plan to meet the requirements of said regulatory agencies, jurisdictions, and Sound Transit.
- Submit the revisions to the Plan within seven days of the Notice of Deficiency.

4.6 Additional Noise Control Measures

It is the discretion of the Contractor to schedule nighttime construction activities. In the event that the measured sound levels exceed the nighttime noise limits specified in the approved Technical Noise Variance, the Contractor will immediately stop the activity and notify Sound Transit. The Contractor will have the discretion to implement any additional noise control measures to reduce noise to acceptable levels or terminate the nighttime construction activity responsible for the noise limits exceedence until the daytime hours when higher sound levels are permitted under S.M.C 25.08.425.

Additional noise control measures may include, but are not limited to raising the height and/or location or otherwise modifying the construction screening wall(s), providing additional noise control measures such as placing moveable temporary noise barriers or noise control curtains, and/or prohibiting the use of noisier activities during nighttime hours.

5.0 NOISE VARIANCE COMPLIANCE TRACKING

In addition to the noise mitigation measures stated in Section 4.0, another component of Sound Transit's TNV proposal for allowing nighttime construction noise is establishing procedures and programs for effectively tracking, evaluating and resolving public complaints by taking appropriate corrective measures.

It is the prime responsibility of the Contractor to monitor the construction activity and the equipment used on the project to ensure compliance with the nighttime sound level limits established under the approved TNV. Section 5.1 specifies the sound level monitoring requirements for the Contractor to implement. Sound Transit will be responsible for implementing the conditions of the Noise Variance and working with the Contractor on remedying noise complaints as provided in Section 5.2.

DPD will act as an independent third party by providing oversight on the night-time work to ensure the public's interests are represented and that the contractor strictly adheres to the City's Noise Code and permit conditions. DPD will assign a Noise Abatement Specialist who will serve as the city's primary contact for noise related issues surrounding University Link construction, including the nighttime construction activities proposed under the Technical Noise Variance for the University Station site (and other major public works projects). The Noise Abatement Specialist will be responsible for receiving and responding to night time noise complaints through the Sound Transit 24-hour construction hotline. (See Section 6.1 below)

5.1 Sound Level Monitoring

Due to the sensitive nature of the receptors, and the potential risk of non-compliance violations during the work, continuous sound monitoring stations shall be required at all construction sites. Sound monitoring services shall be required by the Contractor from a qualified noise consultant not affiliated with Sound Transit or any project contractors.

A noise consultant will be considered qualified to provide sound monitoring services if they meet the following criteria:

- Acoustic Specialist with a minimum of ten years of experience working in the field of environmental noise and acoustic analysis.

The consultant should work with the contractor to provide sound monitoring stations, equipped with the following measurement and documentation devices:

- One sound level analyzer with the following capabilities and specifications:
  - Type 1 rating as delineated in American National Standards Institute (ANSI) S1.4 and S1.43.
  - Type 0 rating as delineated in ANSI S1.11.
  - Continuous broadband logging of one-second LA_{eq}, LA_{max} and LA_{min}.
  - Continuous spectral logging of one-second LA_{eq}, LA_{max} and LA_{min}.
  - Sound recording and external equipment trigger capabilities in the event of a variance exceedence.
  - Sufficient internal memory for one week of logged data and sound recordings.
- One free-field microphone housed in an environmental shroud providing protection from rain and wind conditions. The environmental shroud will be capable of outdoor measurements for at least one year without service or replacement.

Results of the sound monitoring will be documented in a letter report and provided to Sound Transit on a weekly basis. This letter will be transmitted to DPD at a weekly meeting between DPD's Noise Abatement Specialist and Sound Transit's Resident Engineer. If the initial monitoring indicates that the construction activities do not comply

with the applicable variance limits, the letter should indicate the proposed mitigation measures and the proposed timing of the implementation of said measures.

5.2 Variance Non-Compliance Resolution

Complaints received by DPD, Sound Transit or Sound Transit's Community Outreach staff during the Work will be shared with the Contractor. (See Section 6.0 for a description of Sound Transit's public outreach programs, including the procedures that will be used to respond to complaints.) The Contractor will work with Sound Transit, as required, to resolve noise related complaints by providing mitigation measures when practical and feasible.

Potential sound mitigation measures include but are not limited to:

- Modification of Solid Construction Screening wall(s) with absorptive treatment on inner surfaces.
- Install individual noise barriers or enclosures around equipment including but not limited to: compressors, pumps, generators, etc.
- During nighttime construction activities, strobe lights may be used in lieu of audible back-up alarms.
- Limit engine idling time of project vehicles, including delivery and haul trucks, to 5 minutes maximum.
- Place ventilation fans within shafts and use acoustically absorptive ducting and/or in-line silencers.
- Provide equipment with properly sized and maintained mufflers, including hospital-grade mufflers as applicable, and silencers as appropriate.
- Use electric and hydraulic equipment.
- Use best available equipment and technology that will assist in meeting the noise requirements.

6.0 PUBLIC OUTREACH AND COMMUNITY INVOLVEMENT

During the entire construction period at the UWS site, Sound Transit's Public Outreach staff will be able to assist citizens by providing up-to-date information on proposed construction activities and responding to and assisting in resolving any noise complaints that may be received. Outreach staff and DPD's Noise Abatement Specialist will work in close coordination to ensure that the public is kept aware of any changes to the work environment that may affect night-time noise levels, and that all complaints are dealt with in a timely and effective manner.

The public outreach programs listed below will be in place prior to commencement work for the U220 Contract.

6.1 Construction Hotline

Sound Transit will maintain a toll-free 24-hour Construction Hotline to provide a single point of contact for construction inquiries and complaints, including noise complaints. During normal business hours, 8:00 a.m. to 5:00 p.m. Monday through Friday, the line will be personally answered by Sound Transit Community Outreach staff. After hours and on weekends and holidays, calls will be answered by a professional answering service to ensure that callers are able to speak to a live person, not voice mail. Noise related calls will be immediately transferred to DPD's Noise Abatement Specialist (see above). Non-noise related calls will be transferred to the Sound Transit community outreach team for resolution.

All complaints received by Community Outreach staff or over the Construction Hotline, whether during business hours or after hours, will be logged in a complaint database. The Noise Abatement Specialist will be responsible for providing a written summary of noise related hotline calls to Sound Transit outreach staff to include in the database. Reports derived from that database will be presented regularly to the construction management team, to the contractor, and to the City of Seattle DPD Noise Control Office. The database will indicate the date, time, and location of each incident, contact information for the complainant, and steps that were taken to resolve the complaint.

6.2 Noise Complaint Response

For each noise complaint received, DPD's Noise Abatement Specialist will contact Sound Transit's Resident Engineer or the lead nighttime inspector to initiate an investigation to determine the source of the noise and whether or not it exceeded applicable noise limits for that time and location. If the determination is made that the noise did exceed applicable limits, then the Noise Abatement Specialist will work with the Sound Transit construction management team to direct the contractor to take corrective actions and to operate within limits in the future. If the noise is within applicable limits but still objectionable to citizens, staff will determine if contractor should be requested to voluntarily reduce sound levels.

6.3 Public Notification and Communication

Building a mass transit system can temporarily impact neighborhood residents and businesses. Sound Transit's experience on past light rail projects has shown that advance notification of an activity can greatly reduce the perceived impact of construction. Sound Transit's Community Outreach and public involvement program described below will continue throughout the construction period at the UWS site. Periodic public meetings, construction update flyers, and updates to the web page will be used to inform the public about the progress of construction and upcoming activities. Staff will also visit adjacent businesses and homes to discuss construction activity.

Sound Transit has developed and implemented a pro-active program of notification and communication, including the following:

1) Keep the public informed of construction activities through written materials, such as

a) Fact sheets contain basic information on the stations, art, etc. They are printed and handed out as needed.

b) The Link Newsletter provides a progress update on all Sound Transit corridors (east link, north link, etc.). It is printed and mailed periodically.

c) The University Link Project Update describes the major milestones and status updates for the U-Link project. It is printed and mailed to the University Link corridor.

d) Construction updates provide status update and information on current activities for the University Link project. It is e-mailed monthly.

e) Construction alerts provide fast breaking information on specific activities, such as road closure, night work, and utility shut-offs, etc. They are e-mailed or printed and hand delivered as needed. See Section 3 below.

f) The Sound Transit website (www.soundtransit.org) is kept up to date with the latest design and construction information.

g) Custom communications are written materials that have the look and feel of existing stakeholder publications (newsletter inserts, ticket stuffers, etc.). They are produced as needed.

h) Local media is used as needed to distribute information.

i) Sound Transit maintains an electronic mailing list at www.soundtransit.org/subscribe.

2) Host public meetings to provide opportunities for the public to meet with staff and discuss their concerns, such as:

a) Neighborhood construction update meetings are held regularly to provide a chance to speak directly with the project staff and the contractor about current concerns, etc.

b) Open houses are hosted several times a year to provide a broad overview to a wide audience.

c) Community group briefings (as needed or by request)

d) Participate in community events

e) Host Sound Transit events at major milestones

f) Provide periodic tours of the construction activities

g) Door to door outreach to properties directly impacted by construction activities

3) Community Outreach protocols for advance notification of noise-producing activities:

a) The Contractor will notify Sound Transit Community Outreach staff a minimum of 72 hours prior to construction work that will generate noise at high levels and prior to work that will occur during nighttime hours when a noise variance is in effect.

b) Sound Transit Community Outreach staff will notify nearby residents and businesses with as much advance notice as possible prior to the noisemaking activities. Notification will normally include an email alert to the project email list and hand distribution of a Construction Alert flyer to affected parties. All flyers and other communications materials shall contain the name and contact information for the Sound Transit Community Outreach staff personally assigned to the particular project area and the 24-hour Construction Hotline number. They shall also contain the URL for the Sound Transit Web page for the University Link project, where people can sign up for regular email newsletters and Construction Alert notifications.

c) Business and residential neighbors can contact the Sound Transit Community Outreach staff by telephone or email to inquire about construction issues or to register complaints about noise or other matters.

4) Community Outreach protocols during the construction period:

When construction activities reach the level where they start to create a perceived impact, Sound Transit's community outreach staff members are available 24-hours a day to begin working on solutions. Regular visits with impacted residents and businesses are a key component in identifying problems before they become complaints. An integral part of the construction management team, outreach staff works in the field along the inspectors and the Resident Engineer to help avoid construction impacts:

a) Monitor the contractor's activities to minimize impacts
   i) Traffic flow
   ii) Pedestrian traffic
   iii) Access to business and residential properties
   iv) Housekeeping / worksite maintenance
   v) Parking
   vi) Directional signage

b) Work cooperatively to solve problems, minimize impacts and respond to concerns or complaint:
   i) Door to door outreach to impacted properties
   ii) Utilize the 24-hour hotline to receive concerns / complaints.(See Section 8.
   iii) Outreach staff has access to the resources needed to respond quickly such as janitorial services, noise mitigation measures, plumbers, etc.

c) Respond to community inquiries and keep a log of all interactions (including noise complaints)

In addition to providing notification and responding to emerging issues, Sound Transit's outreach program includes other types of mitigation for the community, such as:

5) Signage and Art

a) Provide custom business signage to mitigate construction impacts
b) Soften the impact by installing art on construction fencing
c) Install pedestrian kiosks to provide information
d) Work with "Start" program to incorporate temporary art into Sound Transit facilities
e) Provide pedestrian environment amenities where appropriate

6) Support business mitigation activities for the impacted businesses

a) Provide signage for better visibility during construction
b) Promotional activities
c) Business assistance / training

7) Provide information on safety around construction sites and rail facilities

a) School presentation and safety information aimed at students.