East Link | South Bellevue to Overlake Transit Center
Contract No. RTA/AE 0143-11

Contract E340
Noise and Vibration Report
90% Submittal

OPERATIONS

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Prepared for:

SOUNDTRANSIT

Prepared by:

FINAL DESIGN PARTNERS.

Contract E340
Noise and Vibration Report

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Acronyms and Abbreviations

AWD	Audible Warning Device
BCC	Bellevue City Code
dBA	A-weighted decibel
DF	Direct Fixation
EDNA	Environmental designation for noise abatement
EIS	Environmental Impact Statement
FDL	Force Density Level
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
Ldn	24-hour day-night sound level
Leq	Equivalent sound level
LRT	Light Rail Transit
LRV	Light Rail Vehicle
LSTM	Line Source Transfer Mobility
PA	Public Address
PNB	Pacific Northwest Ballet
ROD	Record of Decision
SEL	Sound Exposure Level
ST	Sound Transit
TNM	Traffic Noise Model
TPSS	Traction Power Substation
VdB	Vibration decibel with reference to 1 µin/sec

1.0 Introduction

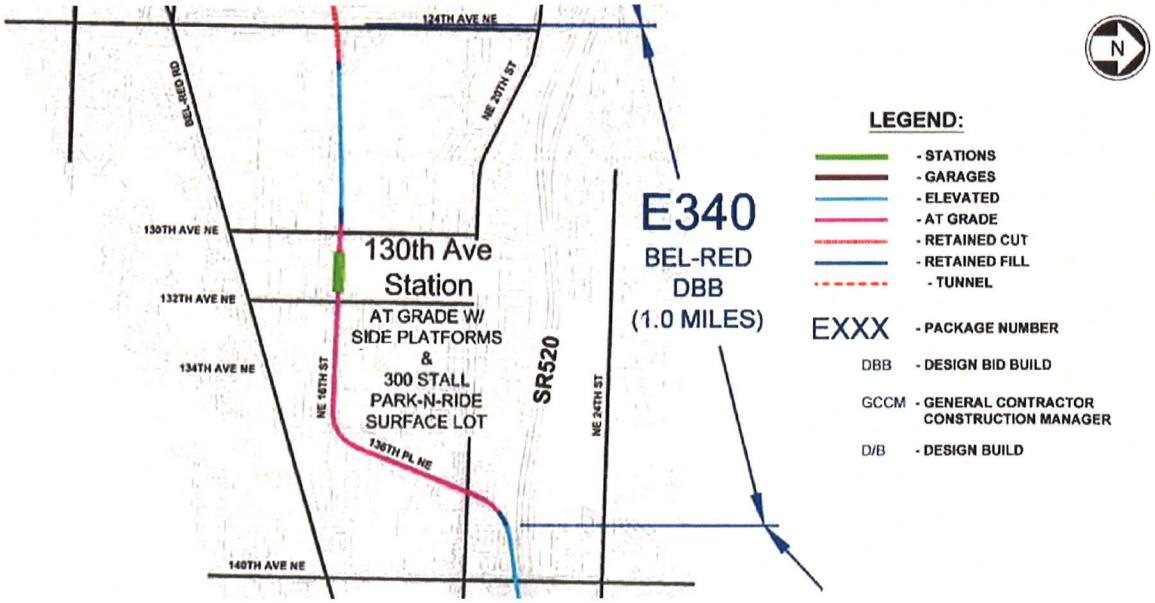
This draft Noise and Vibration Report presents the results of the noise and vibration impact assessment and the recommended mitigation measures for the E340 package. The predicted noise levels demonstrate compliance with both the Federal Transit Administration (FTA) impact criteria and the Bellevue City Code (BCC) Chapter 9.18 noise limits. Package E340 extends from the intersection of the ROW and 124th Ave NE at Station 635+00 to the intersection of 136th Place NE and NE 20th Street near SR-520 at Station 688+00. The package includes track that is in a retained cut, on elevated structure, and at-grade. The 130th Avenue Station with a 300 stall park-n-ride surface lot is located within the package. Figure 1-1 shows a site map of the East Link E340 package.

This report includes a noise impact assessment of operations of light-rail transit including noise from light-rail vehicles (LRVs), bell noise from trains and crossings, noise from the park-and-ride facility, and an assessment of station acoustics. Also included is a detailed vibration impact assessment of light-rail operations. The information in this report is an update to the noise and vibration impact assessment presented in the East Link Project Final Environmental Impact Statement (EIS), Appendix H2: Noise and Vibration Technical Report (July 2011). The recommendations in this report are based on the additional measurements and analysis performed by ATS Consulting in March through October of 2013.

The noise and vibration impact assessment presented in this report is consistent with the guidelines and methodology presented in the following documents:

- FTA's Transit Noise and Vibration Impact Assessment guidance manual (referred to in this report as the FTA guidance manual);
- Sound Transit's Link Noise Mitigation Policy, February 2004;
- Record of Decision (ROD) issued November 2011;
- the East Link Final Environmental Impact Statement, July 2011; and
- City's Noise Control Code, Chapter 9.18 Bellevue City Code

Figure 1-1: Site Map of East Link Package E340



2.0 Executive Summary

The FTA noise and vibration impact thresholds apply only to land uses defined as noise or vibration sensitive receivers in the FTA guidance manual. There is one parcel classified as a noise and vibration sensitive receiver located near the LRT tracks within the package E340 limits using the FTA land use definitions. The sensitive receiver is parcel EL310, the Francia Russell Center, a Pacific Northwest Ballet (PNB) School (an institutional land use). The location of the PNB School is shown in Figure 5-1. The PNB facility is being relocated to a new structure within the same parcel as part of the Project; the noise and vibration analysis in this report is for the new building location. This report includes a detailed noise and vibration impact assessment of LRT operations for this sensitive receiver using the FTA impact thresholds. There is also a sensitive receiver, the Blue Sky Church, located north of the park-and-ride facility at the 130th Avenue Station. The church is over 500 feet from the LRT tracks which is beyond the screening distance requiring an operational noise and vibration impact assessment; however, the church is assessed for noise impact from the park-and-ride facility using the FTA impact thresholds.

This report also assesses noise impact using the City of Bellevue's noise code, which applies to the Project's stationary noise sources such as park-and-ride facilities and stations. Traction power substation (TPSS) units are another stationary noise source associated with the Project; however, there are no TPSS sites within the package E340 limits.

This report includes a detailed noise and vibration impact assessment of LRT operations and park-and-ride noise for sensitive receivers using the FTA impact thresholds, as well as an assessment of park-and-ride noise and station noise using the noise limits defined in the City's noise code.

The conclusions of the noise and vibration impact assessment are:

- The predicted noise level at the PNB School is one decibel below the FTA noise impact threshold, so no noise mitigation measures are recommended. The predicted noise level at the PNB School is a one-hour equivalent sound level (Leq) of 62 dBA. The FTA moderate noise impact threshold at the PNB School is 63 dBA Leq(1-hour).
- The Project design includes the installation of lubricators on the curve adjacent to the PNB School to minimize wheel squeal and flanging. Noise from wheel squeal was not included in the noise predictions for the school because lubricators are included in the design.
- The predicted groundborne vibration and groundborne noise levels are below the FTA impact thresholds for the PNB School. No vibration mitigation is recommended.
- There is one crossover located within the package limits beginning at station 644+30. The crossover is located on the elevated structure between 124th Avenue NE and 130th Avenue NE. There are no noise or vibration sensitive land uses near the crossover using the FTA land use definitions. Therefore, no low-impact frog is recommended for the crossover to minimize noise and vibration levels from the special trackwork.
- The 130th Avenue Station is an at-grade station that is not fully enclosed but is open to the outside area. Due to the large area of the station ceiling and side walls that are open to the outside area, no acoustical treatment or other noise mitigation is required for the station.

- The predicted noise from the park-and-ride facility at 130th Avenue Station is below the FTA noise impact thresholds and below the limits in the City's noise code. No mitigation is recommended.
- Station noise from electrical transformers and public address announcements (PA) will not exceed the noise limits in the City's code.

3.0 ROD Commitments and EIS Mitigation Recommendations

The impact analysis and mitigation recommendations presented in this report are consistent with the ROD commitments. The noise and vibration ROD commitments applicable to the 60% design are:

1. Noise mitigation measures would be provided that are consistent with Sound Transit's Light Rail Noise Mitigation Policy (Motion No. M2004-08). The FTA manual also defines when mitigation is needed and bases this on the impact's severity, with severe impacts requiring the most consideration. During final design, all predicted impacts and mitigation measures will be reviewed for verification. During final design, if it is discovered that equivalent mitigation can be achieved by a less costly means or if the detailed analysis show no impact, then the mitigation measure may be eliminated or modified. Prior FTA approval is required for any elimination or substantial modification to mitigation measures. The potential mitigation options available for noise from transit operations on the East Link Project are primarily sound walls, special trackwork, lubricated curves, and residential building sound insulation. Sound walls are proposed where feasible and reasonable, as determined by Sound Transit (and the Federal Transit Administration, at its discretion) based on specific site conditions. Sound walls would be located on the ground for at-grade profiles and on the guideway structure for elevated profiles. Sound walls are preferred because they are effective at reducing noise. For locations where there is a potential for traffic noise to be reflected off the sound walls, Sound Transit will include where feasible the use of absorptive treatments to remedy this issue. A crossover track uses a frog (a rail-crossing structure) to allow the train to either cross over to another track or continue moving on the same track. A gap is provided on top of the frog so that vehicle wheels can pass regardless of which track is in use. With typical frogs, noise and vibration are generated when the wheels pass over the gap. Special trackwork, such as movable point or spring rail frogs, eliminates the gap between tracks at crossovers that causes noise and vibration at these locations and will be used where feasible. Sound Transit is currently investigating the use of non-audible warnings for gated and ungated at-grade crossings. If non-audible warning devices are found to be viable, this option could be used to reduce or eliminate bell noise at specific crossings. Where practical, grade separation of at-grade light rail crossings would also be considered to eliminate the need for bells or other audible warning devices. If bells are used at gated crossings, the bells would be set at the minimum noise level that maintains a safe crossing. Finally, the use of acoustic bell shrouds would be examined during final design; the shrouds would direct the bell noise at gated crossings to the intersection. When source mitigation measures or sound walls are infeasible or not entirely effective at reducing noise levels below the FTA impact criteria, then residential sound insulation would be evaluated and implemented at impacted properties where the existing building does not already achieve a sufficient exterior-to-interior reduction of noise levels. Many newer buildings, particularly in Downtown Bellevue, have good interior noise reduction and additional sound insulation may not be necessary. While the mitigation provided herein is based on predicted impacts, noise mitigation shall be provided if, after operations commence, noise impacts occur for which mitigation is deemed necessary and appropriate under FTA noise standards.
2. Traffic noise impacts will be mitigated by sound walls, where determined to be reasonable. For locations with residual traffic noise impacts caused by the project, residential sound insulation might also be considered by Sound Transit.

3. Wheel Squeal: For curves of 600-foot radius or less, a trackside or vehicle-mounted lubrication system will be used to mitigate wheel squeal noise. For curves of 600- to 1,250[1]-foot radius, the project will be designed to accommodate a lubrication system if wheel squeal occurs during operations.
4. Vibration and groundborne noise impacts that exceed FTA criteria warrant and will receive from Sound Transit effective mitigation measures, as described below, when determined to be reasonable and feasible. The locations requiring mitigation will be refined during final design and will be included, where needed, in the project's final design specifications. At some locations, however, light rail trackways or guideways could be within 20 feet of buildings and vibration mitigation may not be effective at reducing the vibration level to below the FTA criteria. At these locations, project design modification and additional information on affected buildings could eliminate these impacts. For instance, the type of building foundation might reduce vibration impacts and therefore, these residual impacts might be eliminated. In addition, each building will need to be examined in detail to determine where the vibration-sensitive uses are located. For example, the side of a building nearest the proposed alternative might be a vibration-sensitive use. Buildings that are mixed use might not have sensitive uses on lower floors where impacts are predicted to occur, and the vibration is not predicted to be noticeable by the time it reached higher floors with sensitive uses, such as sleeping quarters. Outdoor-to-indoor vibration testing, which tests how the vibration changes from the soil outside to a sensitive space inside a building, would also help to refine the vibration projections at these locations. Vibration mitigation measures will be employed at those areas where vibration impacts have not been anticipated but are shown evident after operations commence. Options for mitigating vibration impacts include the following: 1) Ballast mats, which consist of a pad made of rubber or rubberlike material placed on an asphalt or concrete base with the normal ballast, ties, and rail on top. The reduction in groundborne vibration provided by a ballast mat is strongly dependent on the vibration frequency content and the design and support of the mat. 2) Resilient fasteners to provide vibration isolation between rails and concrete slabs for direct fixation track, typically on elevated structures or in tunnels. These fasteners include a soft, resilient element between the rail and concrete to provide greater vibration isolation than standard rail fasteners. 3) Tire-derived aggregate (TDA), which consists of shredded tires wrapped with filter fabric that is added to the base below the track ties. 4) Special trackwork, such as movable point or spring rail frogs, to eliminate the gap between tracks at crossovers that causes noise and vibration at these locations. 5) Floating slabs, which consist of thick concrete slabs supported by resilient pads on a concrete foundation; the tracks are mounted on top of the floating slab. Although floating slabs are designed to reduce vibration at lower frequencies than ballast mats, they are extremely expensive and are rarely used, except in the most extreme situations. Most successful floating slab installations are in subways, and their use for at-grade track is less common and often not reasonable.

The noise and vibration impact analysis performed for the Final EIS did not find any impact within the Contract E340 project limits, and therefore no mitigation measures were recommended in the Final EIS and no mitigation measures were required in the ROD.

[1] The ROD says curves of 600 ft to 1,000 ft should be designed to accommodate a lubrication system, but the Design Criteria Manual (DCM V-3) states lubrication systems shall be accounted within the track design on all curves less than 1250' expect bored tunnels. The ROD text in this section has been modified to be consistent with the DCM.

4.0 Impact Assessment Methodology

4.1 Impact Thresholds and Noise Limits

FTA Impact Thresholds

This report includes a noise and vibration impact assessment using the using the prediction methodology and impact thresholds set forth in the FTA guidance manual. The FTA noise and vibration impact thresholds apply only to land uses defined as noise and vibration sensitive in the FTA guidance manual. The FTA guidance manual defines three categories of noise sensitive land uses:

- Category 1: Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet. Included are outdoor amphitheaters, recording studios, and concert halls.
- Category 2: Residences and buildings where people normally sleep. This category includes homes, hospitals and hotels where nighttime sensitivity to noise is assumed to be of utmost importance.
- Category 3: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material.

There is one parcel classified as a noise and vibration sensitive receiver near the LRT tracks within the package E340 limits using the FTA land use definitions. The sensitive receiver is parcel EL310, the Francia Russel Center, a Pacific Northwest Ballet (PNB) school and is classified as a Category 3 land use. There is another sensitive receiver, the Blue Sky Church, which is adjacent to the park-and-ride facility at 130th Avenue Station. The Church is over 500 ft north of the LRT tracks which is beyond the screening distance requiring an operational noise and vibration assessment; however, it is assessed for noise impact from the park-and-ride facility. Therefore, the PNB School is assessed for operational noise and vibration impact using the FTA impact thresholds and the Blue Sky Church is assessed for noise impact from the park-and-ride facility using the FTA impact thresholds.

Bellevue City Code Noise Limits

Chapter 9.18 of the Bellevue City Code (BCC) addresses noise control. The chapter includes maximum permissible noise levels and exemptions to those noise limits. The BCC applies to stationary noise sources associated with the Project. The stationary noise sources within the E340 package are the park-and-ride facility and the station. Noise from stationary sources are assessed for impact using the maximum permissible noise levels presented in BCC 9.18.030.B. Those maximum permissible noise levels are summarized in Table 4-1.

Table 4-1: Applicable Maximum Permissible Sound Levels, Bellevue City Code

EDNA of Noise Source	EDNA Of Receiving Property	
	Class B	Class C
Class B	60 dBA	65 dBA
Class C	65 dBA	70 dBA
Source: Bellevue City Code Chapter 9.18		

4.2 Airborne Noise

Light-Rail Vehicle Operations

The noise from the operation of LRT vehicles includes noise from the steel wheels rolling on steel rails (wheel/rail noise) and noise from propulsion motors, air conditioning, and any other auxiliary equipment on the vehicles. Operational LRT noise at sensitive receivers is predicted using the FTA detailed noise analysis procedure which is a spreadsheet model using formulas presented in the FTA guidance manual. The formulas take into account the following specific operating characteristics of the Sound Transit system:

- Measured reference sound level of existing Sound Transit LRVs,
- the train operating schedule,
- train speed, and
- track structure.

ATS Consulting took reference sound level measurements on the existing ST Central Link light-rail system in April 2013[2]. Measurements were taken on at-grade track and aerial structure track. The measurements were made using a 3-car train consist travelling at controlled speeds during non-revenue service hours and measurements of 2-car train consists during regular revenue service hours. The results of the noise measurements show that the noise levels on the Central Link system are about 2 decibels higher than the FTA reference noise level for LRVs. The reference sound exposure level (SEL) used for the predictions in this analysis is 84 dBA at 50 ft for a one-car train traveling at 50 mph on ballast-and-tie track (2 decibels higher than the FTA reference level of 82 dBA) and is based on the results of the measurements. The reference sound level measured for direct-fixation track is 4 dB higher than for ballast-and-tie track (the same +4 dB adjustment is recommended in the FTA guidance manual for direct fixation track).

The train schedule from Sound Transit's Revised 2035 Light Rail Operation Plan, shown in Table 4-2, was used for the noise predictions. Note that the revised 2035 operating schedule is different from the assumptions used in the Final EIS predictions. The revised operating schedule assumes 8 minute peak headways and 4-car train consists, while the Final EIS schedule assumed 7-minute peak headways and 3-car train consists. The operating speeds and track structure type assumed in the predictions are based on the information in the 90% design drawings.

Table 4-2: East Link Operating Plan

Hours	Headway (minutes)	Total train cars (assuming 4-car trains)
5-6am	15	16
6-7am	8	30
7-8:30am	8	45
8:30am-3:00pm	10	156
3-6:30pm	8	105
6:30-10pm	10	84

[2] The sound level measurements of the existing ST Central Link light-rail system are documented in the report: *Noise Measurements of Existing Sound Transit Trains* dated October 16, 2013.

Hours	Headway (minutes)	Total train cars (assuming 4-car trains)
10pm-1:00am	15	48
1-5am	0	0

In addition to the operating characteristics of the system, the noise formulas also account for distance from the sensitive receiver, ground absorption effects, and noise from bells. The methodology for the analysis in this report follows the procedures in the FTA guidance manual and the Final EIS.

Bell noise is also included in operational LRT noise for the FTA analysis. The assumptions used for bell predictions are based on the Sound Transit bell policy. Included in the predictions are noise from the warning bells on the light-rail vehicles and audible warning devices at crossings. The assumptions for the different types of bells are:

- Trains will have a high bell, low bell, and horn. The horn is for emergency situations only and is not used in the noise analysis. Consistent with the practice on the Central Link line, the train-mounted bell will be sounded two to three times as a train approaches and passes through an at-grade crossing and for arrivals and departures at a station. The high bell has a sound pressure level of 80 dBA at 50 feet and is used during the daytime hours from 6 a.m. to 10 p.m. The low bell has a sound pressure level of 72 dBA at 50 feet and is used during the nighttime hours from 10 p.m. to 6 a.m.

- Wayside pedestrian audible warning devices (AWDs) located at the at-grade crossings will operate at 10 decibels above the ambient noise levels. The predictions assume the AWDs have an Lmax of 77 dBA at 15 feet and will sound for approximately 40 seconds per train. The noise analysis does not assume that the noise levels of the audible warning devices would be reduced during nighttime hours (a worst case assumption).

AWDs are stationary noise sources; however, they are not included in the impact assessment using the City's noise code. There are two exemptions in section 9.18.020 of the BCC that apply to AWDs. The first exemption is in subsection A.10 and is for "Sounds created by safety and protective warning devices where noise suppression would render the device ineffective". The second exemption is in subsection B.1 and is for "Sounds created by bells, chimes and carillons not operating continuously for more than five minutes in any one hour." Therefore, bell noise is only included in the impact assessment using the FTA noise impact thresholds.

Noise from Park-and-Ride Facilities

Noise from park-and-ride facilities is assessed using both the FTA impact thresholds and the limits in the City's noise code. The methodology for predicting noise levels at receiving properties follows the FTA guidance manual procedures. (The City's noise code does not address prediction methodology).

The noise level at the nearest receiving property or sensitive receiver is predicted using the following equation:

$$Leq(1hr) = SEL_{ref} + 10\log(N_a/2000) - 20*\log(dist/50) - 35.6$$

where SEL_{ref} is the reference SEL at 50 ft, N_a is the number of automobiles per hour, and *dist* is the distance from the facility to the property line of the receiving property (for the analysis using the City's nosie limits) or the distance from the facility to the nearest sensitive receiver (for the FTA analysis). The reference sound exposure level (SEL) at 50 feet for 1000 cars in the peak activity hour is 101 dBA at 50 feet. The predicted noise level from the park-and-ride facility is compared to the impact thresholds to identify potential impacts.

Station Noise

Stationary noise sources associated with the LRT stations are the operation of electrical transformers and PA announcements. Noise from these sources are subject to the limits in the City's noise code.

A 156 KVA transformer will be used at the 130th Avenue NE station. Manufacturer's sound level data of a transformer between 150 KVA and 300 KVA is less than 55 dBA at 3 feet. The noise level at the nearest receiving property is predicted using the following equation:

$$Leq(1hr) = Leq_{ref} - 20*\log(dist/3)$$

where Leq_{ref} is the reference noise level of 55 dBA at 3 feet and *dist* is the distance from the transformer to the property line of the receiving property. Note that this prediction methodology assumes the transformer operates continuously.

The PA speakers at the station will operate at 10 dB above the ambient noise level at a distance of 10 feet from the speaker. The noise level from the PA announcements at the nearest receiving property is predicted using the following equation:

$$Leq(1hr) = L_{ref} + 10*\log(duration) - 20*\log(dist/10) - 10*\log(60*60)$$

where L_{ref} is the reference noise level of 10 dB above the ambient, *duration* is the total duration in seconds of announcements over one hour, and *dist* is the distance from the speaker to the property line of the receiving property.

There is one station located within the E340 package limits - the 130th Avenue NE station. The ambient noise level at the station is assumed to be equal to the ambient noise level measured at the PNB school: Leq(1hr) = 59 dBA. Based on this ambient noise level, the PA announcements will be 69 dBA at 10 feet from the PA speaker on the station platform.

Station Acoustics

In an enclosed environment such as a transit station sound can continue to reflect for a period of time after a source has stopped emitting sound. This prolongation of the sound is called reverberation. Reverberation time (TR60) is defined as the time required, in seconds, for the average sound in a room to decrease by 60 decibels after a source stops generating sound. Reverberation time is the primary descriptor of an acoustic environment and minimizing reverberation time in a transit station helps to ensure intelligibility of announcements and speech within the station.

Reverberation time is affected by the size of the space and the amount of reflective or absorptive surfaces within the space. A space with highly absorptive surfaces will absorb the sound and stop it from reflecting back into the space. This would yield a space with a short reverberation time. In general,

larger spaces have longer reverberation times than smaller spaces. Therefore, a large space will require more absorption to achieve the same reverberation time as a smaller space.

Reverberation time for the transit stations are calculated using the Sabine Formula:

$$RT_{60} = 0.049 * V/a$$

where V is the volume of the space (ft^3) and a is the total room absorption at a given frequency in sabins. It is important to note that the absorption and surface area must be considered for every material within a space in order to calculate sabins. The number of sabins is determined by multiplying the noise reduction coefficients of different surfaces within the station by the surface area of that material.

This calculation method is used to determine if the design of a transit station will achieve the Sound Transit Design Criteria of a maximum reverberation time of 1.5 seconds or less in station platform areas, enclosed public spaces, and other areas where the transit patrons rely on the PA system for information and directions. The FTA and BCC do not have a criteria relating to station reverberation time. The Sound Transit Design Criteria is the only criteria that apply to the acoustical design of the stations.

4.3 Groundborne Vibration and Groundborne Noise

The FTA detailed vibration analysis procedure is an empirical method based on testing of the vibration propagation characteristics of the soil near sensitive receivers and measurements of the vibration characteristics of a similar LRV. The vibration propagation test is used to determine the line source transfer mobility (LSTM). The LSTM quantifies how easily vibration travels through the earth (high transfer mobility indicates that there is relatively little attenuation as vibration travels through the earth). The vibration characteristics of the LRV are quantified by the force density level (FDL). The basic relationship used for the vibration predictions is:

Lv = LSTM + FDL + Train Length Adjustment +Safety Factor
where:

Lv	Predicted train vibration velocity
LSTM	Measured line source transfer mobility that characterizes the vibration propagation through the soil
FDL	Measured force density level that characterizes the vibration forces generated by the train and the track
Train Length Adjustment	A+0.5 dB adjustment to account for a 4-car train consist
Safety Factor	+3 dB adjustment to account for uncertainty in the measurement results

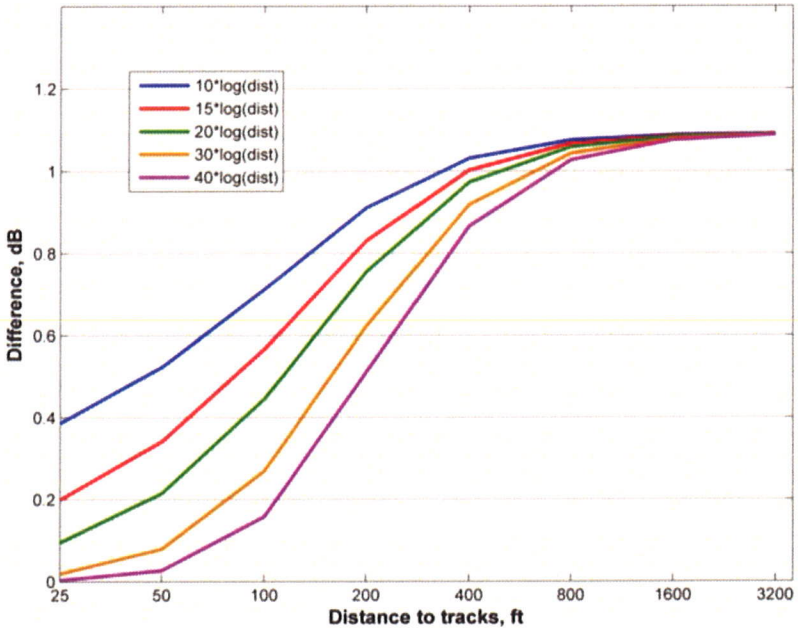
Vibration propagation tests were conducted near the vibration sensitive receiver in the E340 package. The results from the test are presented in Section 5.1.

ATS Consulting measured the FDL on the existing ST Central Link light-rail system in April 2013. Measurements were taken on at-grade track, direct fixation track in a retained cut, and on an aerial structure to determine the FDL for different track types. The FDL measurements were made using a 3-car train consist. The results of the FDL measurements are documented in the report: Vibration Measurements of Existing Sound Transit Trains, July 14, 2013. A plot of the FDL used for the analysis in this report is included in Section 5.1.

The current East Link operating plan calls for four-car trains. A train length adjustment is included in the predictions to account for the fact that the FDL measurement test was conducted with a three-car train. The train length adjustment was derived using a spreadsheet model. The effect of train length on vibration levels at a sensitive receiver will depend on the vibration propagation characteristics of the soil at the receiver and the distance from the tracks to the receiver. Therefore, the effect of train length varies depending on site specific conditions. Figure 4-1 shows the expected vibration difference for four car trains compared to three car trains. The horizontal axis is the distance from the tracks and the vertical axis is the expected increase in vibration levels for a four-car train compared to a three-car train. The different lines on the plot represent different soil propagation characteristics. For example, the blue line represents soil where vibration travels very efficiently and the pink line represents soil where vibration does not travel very efficiently.

The train length adjustment used for the predictions is a +0.5 dB adjustment applied to all frequency bands and to receivers at all distances. This adjustment was chosen because the +0.5 dB adjustment is conservative (most likely an overestimate) for receivers closer than 100 ft to the tracks and all sensitive receivers identified with potential for impact in the Final EIS are located closer than 100 ft to the tracks.

Figure 4-1: Expected Vibration Difference for a 4-Car Train Compared to a 3-Car Train



The relationship between the predicted groundborne vibration, Lv, and the predicted groundborne noise, La, is:

$$La = Lv + Ka\text{-}wt + Krad,$$

where Ka-wt is the A-weighting adjustment at the 1/3 octave band center frequency and Krad is an adjustment to account for the conversion from vibration velocity level to sound pressure level such as

any acoustical absorption in the room. The FTA guidance manual recommends a Krad value of zero for typical residential rooms although recent research indicates the average Krad for residential construction is closer to -5 dBA. The analysis in this report assumes a Krad of 0, which is a conservative assumption to ensure groundborne noise predictions are not underestimated.

Noise Impact Assessment for PNB School

The PNB School is assessed for noise impact using the FTA impact thresholds for an institutional land use. A one hour noise measurement was conducted at the PNB School on May 14, 2013. Determining the existing noise levels at a sensitive receiver is an important step in the noise impact assessment because the FTA thresholds for noise impact are based on existing noise. The noise impact thresholds are higher for areas with high existing noise levels and lower for areas with low existing noise levels.

The noise measurement location at the PNB School is shown in Figure 5-2. The microphone was at the setback distance of the building, 60 feet from NE 16th Street. The primary noise source was traffic from NE 16th Street and activity in the parking lot. The measured 1-hour Leq (equivalent noise level) at the PNB School was 59 dBA. The moderate impact threshold for a Category 3 land use with an existing noise level of 59 dBA is a 1-hour Leq of 63 dBA. The severe impact threshold is a 1-hour Leq of 68 dBA.

Figure 5-2: Aerial Photograph of the PNB School Noise Measurement Location

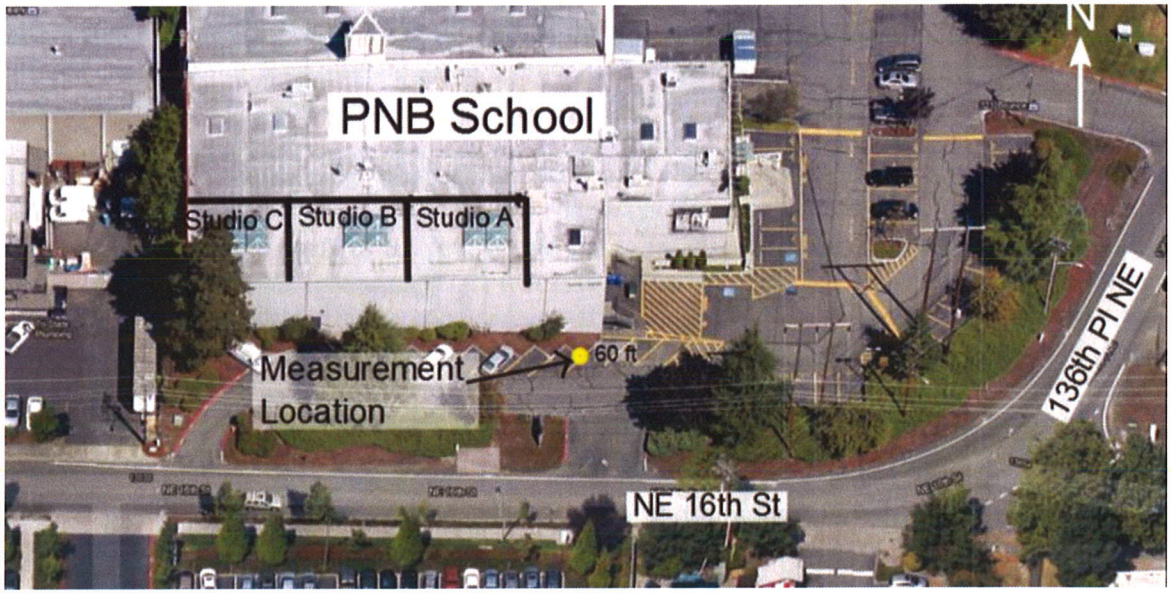


Table 5-1 shows the existing noise level, impact threshold, and predicted noise level for the PNB School. Key notes on the prediction assumptions for the PNB School include:

- There will be embedded track near the PNB School. A +3 decibel adjustment is included in the predictions to account for the embedded track. This is consistent with the recommendation for embedded track in the FTA Guidance Manual.
- The PNB School is located next to a low-radius curve. Wheel squeal from the curve is not included in the predictions because a lubricator will be installed on both the westbound and eastbound tracks to minimize wheel squeal and flanging.
- The LRVs will be traveling 30 mph near the PNB School. LRVs will not be able to operate at higher speeds due to the low-radius curve.
- No ground absorption adjustment is included in the predicted noise level because there is hard, paved ground near the school.

- Noise from train bells and a pedestrian AWD for the NE 16th Street/136th Pl NE at-grade crossing are included in the predicted noise levels.

As shown in Table 5-1, the predicted noise level at the PNB School is one decibel below the moderate impact threshold. No noise mitigation is required. It is anticipated that the design of the reconstructed PNB School building will include design elements such as double glazed windows to ensure that interior noise levels from traffic and train noise will be acceptable for classroom and performance spaces.

Table 5-1: Predicted Noise Levels at PNB School (Parcel EL310)

Parcel	Distance to WB track, ft	Speed (mph)	Existing Noise Level, dBA Leq(1-hr)	Impact Threshold, dBA Leq(1-hr)		Predicted Level, dBA, Leq(1-hr)	Amount Exceeds Moderate
				Moderate	Severe		
EL310	115	30	59	63	68	62	0

As part of the project, the existing NE 16th Street and 136th Place NE roadways will be realigned to accommodate the LRT tracks and the PNB building will be relocated further north within the parcel. The facade of the PNB School is currently 65 feet from the nearest lane of traffic. After the relocation of the building and the realignment of the roadways, the facade of the PNB School will be 80 feet from the nearest lane of traffic. The increase in distance from the traffic will result in about a 1 decibel decrease in traffic noise. There will be no traffic noise impact from the realignment of the roadway and the relocation of the building.

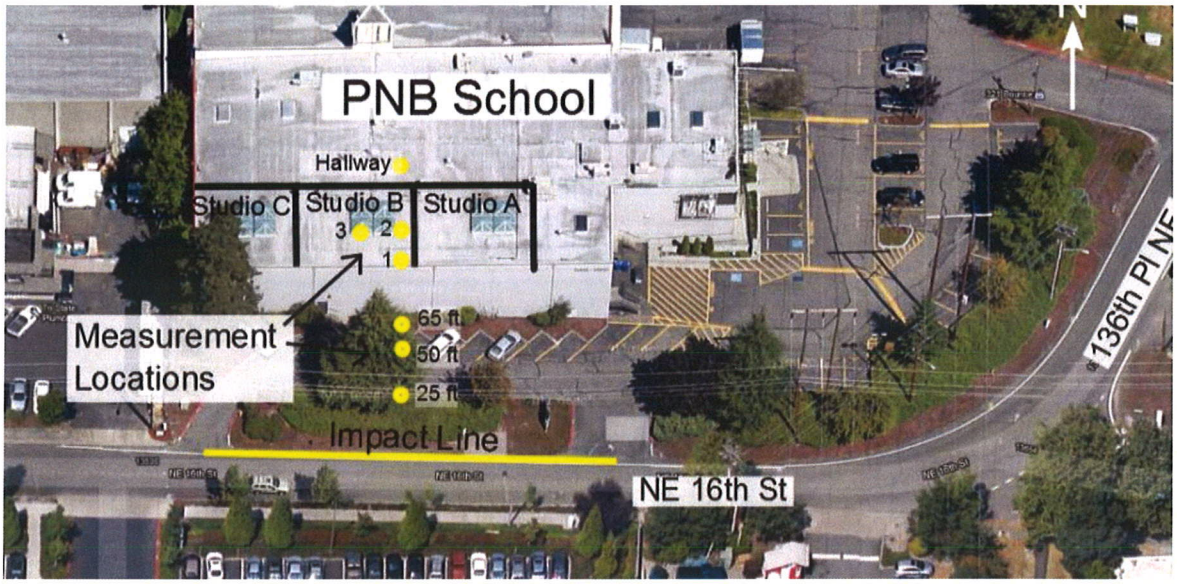
Vibration Impact Assessment for PNB School

A vibration propagation test was conducted at the PNB School on May 14, 2013. The results of the vibration propagation test were used to calculate the LSTM and to predict the vibration levels from LRT operations inside the dance studios using the FTA detailed vibration analysis procedure.

The measurement locations from the vibration propagation test are shown in Figure 5-3. Following is a summary of the measurement locations from the vibration propagation test:

- Propagation impact locations: on the north shoulder of NE 116th Street close to the location of the future eastbound track centerline
- Outdoor measurement locations: 27 ft, 50 ft, and 65 ft from the impact line. The 65 ft measurement location is outdoors adjacent to the building facade.
- Indoor measurement locations: 3 measurement locations inside studio B and one in the hallway just north of studio B.

Figure 5-3: Aerial Photograph of the PNB School Vibration Propagation Measurement



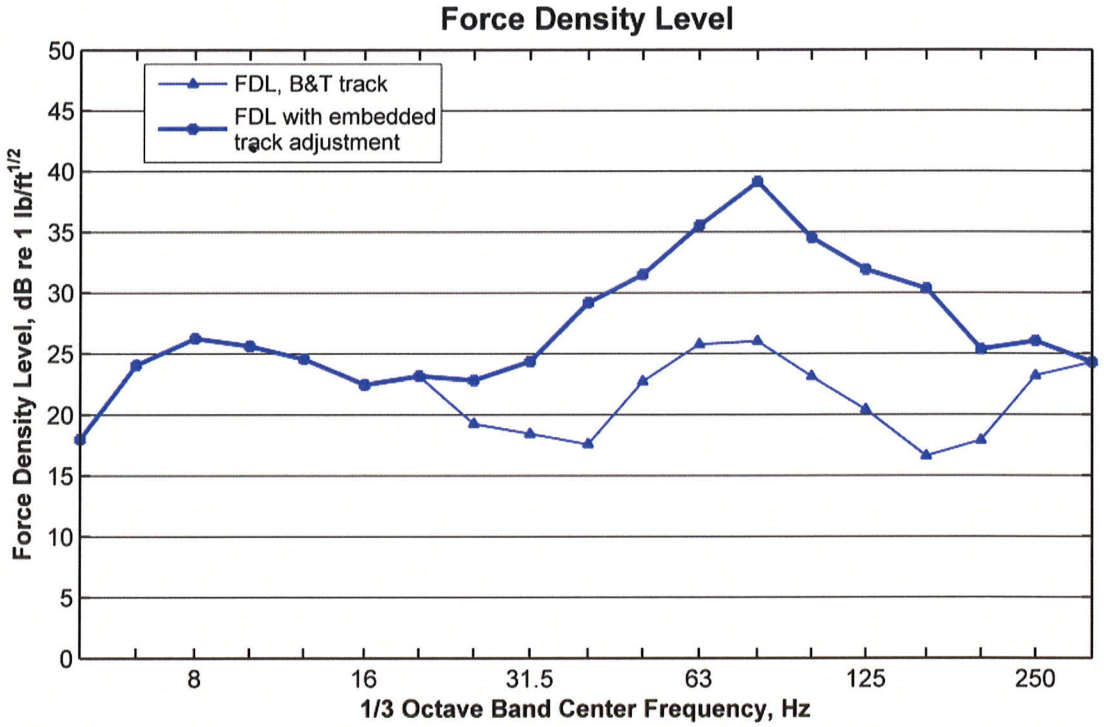
The groundborne vibration prediction methodology follows the procedure described in Section 4.3. In addition, the following assumptions and adjustments were included in the predictions:

- The westbound LRT track will be 115 feet from the new building façade housing the relocated PNB studios. The impact locations from the LSTM propagation tests (impact line) were 65 feet from the existing building facade. A distance adjustment was included in the predicted levels to account for the extra distance to the new building. Because data from outdoor measurements were only available for distances up to 65 feet, the LSTM data from site V-6 from the Final EIS was used to calculate the distance adjustment. The distance adjustment was calculated by taking the difference between the LSTM at 115 feet and at 65 feet from the Final EIS V-6 measurement results and subtracting that difference from the LSTM measured inside the dance studio.
- There will be embedded track near the PNB School. The FDL for embedded track was estimated using the FDL for ballast-and-tie track measured on the existing Central Link and adding an adjustment at high frequencies. The adjustment for embedded track is derived from measurements performed on both embedded track and ballast-and-tie track of the existing Hiawatha LRT system in Minnesota. The adjustment was only included for frequencies greater than 20 Hz because the FDLs showed good agreement at lower frequencies. Further details on the FDL measurements from the Hiawatha system are available in Appendix J of the Central Corridor Final EIS[3]. This adjustment is conservative because FDL results from other systems, such as the Portland TriMet MAX LRT system, have similar results for ballast-and-tie and embedded track systems. The ballast-and-tie FDL from the existing Central Link was measured by ATS Consulting in April 2013 on the existing ST Central Link on ballast-and-tie track on Martin Luther King Jr Way.

[3] Central Corridor Final Environmental Impact Statement available at:
http://www.metrocouncil.org/Transportation/Projects/Current-Projects/Central-Corridor/Environmental/FEIS.aspx

The FDL used in the predictions is shown in Figure 5-4. The LSTM and coherence measured at the PNB School is shown in Figure 5-5. The LSTM from site V-6 is available in the Final EIS. Site V-6 is Highland Park off of Bel-Red Road, and is the closest vibration propagation test site to the PNB School.

Figure 5-4: Ballast-and-tie FDL With Embedded Track Adjustment from Sound Transit, 30 mph (above) and FDLs for Ballast-and-tie Track and Embedded Track from the Hiawatha LRT System (below)



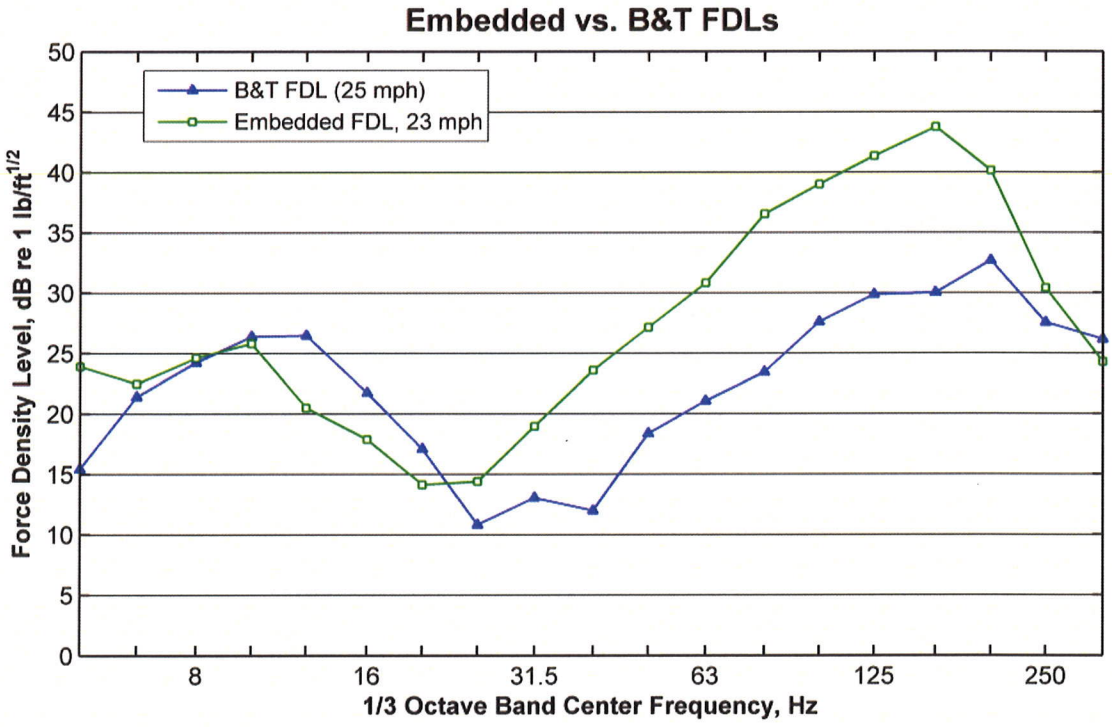
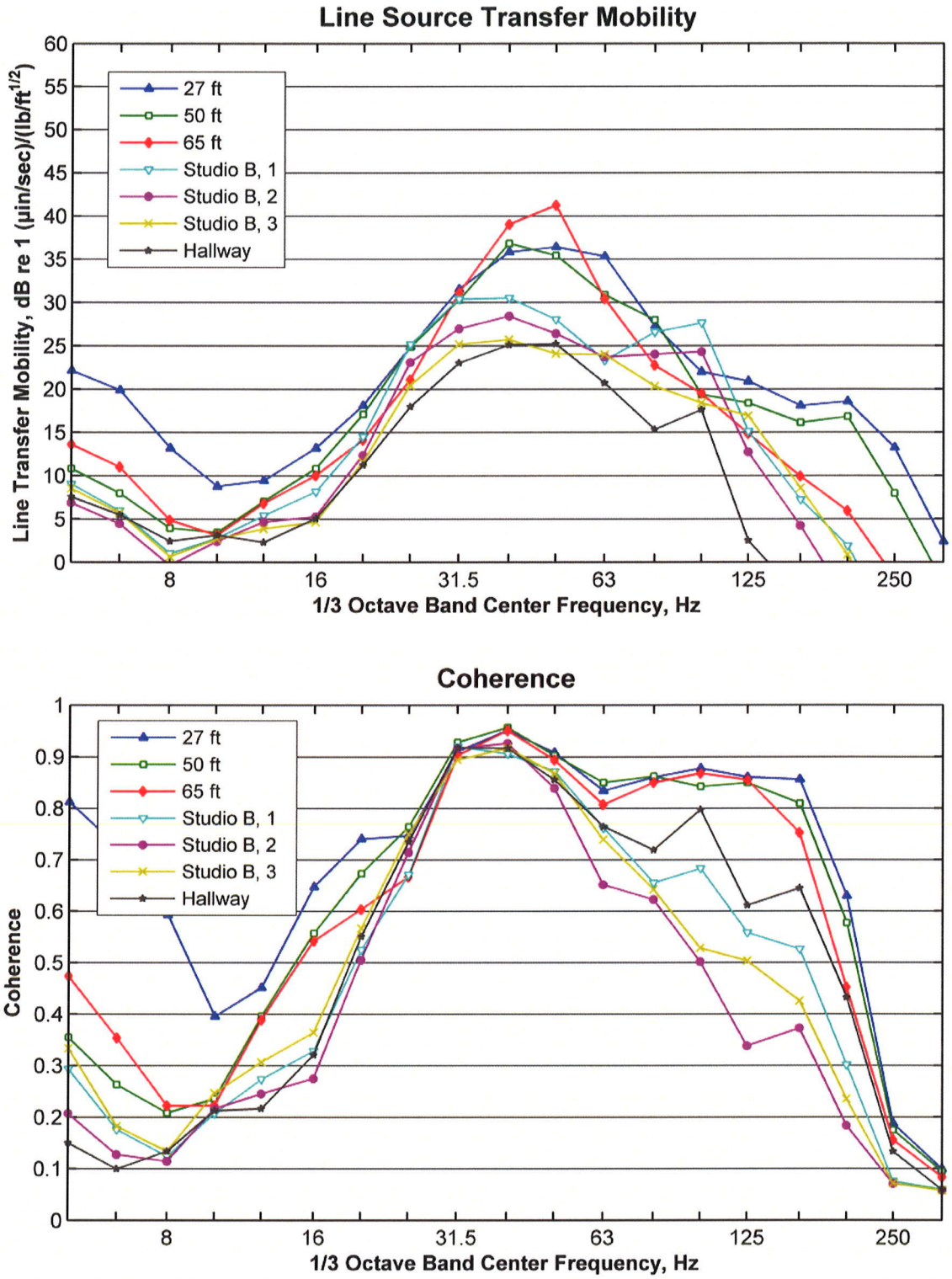


Figure 5-5: Line Source Transfer Mobility and Coherence Measured at the PNB School



The predicted groundborne vibration and groundborne noise levels for each indoor measurement location are shown in Table 5-2, Figure 5-6, and Figure 5-7. For groundborne vibration, a prediction is included for three indoor locations corresponding to the measurement locations inside Studio B. For groundborne noise, one prediction is included that is an average of all three measurement positions because the groundborne noise is the noise radiated off of all surfaces in the room.

The predicted levels for groundborne vibration are about 15 to 20 decibels below the impact threshold and the predicted level for the groundborne noise is 2 decibels below the impact threshold. Therefore, no vibration mitigation is recommended at the PNB School.

Table 5-2: Predicted Groundborne Noise and Vibration Levels at the PNB School (Parcel EL310)

Location	Predicted Vib. Vel. level in max. 1/3 octave band (VdB)	Max. 1/3 octave band	Vibration Impact Threshold (VdB)	Predicted Overall Groundborne Noise (dBA)	Groundborne Noise Impact Threshold (dBA)
Studio, corner	60	80 Hz	78	38	40
Studio, side wall	58	80 Hz	78		
Studio, center	54	80 Hz	78		

Figure 5-6: Predicted Groundborne Vibration Levels at the PNB School (Parcel EL310)

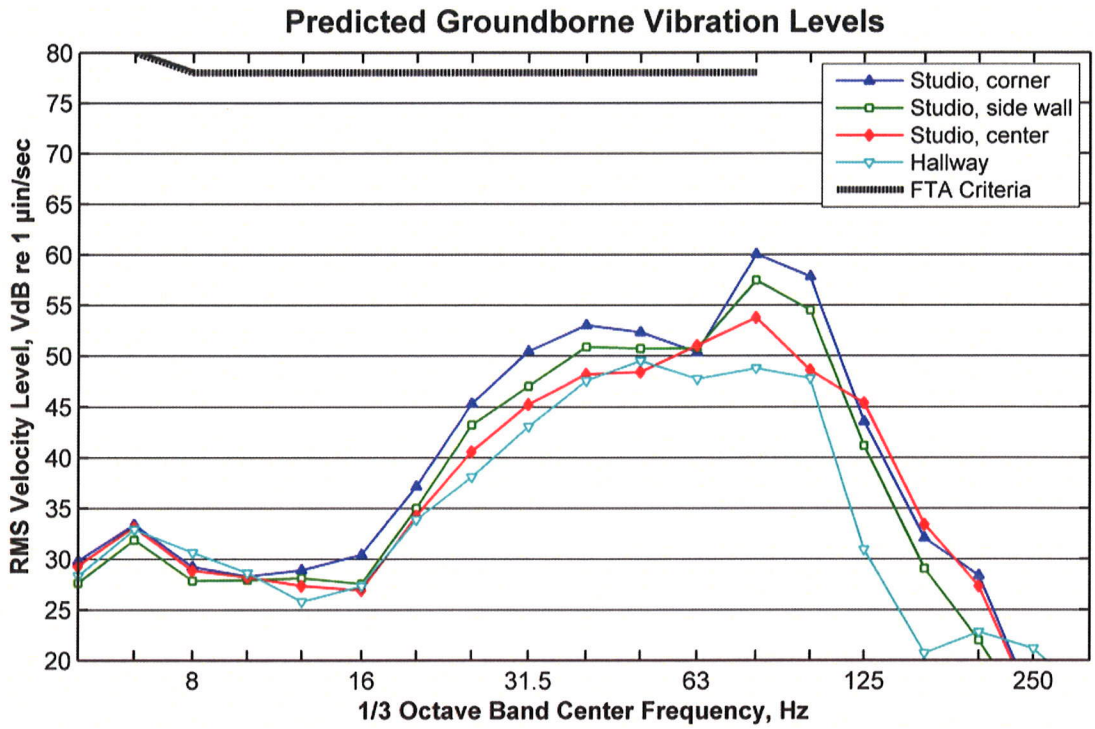
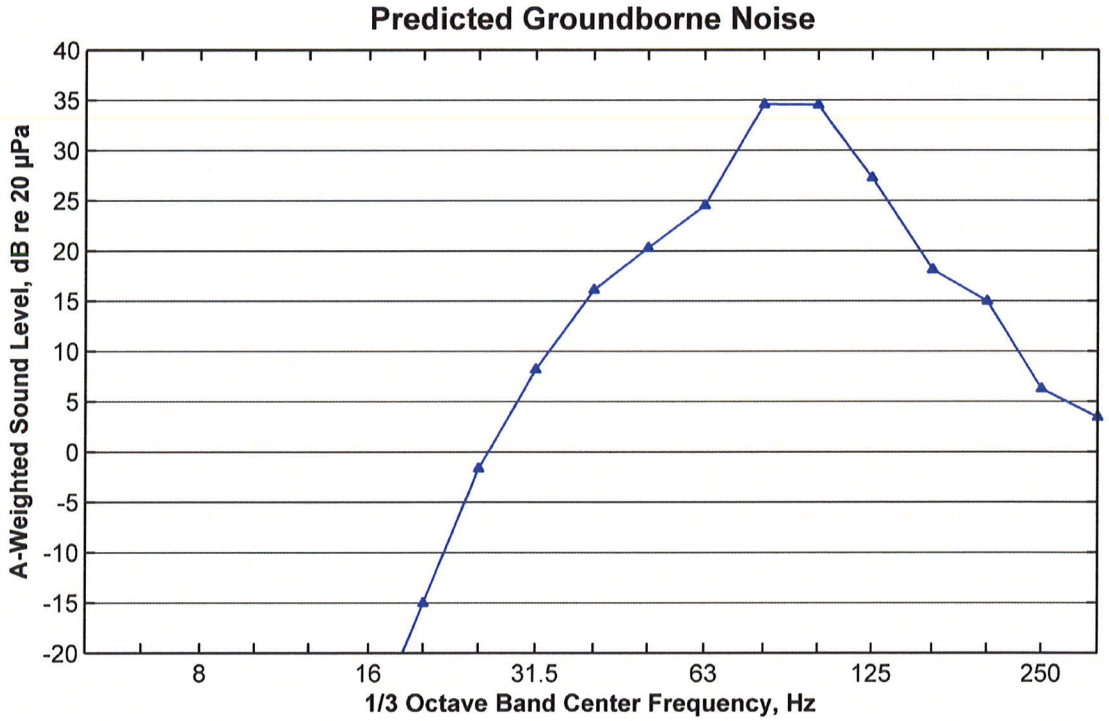


Figure 5-7: Predicted Groundborne Noise Levels at the PNB School (Parcel EL310)



perceptible. A 10-dB increase is judged by most people as an approximate doubling of the perceived loudness.

The two primary factors that reduce levels of environmental sounds are increasing the distance between the sound source and the receiver and having intervening obstacles such as walls, buildings, or terrain features that block the direct path between the sound source and the receiver. Factors that act to make environmental sounds louder include moving the sound source closer to the receiver, sound enhancements caused by reflections, and focusing caused by various meteorological conditions.

Following are brief definitions of the measures of environmental noise used in this study:

- *Maximum Sound Level (L_{max}):* L_{max} is the maximum sound level that occurs during an event such as a train passing. For this analysis L_{max} is defined as the maximum sound level using the slow setting on a standard sound level meter.
- *Equivalent Sound Level (L_{eq}):* Environmental sound fluctuates constantly. The equivalent sound level (L_{eq}) is the most common means of characterizing community noise. L_{eq} represents a constant sound that, over a specified period of time, has the same sound energy as the time-varying sound. L_{eq} is used by the FTA to evaluate noise effects at institutional land uses, such as Schools, churches, and libraries, from proposed transit projects.
- *Day-Night Sound Level (L_{dn}):* L_{dn} is basically a 24-hour L_{eq} with an adjustment to reflect the greater sensitivity of most people to nighttime noise. The adjustment is a 10 dB penalty for all sound that occurs between the hours of 10:00 p.m. to 7:00 a.m. The effect of the penalty is that, when calculating L_{dn}, any event that occurs during the nighttime is equivalent to ten occurrences of the same event during the daytime. L_{dn} is the most common measure of total community noise over a 24-hour period and is used by the FTA to evaluate residential noise effects from proposed transit projects.
- *L_{XX}:* This is the percent of time a sound level is exceeded during the measurement period. For example, the L_{99} is the sound level exceeded during 99 percent of the measurement period. For a 1-hour period, L_{99} is the sound level exceeded for all except 36 seconds of the hour. L_1 represents typical maximum sound levels, L_{33} is approximately equal to L_{eq} when free-flowing traffic is the dominant noise source, L_{50} is the median sound level, and L_{99} is close to the minimum sound level.
- *Sound Exposure Level (SEL):* SEL is a measure of the acoustic energy of an event such as a train passing. In essence, the acoustic energy of the event is compressed into a 1-second period. SEL increases as the sound level of the event increases and as the duration of the event increases. It is often used as an intermediate value in calculating overall metrics such as L_{eq} and L_{dn}.
- *Sound Transmission Class (STC):* STC ratings are used to compare the sound insulating effectiveness of different types of noise barriers, including windows, walls, etc. Although the amount of attenuation varies with frequency, the STC rating provides a rough estimate of the transmission loss from a particular window or wall.

Vibration Fundamentals

One potential community effect from the proposed project is vibration that is transmitted from the tracks through the ground to adjacent houses. This is referred to as *groundborne vibration*. When evaluating human response, groundborne vibration is usually expressed in terms of decibels using the root mean square (RMS) vibration velocity. RMS is defined as the average of the squared amplitude of the vibration signal. To avoid confusion with sound decibels, the abbreviation VdB is used for vibration decibels. All vibration decibels in this report use a decibel reference of 1 micro-inch/second (µin/sec.).[5] The potential adverse effects of rail transit groundborne vibration are as follows:

- **Perceptible Building Vibration:** This is when building occupants feel the vibration of the floor or other building surfaces. Experience has shown that the threshold of human perception is around 65 VdB and that vibration that exceeds 75 to 80 VdB may be intrusive and annoying to building occupants.
- **Rattle:** The building vibration can cause rattling of items on shelves and hanging on walls, and various different rattle and buzzing noises from windows and doors.
- **Reradiated Noise:** The vibration of room surfaces radiates sound waves that may be audible to humans. This is referred to as *groundborne noise*. When audible groundborne noise occurs, it sounds like a low-frequency rumble. When the LRT tracks are at-grade, the groundborne noise is usually masked by the normal airborne noise radiated from the transit vehicle and the rails.
- **Damage to Building Structures:** Although it is conceivable that vibration from a light-rail system could cause damage to fragile buildings, the vibration from light-rail transit systems is usually one to two orders of magnitude below the most restrictive thresholds for preventing building damage. Hence the vibration effect criteria focus on human annoyance, which occurs at much lower amplitudes than does building damage.

Vibration is an oscillatory motion that can be described in terms of the displacement, velocity, or acceleration of the motion. The response of humans to vibration is very complex. However, the general consensus is that for the vibration frequencies generated by passenger trains, human response is best approximated by the vibration velocity level. Therefore, vibration velocity has been used in this study to describe train-generated vibration levels.

When evaluating human response, groundborne vibration is usually expressed in terms of decibels using the root mean square (RMS) vibration velocity. RMS is defined as the average of the squared amplitude of the vibration signal. To avoid confusion with sound decibels, the abbreviation VdB is used for vibration decibels. All vibration decibels in this report use a decibel reference of 1 µin/sec.

Figure A-2 shows typical vibration levels from rail and non-rail sources as well as the human and structure response to such levels.

[5] One µin/sec= 10^{-6} in/sec.

East Link Light Rail Project-
South Bellevue to Overlake Transit Center
Contract 340

Final Sound and Vibration Peer Review
60% Construction Noise and Vibration Study and
90% Noise and Vibration Study-Operations

PREPARED FOR

CITY OF BELLEVUE
Department of Transportation

PREPARED BY

THE GREENBUSCH GROUP, INC.

OCTOBER 13, 2014

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1.0 INTRODUCTION

The E340 contract consists of trackway from approximately 124th Avenue NE, where E335 ends, to NE 20th St. where E360 begins. Noise and Vibration Studies have been completed for two elements of the project; construction and operation. The studies reviewed for this peer review were both authored by ATS Consulting, *Package E340 Construction Noise and Vibration Study 60% Submittal* August 12, 2013 and *Contract E340 Noise and Vibration report 90% Submittal Operations* , April 2, 2014.

Based on FTA methodology, only one location, the Pacific Northwest Ballet (PNB) School at the Francia Russell Center was considered noise sensitive. A second location, the Blue Sky Church was identified as potentially noise sensitive. However, the church is over 500 ft north of the LRT tracks which is beyond the FTA required screening distance for the operational noise. Noise levels from stationary sources at the Park and Ride are analyzed at this one location and compared with the Bellevue Code. Analysis of construction and rail operation impacts in relation to the Bellevue City Code was not conducted.

2.0 EXECUTIVE SUMMARY

Both studies identify noise sensitive properties according to FTA methodology. This approach does not recognize any commercial properties as noise sensitive, outside of institutional uses. This has limited the study of properties along the alignment to only PNB and Blue Sky Church. This is consistent with the FTA guidelines but not with the City of Bellevue Noise Code. It is also not consistent with the FTA Guidelines for vibration evaluation, which includes office buildings in Category 3.

Construction noise was evaluated using a computer model. Noise levels were predicted at two PNB Studios for four construction conditions; trackway preparation, roadway preparation, new roadway construction and rail installation. Other commercial facilities along the alignment were not evaluated. Given that the City of Bellevue exempts noise from construction activity during Daytime hours, as long as there is no night time work, these additional facilities may not need to be evaluated. It was acknowledged that any work after 6 PM or on Sundays or holidays would require a Variance. The study needs to be expanded to provide details necessary to evaluate Bellevue City Code against all properties.

Vibration related to construction was evaluated by FTA methodology, but only for potential structural damage, and only at PNB. Per FTA Guidelines the evaluation should extend to office buildings along the alignment as well. Hoe ram activity was identified as potentially causing structural damage at PNB. Monitoring vibration levels during high impact activities was recommended in the analysis. Human vibration response thresholds were also not considered. The Study should be expanded to

include the analysis of annoyance due to the construction, for both groundborne noise and groundborne vibration.

The operational airborne sound, groundborne noise and groundborne vibration were evaluated at PNB. The predicted noise and vibration levels fall within the FTA guidelines for impact. Bells were included in the FTA analysis. The recommended mitigation for both sound and vibration is reasonable against FTA guidelines.

Airborne, operational sound levels were not evaluated against Bellevue Noise Code. Bells, as warning devices, were exempted from Code analysis. Compliance with Bellevue Noise Code was evaluated at The Blue Sky Church, but only for the stationary sources at the Park and Ride, transformers and PA speakers. The Study concludes that the resulting levels at the Church are Code compliant, although predicted levels are not included in the Study.

In summary, the Studies should be expanded to include the following:

- Office Buildings in the vibration study.-FTA
- Human response to Ground Borne-Vibration in VdB-FTA
- Human response to Ground-Borne noise in dBA-FTA
- Operational noise for all properties along the alignment-City of Bellevue Code

Recommended mitigation methodology is reasonable. The Study identifies the following potential mitigation for investigation in final design:

- Absorption on sound walls if shown to reflect traffic noise.
- Use of non-audible warnings at gated and ungated at-grade crossings.
- Bell shrouds to direct sound at the gated crossings.
- Residential sound insulation where not already implemented.
- Noise mitigation after operations begin, if impacts are identified.

3.0 NOMENCLATURE

- **Decibel, dB**
  The most common measure of sound level is expressed in decibels. The auditory response to sound is a complex process, which occurs over a wide range of frequencies and intensities. Decibel levels, or “dB”, are a form of shorthand that compress this broad range of intensities into a convenient numerical scale.

  The decibel scale is logarithmic, and as such, a doubling or halving of energy causes the sound level to change by 3 dB; it does not double or halve the sound level as might be expected. The minimum sound level variation perceptible to a human observer is generally around 3 dB. A 5-dB change is clearly perceptible, and an 8 to 10 dB change is associated with a perceived doubling or halving of loudness.

- **A-weighted Decibel, dBA**
  The human ear has a unique response to sound pressure. It is less sensitive to those sounds falling outside the speech frequency range. Sound level meters utilize a filtering system to approximate human perception of sound. Measurements made utilizing this filtering system are referred to as "A weighted" and are called "dBA".

- **Day-Night Sound Level, L_{dn}**
  DNL is the L_{eq} calculated over a 24 hour interval, with sound levels occurring between 10:00 PM and 7:00 AM penalized by 10 dBA to reflect greater potential for disturbance. The DNL is closely related to the L_{dn}. It is the descriptor used by the FAA to assess noise impact of aircraft activity at an airport. Typically noise contours are drawn around an airport to determine areas of impact.

- **Equivalent Sound Level, L_{eq}**
  L_{eq} is the A-weighted level of a constant sound having the same energy content as the actual time-varying level during a specified interval. The L_{eq} is used to characterize complex, fluctuating sound levels with a single number. Typical intervals for L_{eq} are hourly, daily and annually.

- **Maximum Sound Level, L_{max}**
  L_{max} is the maximum recorded root mean square (rms) A-weighted sound level for a given time interval or event. L_{max} "fast" is defined as a 125-millisecond time-weighted maximum, while L_{max} "slow" corresponds to a 1-second time-weighted maximum.

- **Vibration Level**
  Vibration is an oscillatory motion, which can be measured in a variety of ways: displacement, velocity or acceleration. The displacement is a measure of the distance that a point moves away from its resting position. The velocity represents the instantaneous speed of the movement and acceleration is the rate of change of the speed.

- **Vibration Velocity Level, Lv**
  The Vibration Velocity Level (Lv) describes the maximum level of root-mean-square (RMS) vibration velocity of a measurement surface within a specified time period and frequency band. The value is expressed in decibels (VdB) referenced to 1 micro(μ)-inch per second and is commonly used to assess building occupant annoyance and equipment interference from vibration.

- **Peak Particle Velocity, PPV**
  Peak Particle Velocity (PPV) describes the maximum instantaneous vibration velocity of a measurement surface within a specified time period. The value is expressed in inches-per-second and is commonly used to assess building damage from vibration.

Table 1. Common Noise Sources

Sound	***Sound Pressure Level, (dBA)***	***Relative Loudness[1]***
Jet Plane 100'	130	128
Rock Music with Amplifier	120	64
Thunder, Danger of Permanent Hearing Loss	110	32
Boiler Shop, Power Mower	100	16
Orchestral Crescendo at 25 feet	90	8
Busy Street	80	4
Interior of Department Store	70	2
Ordinary Conversation	60	1
Quiet Car at Low Speed	50	½
Average Office	40	¼
City Residence, Interior	30	1/8
Quiet Country Residence, Interior	20	1/16
Rustle of Leaves	10	1/32
Threshold of Hearing	0	1/64

Note 1: As compared to ordinary conversation at 3 feet.
Source: US Department of Housing and Urban Development, Aircraft Noise Impact Planning Guidelines for Local Agencies, November 1972.

4.0 REGULATORY CRITERIA

4.1 FTA

The FTA evaluation considers ambient conditions in setting Noise Impact Criteria for public transit systems. Both existing ambient and the cumulative effect of the predicted project sound are used to determine the criteria for impact. The quieter the ambient condition, the greater exposure above ambient is allowed. Table 2 below outlines the FTA criteria.

4.1.1 Operational Noise Impact Criteria

Table 2. FTA Category 3 Noise Impact Criteria and Project Cumulative Noise Levels

Noise Levels Defining Impact for Transit Projects-Category 3 Sites				
Existing (Ambient) Noise Exposure L_{eq}	***Project Noise Impact Exposure L_{eq}***			***Allowable Increase Over Ambient, No Impact***
	No Impact	***Moderate Impact***	***Severe Impact***	
<43	<Ambient + 15	Ambient +15-20	>Ambient +20	<15
43	<57	57-63	>63	14
44	<57	57-63	>63	13
45	<57	57-63	>63	12
46	<58	57-63	>64	12
47	<58	58-64	>64	11
48	<58	58-64	>64	10
49	<59	58-64	>64	10
50	<59	59-64	>64	9
51	<59	59-64	>65	8
52	<60	60-65	>65	8
53	<60	60-65	>65	7
54	<60	60-66	>66	6
55	<61	61-66	>66	6
56	<61	61-67	>67	5
57	<62	62-67	>67	5
58	<62	62-67	>67	4
59	<63	63-68	>68	4
60	<63	63-68	>68	3
61	<64	64-69	>69	3
62	<64	64-69	>69	2
63	<65	65-70	>70	2
64	<66	66-70	>70	2
65	<66	66-71	>71	1
66	<67	67-72	>72	1
67	<68	68-72	>72	1
68	<68	68-73	>73	0
69	<69	69-74	>74	0
70	<70	70-74	>74	0
71	<71	71-75	>75	0
72	<71	71-76	>76	-1
73	<71	71-76	>76	-2
74	<71	71-77	>77	-3
75	<71	71-78	>78	-4
76	<71	71-79	>79	-5
77	<71	71-79	>79	-6
>77	<71	71-80	>80	>-6

Source: Table 3.1 Noise Impact Criteria: Effect on Cumulative Noise Exposure FTA Transit Noise and Vibration Impact Assessment, May 2006

4.1.2 Vibration Impact Criteria

Vibration Impact Criteria for Category 3 facilities includes schools, churches and other institutions, consistent with the Noise Impact Criteria. However, office buildings are also included in the Category 3 land use for evaluation of vibration. Peak particle velocity (PPV) is the descriptor typically used to assess building damage. It is not suitable for

evaluating human response to vibration, the rms value of VdB is typically used to assess tolerance thresholds.

With vibration comes the potential for Ground-Borne noise, which is the rumbling sound caused by the vibration of room surfaces.

Table 3. Ground-Borne Vibration (GBV) and Ground-Borne Noise (GBN) Impact Criteria for General Assessment.

Land Use Category	***GBV Impact Levels (VdB re 1 mips)***			***GBN Impact Levels (dB re 20 m PA***		
	Frequent Events[1]	***Occasional Events[2]***	***Infrequent Events[3]***	***Frequent Events[1]***	***Occasional Events[2]***	***Infrequent Events[3]***
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: Table 3.1 Noise Impact Criteria: Effect on Cumulative Noise Exposure FTA Transit Noise and Vibration Impact Assessment, May 2006

Notes:

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
2. “Occasional Events” is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.

Table 4. Construction Vibration Damage Criteria.

Building Category	***PPV (in/sec)***	***Approximate Lv, VdB re 1 mip***
Reinforced concrete, steel or timber (no plaster)	0.5	102
Engineered concrete and masonry (no plaster)	0.3	98
Non-engineered timber and masonry buildings	0.2	94
Buildings extremely susceptible to vibration damage	0.12	90

Source: Table 3.1 Noise Impact Criteria: Effect on Cumulative Noise Exposure FTA Transit Noise and Vibration Impact Assessment, May 2006

Section 12.2.2 of the FTA Manual instructs that “the criteria for General Assessment in Chapter 8 can be applied” to evaluate potential annoyance or interference… due to construction. Vibration criterion for an office is 84 VdB. PNB may have more stringent criterion that this.

4.2 City of Bellevue BCC 9.18.030 Maximum Permissible Environmental Noise Levels

Within the City of Bellevue, the Bellevue City Code (BCC) Chapter 9.18 governs noise levels. The Code designates maximum permissible noise levels by district of noise source and district of receiving property. These permissible sound levels are based on

the Environmental Designation for Noise Abatement ("EDNA") of the area, which, for Bellevue, is based on zoning as follows:

- Class A EDNA – Residential;
- Class B EDNA – Commercial;
- Class C EDNA – Industrial.

Permissible sound levels transmitted between two unrelated properties are listed in Table 5 below.

Table 5. Maximum Permissible Sound Levels by Receiving Property**,** dBA re: 20 µPa

	Receiving Property District		
Noise Source District	Residential	Commercial	Industrial
Residential	55	57	60
Commercial	57	**60**	65
Industrial	60	65	70

Source: BCC 9.18.030

Assuming both source (East Link) and receiver (PNB) are within Commercial zones, the baseline threshold would be 60 dBA.

However, BCC 9.18.030 C.3 allows an increase in the level for sounds with short duration. Periodic exceedances of baseline levels in any given hour are as follows:

- 5 dBA for 15 minutes, or;
- 10 dBA for 5 minutes, or;
- 15 dBA for 1.5 minutes.

In order to isolate shorter duration events that would utilize these exceedance allowances, the percent sound level (L_n) descriptors are used to correlate level with a percentage of time exceeded. While BCC 9.18 does not include guidance on how to assess these allowed exceedances, it is a widely accepted practice among acousticians evaluating sound levels for projects with this Code provision, to assign percent sound level (L_n) descriptors as shown in Tables 6. The threshold listed assumes that the public transportation corridor including the East Link 340 alignment is Commercially zoned property.

Table 6. Permissible Sound Levels at Residential Properties, dBA re: 20 µPa

Descriptor	Exceedance Allowance	Level Day/Night	Description
L_{25}	None – baseline Code level	60	Assures that the sound level is equal to the baseline level for at least 75% of the hour.
L_{08}	+5 dBA for 15 minutes	65	Applies the 5-dBA exceedance for short events.
L_{02}	+10 dBA for 5 minutes	70	Applies the 10-dBA exceedance for shorter events.
L_{max}	+15 dBA for 1.5 minutes	75	Assures the sound level of the shortest events never goes above the 15-dBA exceedance.

Source: The Greenbusch Group

Typically, one descriptor will be the most limiting for assessing the Code compliance of a specific activity. For example, a steady sound source would be limited by the baseline sound level, because it never has the opportunity to utilize exceedance allowances due to its constant and unchanging sound emission. In this case, the L_{25} would be used to assess the continuous sound generated. A louder event of shorter duration, such as the passing light rail, bells, wheel squeal or crossover impact, may utilize the exceedance allowances.

4.2 BCC 9.18.020 Exemptions

BCC 9.18.020 A. exempts the following sounds from the provisions outlined in 9.18.030.
Transportation sources

- Aircraft in flight
- Motor vehicles regulated by Washington Administrative Code (WAC) 173-62. WAC 173-62-020(6) offers the following definition for motor vehicles. "'Motor vehicle' means any vehicle which is self-propelled, used primarily for transporting persons or property upon public highways and required to be licensed under RCW 46.16.010 (aircraft, water craft and vehicles used exclusively on stationary rails or tracks are not motor vehicles as that term is used herein);"
- Surface carriers engaged in interstate commerce by railroad

Warning devices

- "Sounds created by safety and protective warning devices where noise suppression would render the device ineffective."

BCC 9.18.020 B. exempts the following sounds:
Bells

- Bells and chimes not operating for more than 5 minutes in any one hour at all Commercial and Industrial properties.
- Bells and chimes for not more than 5 minutes in any one hour between the hours of 7:00 AM and 10:00 PM on weekdays and 9:00 AM to 10:00 PM on weekends, if the receiving property is zoned Residential.

BCC 9.18.020 C. exempts:
Construction

- Sounds associated with construction between the hours of 7:00 AM and 6:00 PM on weekdays
- Sounds associated with construction between 9:00 AM and 6:00 PM on Saturdays which are not legal holidays
- Sounds associated with construction on Sundays and legal holidays and those outside of the exempt work hours must comply with provisions of 9.18.030 unless expanded hours are authorized by the applicable department director.

5.0 PEER REVIEW

CONSTRUCTION NOISE AND VIBRATION

Construction Vibration-FTA Compliance
Vibration levels were evaluated in peak particle velocity (PPV) for risk of structural damage. The hoe ram hammers were identified as exceeding the damage risk threshold at PNB.

The PPV descriptor is not suitable for evaluating human response to vibration. Ground-borne noise was also not evaluated. FTA has established impact criteria for both ground-borne vibration and ground-borne noise. The study should be expanded to look at human response as well.

Construction Noise-Bellevue City Code Compliance
The Study cites WAC173-60 as the regulatory jurisdiction for construction noise. Given that Bellevue BCC 9.18.020C addresses construction noise and is more restrictive (not less) than the State Code, WAC 173-60 does not have jurisdictional authority.

BCC 9.18.020C limits construction noise to between 7:00 AM to 6:00PM on weekdays and 9:00 AM to 6:00 PM on Saturdays. Construction noise, exceeding basic Code limits, is not allowed on legal holidays and Sundays.

The study has assumed the following construction activities near the noise sensitive receiver, PNB:

- trackway preparation
- demolition of existing roadways
- construction of new roadway

- embedded rail installation

The Study acknowledges that hours of construction will be during Daytime hours only as defined by City of Bellevue Noise Code BCC 9.18.020C. No night work, except as is necessary to complete concrete pours or bridge girder delivery, is anticipated. It is understood that a variance is required for any work outside of the exempted hours, and that location and activity specific mitigation measures (e.g. equipment muffling, notification of adjacent property owners, etc) will be imposed as part of the variance approval process.

Noise levels were predicted with a computer model, CadnaA v4.0. Two locations at PNB were considered; Studios A and C. Studio A is located nearer to the alignment than Studio C. Construction noise at Studio A was predicted to range between L_{max} 85 dBA to 88 dBA. Noise levels at Studio C ranged between L_{max} 77 dBA to 79 dBA, with the exception of new roadway construction which was predicted to be L_{max} 84 dBA. Given that there are no limits on the noise levels from construction during Daytime hours, no further evaluation is required.

Construction Noise and Vibration Mitigation
The Study acknowledges that the Contractor will be required to submit a Noise and Vibration Monitoring Plan, outlining monitoring that will take place during phases of construction that generate higher levels of noise and vibration.

OPERATIONS NOISE AND VIBRATION
Airborne Noise-FTA compliance
Operational noise levels were evaluated at the one noise sensitive property, PNB. The school was assessed in compliance with FTA methodology. FTA impact criteria is based on existing ambient. The ambient noise level at the PNB facility was measured at L_{eq} 59 dBA. This sets the FTA moderate impact criteria at L_{eq} 63 dBA. The predicted 1 hr L_{eq} from the operation of the light rail in 62 dBA. No impact was predicted. No additional mitigation is required. Although, it is acknowledged that the design for reconstruction of the school should include elements, such as double lazed windows, to insure that background noise levels inside classrooms and performance spaces will be acceptable.

Groundborne Noise-FTA Compliance
The analysis of the predicted groundborne noise was conducted in accordance with FTA protocol. Predictions reflect the sound level inside of one of the new Studios. The FTA impact threshold is 40 dBA. This is the most stringent category, assuming more than 70 vibration events daily. The predicted level is 38 dBA, assuming the embedded track. No additional mitigation is required.

Groundborne Vibration-FTA Compliance

The predicted groundborne vibration also reflects 3 locations inside of one of the new Studios at PNB. The analysis complies with FTA methodology. The FTA impact threshold is 78 VdB. The predicted levels range between 54 VdB and 60 VdB, significantly below the impact threshold.

Per the FTA Guidelines, one parcel is identified as a noise and vibration sensitive receiver, PNB. A second parcel, adjacent to the park and ride facility at 130th Avenue Station is identified as another sensitive receiver. The facility is the Blue Sky Church. However, the church is over 500 ft north of the LRT tracks which is beyond the FTA required screening distance for the operational noise. The church is screened for compliance with the City of Bellevue Noise Code from the stationary noise sources at the park-and-ride facility; a transformer and the PA system.

Airborne Noise-Bellevue City Code Compliance

The Study states that Bellevue's Noise Code applies only to stationary sources. As such they have evaluated the Park and Ride transformers and PA speakers against the Code limits. The Study concludes that noise levels from these sources will not exceed the Code. Looking at the sound levels associated with the transformer and the PA system, it is likely that the Code will be met. However, predicted sound levels at the Blue Sky Church are not included.

BCC 9.18 not evaluated for operational noise.Train bells and wayside pedestrian audible warning devices (AWD) are also not included in the Code analysis. The Study cites exemptions to warning devices in the Code.

City of Bellevue

Post Office Box 90012 ▪ Bellevue, Washington ▪ 98009 9012

October 17, 2014

Justin Lacson
Sound Transit
Union Station
401 S. Jackson Street
Seattle, WA 98104-2826

Subject: East Link Extension Bel Red Segment
124th Ave NE to WSDOT ROW
13-135564 LD

The purpose of this letter is to transmit the results of our third party peer review of the E340 Noise and Vibration Reports submitted as a revision to this permit on April 8, 2014. The attached report titled East Link Light Rail Project – South Bellevue to Overlake Transit Center Contract 340, prepared by The Greenbusch Group, Inc. contains the results of this review.

The City of Bellevue concurs with the findings and recommended expansion of the E340 Noise and Vibration Reports included in Section 2.0, Executive Summary. Airborne operational sound levels were not evaluated against the City of Bellevue Noise Code and operational sound generated by light rail trains is not exempt. Sound Transit must demonstrate that operational noise from light rail trains complies with Bellevue Noise Code maximum noise levels for all properties along the alignment included in this segment. An analysis of a representative sample of properties along the alignment beyond the two properties identified as sensitive noise receptors is required. An alternative method to demonstrate compliance with maximum noise levels along the entire alignment may be identified by Sound Transit or its consultant. This analysis must be submitted and reviewed by the city prior to issuance of the Design and Mitigation Permit.

Additional information regarding potential impacts to train operations or systems in the E340 segment is needed with the selection of the International Paper site for the Operations and Maintenance Satellite Facility (OMSF). The Draft Environmental Impact Statement (DEIS) prepared for the OMSF does not include an analysis of the cumulative impacts on train operations with the siting of a large maintenance facility and rail yard in close proximity to the E340 segment. Any impacts to operational noise as a result of the OMSF need to be identified.

If you have any additional questions regarding this letter feel free to contact me at mjackson@bellevuewa.gov.

REVISION SUBMITTAL
You will be required to resubmit this correspondence, along with a "Revisions/Additions Submittal Form" to the Permit Processing counter at City Hall.

Included in the resubmitted material must be an itemized response that demonstrates how all staff comments have been addressed.

Sincerely,

Matthews Jackson
Planning Manager

Cc Monica Buck, City Attorney's Office
Carol Helland, Development Services Department
Nancy Lacombe, Transportation Department
Arturo Chi, Utilities Department
Carl Wilson, Transportation Department
Travis Ripley, Fire Department

Memorandum

To:	Monica Buck, City of Bellevue, Assistant City Attorney
From:	Steve Sheehy, Sound Transit, Senior Legal Counsel Pat Schneider, Foster Pepper PLLC
Date:	November 6, 2014
Subject:	Bellevue's Third-party Review of the Bel-Red (E340) Noise and Vibration Report Regarding Operations

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The memo provides our legal analysis of fundamental issues raised by the "Final Sound and Vibration Peer Review" report dated October 13, 2014, which the City transmitted to Sound Transit as an attachment to the October 17, 2014 letter from Matthews Jackson, Development Services Department Planning Manager, to Justin Lacson, Sound Transit Assistant Permits Administrator.

This Peer Review states that the operation of Sound Transit's light rail transit vehicles in the Bel-Red (E340) segment of East Link must comply with the City's maximum permissible sound levels in BCC 9.18.030, and that Sound Transit must use the Ln metric in modeling such compliance. It also questions whether Sound Transit's Noise and Vibration Report is consistent with Federal Transit Administration (FTA) criteria.

For the reasons we explain below, the Peer Review's interpretation of the City's Noise Code is unlawful, and its interpretation of the FTA criteria mistaken. The Peer Review ignores the plain language of the Code and uses a metric ("Ln"), that is neither in the Code nor suitable for regulating noise from transit vehicles. The City of Bellevue's Development Services Department (DSD) is an administrative agency that may only exercise the authority that has been delegated to it by the City Council:

> The resolution of this case turns on a fundamental rule of administrative law—an agency may only do that which it is authorized to do by the Legislature. *In re Puget Sound Pilots Ass'n,* 63 Wash.2d 142, 146 n. 3, 385 P.2d 711 (1963); *Neah Bay Chamber of Commerce v. Department of Fisheries,* 119 Wash.2d 464, 469, 832 P.2d 1310 (1992).

Rettkowski v. Department of Ecology, 122Wn.2d 219, 226 (1993) (invalidating DOE order to cease and desist withdrawing water). The authority to regulate transit vehicles in the manner set forth in the Peer Review has not been delegated to DSD.

In addition, at the end of this memo we include an appendix prepared by Sound Transit staff that summarizes Sound Transit's actions already incorporated into the East Link Project to minimize noise from train operations.

A. DSD May Not Ignore the Plain Language of the Noise Control Code, Chapter 9.18

1. DSD may not ignore the exemption in 9.18.020.B.5

BCC 9.18.020.B.5 states:

> B. The following sounds are exempt from the provisions of this chapter at all times if the receiving property is in Class B and Class C EDNAs, and between the hours of 7:00 a.m. and 10:00 p.m. on weekdays and 9:00 a.m. and 10:00 p.m. on weekends if the receiving property is located in a Class A EDNA (except as noted below):
>
> * * *
>
> 5. Sound created by . . . operating or testing any motor vehicle . . .

All properties within the Bel-Red segment of East Link are in Class B and Class C EDNAs, and therefore all sounds created by motor vehicles within this segment are exempt from the Noise Code "at all times."

The Peer Review asserts that Sound Transit's vehicles are not exempt but does so without explaining why they are not motor vehicles, and without even acknowledging the existence of the exemption for motor vehicles. Does the Peer Review assume that light rail transit vehicles are not vehicles, or that they do not have motors? Light rail transit vehicles are vehicles with motors that are necessarily within the scope of this exemption by the plain terms of the Code.

It is a canon of statutory construction that meaning must be given to every word in a regulation:

> We must interpret this language so as to give it meaning, significance, and effect. *See In re Parentage of J.M.K.*, 155 Wash.2d 374, 393, 119 P.3d 840 (2005) (stating a court must not "simply ignore" express terms when interpreting a statute); *State ex rel. Baisden v. Preston*, 151 Wash. 175, 177, 275 P. 81 (1929) (stating a court must interpret a statute as a whole so that, if possible, " 'no clause, sentence, or word shall be superfluous, void, or insignificant' " (quoting *Wash. Mkt. Co. v. Hoffman*, 101 U.S. 112, 115–16, 25 L.Ed. 782 (1879))); *Murray v. Dep't of Labor & Indus.*, 151 Wash. 95, 102, 275 P. 66 (1929) (a court must, if possible, interpret a statute so as to give **every word** or phrase "meaning" as well as "significance and **effect**" (internal quotation marks omitted)).

Spokane County v. Eastern Washington Growth Management Hearings Board, 176 Wn. App. 555, 570-71 (2013).

Pages 8 and 9 of the Peer Review purport to identify the applicable exemptions from the Noise Code in BCC 9.18.020, but these pages, and the Peer Review as a whole, simply ignore the exemption in 9.18.020.B 5 for "motor vehicles." The fact that a vehicle with a motor serves a transit purpose or runs on rails does not mean it is not a motor vehicle, and while a consultant working for the City may be able to ignore the plain language in the Code, the City may not. *See Rettkowski*, *supra* at 227 ("An administrative agency cannot modify or amend a statute through its own regulation," citing *State v. Thompson*, 95 Wash.2d 753, 759, 630 P.2d 925 (1981)).

The exemption in BCC 9.18.020.B.5 is an exemption "at all times" for "any motor vehicle" in a Class B or C EDNA, and a daytime exemption in a Class A EDNA. This exemption has been part of the City's Noise Code since 1991 and the legislative history of this exemption is consistent with the plain meaning of the term "motor vehicle."

The state regulates noise from motor vehicles pursuant to the regulations adopted under RCW 70.107, Noise Control, which states in RCW 70.107.030(5):

> The Legislature recognizes that the operation of motor vehicles on public highways as defined in RCW 46.09.310 contributes significantly to environmental noise levels and directs the department [Ecology], in exercising the rule-making authority under the provisions of this section, to give first priority to the adoption of motor vehicle noise performance standards

Pursuant to this direction, the Department of Ecology promulgated two chapters of rules to regulate noise: first, the "Motor Vehicle Noise Performance Standards" in Chapter 173-62 that became effective July 1, 1975; and then, the Maximum Environmental Noise Levels" in Chapter 173-60 that became effective September 1, 1975.

WAC 173-62-020(6) defines "motor vehicle" for purposes of that chapter's regulation of noise from motor vehicles by tracking the definition in Title 46:

> (6) "Motor vehicle" means any vehicle which is self-propelled, used primarily for transporting persons or property upon public highways and required to be licensed under RCW 46.16.010 (aircraft, water craft and vehicles used exclusively on stationary rails or tracks are not motor vehicles as that term is used herein);

The fact that this definition of "motor vehicle" says that "vehicles used exclusively on stationary rails or tracks are not motor vehicles as that term is used herein" simply confirms that vehicles used on stationary rails or tracks are motor vehicles that would be regulated by this WAC if not expressly excluded.

Correspondingly, Chapter 173-60 regulates sounds from all motor vehicles not regulated by Chapter 173-62 because Chapter 173-60 limits its exemption for motor vehicles to those motor vehicles regulated by 173-62. Thus Section 173-60-050 states:

> (4) The following shall be exempt from all provisions of WAC 173-60-040 [maximum permissible noise levels]:
>
> (a) Sound created by motor vehicles when regulated by Chapter 173-62 WAC.

In other words, there is *no* exemption from the Maximum Permissible Environmental Noise Levels in 173-60-040 WAC for sounds created by motor vehicles that are not regulated by Chapter 173-62. Therefore, all other motor vehicles, including those "used exclusively on stationary rails or tracks," are subject to the maximum permissible noise levels in WAC 173-60-040.

In 1985, the City adopted these same "maximum permissible environmental noise levels and exemptions set forth in Washington Administrative Code 173-60-040" and codified them in a new Chapter 9.18 of the BCC (Ordinance No. 3491, section 1, passed May 6, 1985). Thus the City's first Noise Code exempted only "sounds created by motor vehicles when regulated by Chapter 173-62 WAC," and if the 1985 Code still applied today, light rail transit vehicles would be subject to the maximum permissible sound levels in BCC 9.18.030 because these motor vehicles are not regulated by Chapter 173-62 WAC.

The City, however, has the authority to adopt its own noise regulations so long as they are approved by Ecology pursuant to WAC 173-60-110. On April 15, 1991 the City Council passed Ordinance 4241, adopting additional exemptions that are not in the WAC, including the exemption for "any motor vehicle" that is presently codified in BCC 9.18.050.B.5 (this exemption originally was codified in 050.B.8).

Thus from 1991 until today, the City has had two exemptions for motor vehicles: (1) the complete exemption codified today in 9.18.020.A7 that applies at all times of the day and in all EDNAs for "motor vehicles when regulated by Chapter 173-62 WAC;" and (2) the partial exemption codified today in 9.18.020.B.5 that does not apply during nighttime hours in Class A EDNAs for "*any* motor vehicle" (emphasis added).

The partial exemption in 020.B.5 for "any motor vehicle" necessarily means what it says: it partially exempts *any* motor vehicle that is not completely exempted by 020.A.7. The City must give effect to every part of its Code, *Spokane County*, *supra* at 570 -71, and the only way to reconcile the complete exemption in A.7 with the partial exemption in B.5 is by recognizing the plain meaning of the words in the two regulations: the partial exemption applies to "*any* motor vehicle" that is not "regulated by WAC 173-62."

The Code regulates such motor vehicles by requiring them to comply with the City's "maximum permissible sound levels" during nighttime hours in Class A EDNAs, as set forth in

9.18.020.B.5. Sound Transit relied upon the partial exemption in 9.18.020.B.5 in preparing its DMP applications and noise reports, and DSD has been aware that Sound Transit would do so since February 2014 through discussions between staff and consultants. The noise reports submitted in support of the DMP applications recognize and conform to this partial exemption, but the Peer Review ignores the exemption without explanation.

DSD may not ignore the Code and may not vary the plain meaning of the words in the Code by making assumptions about legislative intent. For example, DSD may not assume that in 1991, long before the planning of East Link, that the City Council intended to exclude light rail transit vehicles from the phrase "any motor vehicle." In *Cox v. City of Lynnwood*, 72 Wn. App. 1 (1993), the City of Lynnwood denied a boundary line adjustment because, as the planning director testified, boundary line adjustments are intended for minor adjustments to lot lines and this particular adjustment was not minor even though it complied with the Code. The Court of Appeals affirmed a superior court decision reversing the City's denial and awarding damages to the applicant under both Chapter 64.40 RCW and 42 USC § 1983 on the grounds that the denial was arbitrary, capricious, and irrational:

> . . . there is no merit in Lynnwood's argument that it may look beyond whether the individual application complies with its ordinance and deny the boundary adjustment if it feels the application does not comport with the purposes and substance of the lot boundary adjustment ordinance.

Cox at 7. Similarly, DSD may not look beyond the plain meaning of the exemption in BCC 9.18.020.B.5 for "any motor vehicle" and administratively decide that transit vehicles with motors are not motor vehicles because they run on rails instead of on wheels. The exemption in 9.18.020.B.5 for "any motor vehicle" applies regardless of whether the motor vehicle runs on wheels or rails or treads, and regardless of whether the motor vehicle is operating on a street, in someone's back yard, on a commercial parking lot, or on a fixed rail transit system.

2. DSD may not ignore the Noise Code's metrics for regulating noise

The Noise Code does not require modeling of noise from the operation of light rail transit vehicles in the Bel-Red segment because all affected properties in that segment are in the Class B or C EDNA and the operation of all motor vehicles, including transit vehicles, is exempted by BCC 9.18.020.B.5. The Peer Review, however, not only says that such operations must be modeled, it says that they must be modeled using the Ln metric, which is neither defined nor used by the Noise Code. The Ln metric also is widely recognized as not appropriate for modeling noise from transportation sources.

Not only does the Peer Review ignore the exemption in 9.18.020.B.5, it ignores the fact that the only metrics for regulating noise that are defined and used in the Noise Control Code are Leq and Ldn. In fact, Section 3.0 of the Peer Review, entitled "Nomenclature," demonstrates succinctly just how indifferent the Peer Review is to the actual language of the Code. This

section not only defines terms that are not defined or used in Bellevue's Code, such as Lmax, this section also defines terms that are defined in Bellevue's Code, such as Leq, by defining them differently than the Code does. In addition, the metric that the Peer Review asserts should determine the maximum permissible sound levels from Sound Transit's operations, Ln, is not defined in the Peer Review's own Nomenclature section, let alone in the City's Code. The terms used in the Peer Review have no regulatory effect and cannot be used in place of the City's regulations. *See again, Rettkowski, supra* at 227 ("An administrative agency cannot modify or amend a statute through its own regulation.").

The Noise Code necessarily states its maximum permissible sound levels in either Leq or Ldn because those are the only metrics in the Code. Ldn is a "day-night average" that is entirely appropriate for modeling noise from transportation sources: for example, it is used by the FTA to model noise at locations where people sleep. However, in Class A EDNAs, where the partial exemption in 020.B.5 does not apply, Sound Transit modeled train noise using one-hour Leq, thereby averaging noise energy over each hour that the system is operating. In other words, Sound Transit used the metric in the City's Noise Code that results in the modeling of higher dBA levels and thus leads to more mitigation.

The Peer Review, however, in an extended discussion that completely ignores the actual regulations in the Noise Code, asserts that the City's maximum permissible sound levels are expressed in Ln (specifically L25, L08, and L02) and Lmax metrics, neither of which is defined in the Code.

Table 6 of the Peer Review then sets forth what the Ln and Lx metrics would mean for train operations in the E340 segment (Table 6 ignores the fact that train operations in the E340 segment are exempt as discussed above). According to Table 6:

- the maximum permissible sound level of 60 dBA in 9.18.030.B (which applies when both the noise source and the receiving property are in the Class B EDNA) is expressed as L25, which means that 60 dBA may not be exceeded more than 25 percent of the applicable time period
- the "increase by five dBA for 15 minutes in any one-hour period" allowed by 9.18.030.C.3.a is expressed as L08, which means that 65 dBA may not be exceeded for more than 8 percent of the applicable time period
- the "increase by 10 dBA for five minutes in any one-hour period" allowed by 9.18.030.C.3.b is expressed as L02, when means that 70 dBA may not be exceeded for more than 2 percent of the applicable time period
- the "increase by 15 dBA for 1.5 minutes in any one-hour period" allowed by 9.18.030.C.3.c is expressed as Lmax, which means that 75 dBA may not be exceeded any time for the applicable time period even for a single second.

Despite the fact that the Code describes these increases for short duration sounds as increases that apply "in any one-hour period," the Peer Review does not identify the applicable time period to which these Ln metrics of L25, L08, and L02 are to be applied. However, in discussions with Sound Transit's noise consultant, the author of the Peer Review stated that these Ln metrics should not be applied to one-hour periods, but to the duration of train events within each one-hour period. The consequences of this methodology would be staggering.

An example of the consequences using the Peer Review suggested methodology can be extrapolated from the South Bellevue DMP Application (E320) and Noise Impact Assessment (section 2.2). South Bellevue includes property within the Class A EDNA so the exemption applicable in Class B and C EDNA's does not apply and Sound Transit modeled noise from train operations on those parcels. Sound Transit's consultant calculated the duration of train events, assuming 16 one-way trips per hour (and using a "10 dBA down point" methodology). These calculations show that for trains traveling at 50 mph, the noise from 16 one-way trips (the maximum number) will be cumulatively audible for 1.8 minutes per hour. These calculations are equally valid for the Bel-Red segment. Using the Ln metric required by the Peer Review (rather than the Leq metric required by the Code), would mean that the L02 level of 70 dBA would be violated if the train noise exceeded 70 dBA for more than 2.16 seconds per hour (2.16 seconds is 2 percent of the 1.8 minutes of audible train sound per hour), and could not exceed 75 dBA at all.

According to the measurements taken by Sound Transit's noise consultant and set forth in the Bel-Red (E340) Noise and Vibration Report, the noise level from a one-car train traveling at 50 mph on ballast-and-tie track, measured at a 50-foot distance (which approximates the typical distance of a property line from a track) would be 84 dBA, and would increase to 88 dBA for trains travelling on direct-fixation track. Because each train event would be audible for 6.6 seconds for trains travelling at 50 mph, each train event would, by itself, violate, by well over 10 dBA, the L02 and Lmax limits set forth in Table 6 of the Peer Review.

Not only is the methodology in the Peer Review not based on the language of the City's Noise Control Code, but the methodology in the Peer Review makes no sense in terms of public policy. Leq, the applicable metric in the City's Code, is widely recognized by the Federal agencies that regulate noise from transportation sources as an appropriate metric to use when determining the impact that intermittent noise will have on people: Leq is used not only by the FTA for transit and rail noise but also by the FHWA for traffic noise and the FAA for aircraft noise. Leq is recognized as an appropriate metric for transportation noise because it is an energy average that reflects the cumulative effect of noise over a given period of time (such as an hour). The metric used by the Peer Review, Ln, is not an energy average and bears no relationship to how human beings respond to noise over time: it simply states an absolute sound level that may not be exceeded for more than the specified period of time (2.16 seconds according to the Peer Review, using the example given above). Ln is fundamentally unsuitable for assessing the impact of noise from transit operations on people, and Sound Transit's consultant, who works on transit projects throughout the country, is unaware of a single agency or jurisdiction that uses it for that purpose.

As we stated at the beginning of this memo, DSD is an administrative agency that may only exercise the powers that have been delegated to it by the City Council. *Rettkowski, supra*. DSD may not ignore the Code; instead , as a matter of law, it must give effect to all the language of the Code, including the Leq metric and the exemption in BCC 9.18.020.B.5 for sounds from "any motor vehicle." For the same reason, DSD may not import into the Code a metric that is not in the Code, that is fundamentally inconsistent with the Leq metric in the Code, and that makes no sense in terms of public policy.

B. The Peer Review Does Not Accurately Apply the FTA Criteria

Section 2.0, Executive Summary, of the Peer Review states that the E340 Noise and Vibration Study prepared by ATS Consulting did not recognize any commercial properties as noise sensitive outside of the institutional use at the PNB facility. In accordance with Section 3.2.1 Noise-Sensitive Land Uses of the FTA Guidance Manual ("Transit Noise and Vibration Impact Assessment," May 2006), the commercial properties along the E340 alignment are not considered noise sensitive. This section of the FTA Guidance Manual, on page 3-7, states that the FTA noise impact "*criteria do not apply to most commercial or industrial land uses because in general, the activities within these buildings are compatible with higher noise levels. They do apply to business uses which depend on quiet as an important part of operations, such as sound and motion picture recording studios"*. None of the commercial land uses along E340 includes recording studios or similar uses that depend on quiet.

The Peer Review also states that the ATS evaluation of construction vibration should be extended to office buildings along the E340 alignment. The East Link Project Final Environmental Impact Statement, Appendix H2 Noise and Vibration Technical Report July 2011 provided an assessment of the potential annoyance from construction vibration. The results of the Final EIS assessment concluded that because of the short duration of construction vibration activities, annoyance is usually not an issue. For longer-term activities, such as tunneling and associated muck train use, annoyance impact would be addressed. Therefore no further assessment was prepared for the E340 segment as part of the final design because such longer-term activities do not occur in this segment. This approach is consistent with the FTA Guidance Manual.

APPENDIX:

Summary of measures undertaken by Sound Transit to address operational noise impacts.

1. Sound Transit has tested the vehicles it owns and operates to determine their "actual" vehicle noise signature and used this signature in the most recent noise models to assure accurate results. The models were then calibrated with the field tests and verified.

2. All light rail vehicles are designed with wheel skirts (a cover over the wheel wells) which reduce noise from the rail-wheel interface, which is the primary source of noise from operating trains.

3. Sound Transit has a robust operations and maintenance program that minimizes noise from the light rail vehicles and rails:

    a. Rail grinding and replacement: As rails wear, noise levels from light rail operations can increase. By grinding or replacing worn rails, noise levels will remain at the projected levels.

    b. Vehicle Wheel truing and replacement: Wheel truing is a method of grinding down flat spots (commonly called "wheel flats") on the vehicle wheels. Flat spots occur primarily because of hard braking. When flat spots occur they can cause increases in the noise levels produced by the light rail vehicles.

    c. Vehicle maintenance: Vehicle maintenance includes performing scheduled and general maintenance on items such as air conditioning units, bearings, wheel skirts, and other mechanical units on the light rail vehicles. Keeping the mechanical systems on the light rail vehicles in top condition also helps to maintain the projected levels of noise and vibration.

    d. Operator training: Operators are trained to operate light rail vehicles at the speeds given in the operation plan that was used for the analysis and to avoid "hard-braking," which can cause wheel flats and may also damage the track. Furthermore, by training operators to identify potential wheel flats and other mechanical problems with the trains, proper maintenance is performed in a timelier manner.

4. Sound Transit hired a consultant to perform a rail-wheel study to better understand the source of rail-wheel noise and the methods that could be employed to reduce that noise. The recommendation was to re-profile the rails to better match the wheels and thus reduce rail-wheel noise. Sound Transit has now adopted a new rail profile and is implementing this on U-Link, Angle Lake, and Northgate Link extensions. These will also be used on the East Link extension. A second recommendation was to grind the head of the rails to a much smoother surface than is required for typical freight rail roads. This has been done on Central Link and is being done on the extensions listed above.

5. Experience on Central Link found that wheel squeal occurred on curves with a radius of 600-feet or less. All track curves with a radius of 600 feet or less near noise sensitive receivers will be built with a rail lubricator to reduce the noise in the curves. Curves between a radius of 600 feet up to 1250 feet will be built to easily accommodate lubricators in the event additional mitigation is required once revenue service begins.

6. Sound Transit knows from experience that ballasted track is quieter than paved track. Sound Transit is maximizing the use of ballasted track on East Link to take advantage of this track characteristic.

7. Cross-overs and switches are modeled to understand the noise they may produce. These switches are designed to meet the noise criteria where they are installed. Sound Transit will install all East Link switches on either ballasted track or on plinths so that they can easily be replaced in the event a quieter type switch is required to meet the noise requirement once revenue service begins.

8. The noise levels from audible safety warning devices have been reduced in general and at night when the ambient noise levels are lower. Normal operating Procedures only require train-mounted bells to be sounded two to three times as a train stops and starts at a station or approaches and passes through an at-grade crossing. The operator may sound the bell more times if they perceive a safety issue at a crossing. During daytime operations (6:00 a.m. and 10:00 p.m.) the bell is set at 80 dBA Lmax at 50 feet. During nighttime operations (10:00 p.m. and 6:00 a.m.) the bell is reduced to 72 dBA Lmax at 50-feet because background noise levels are lower at night. Wayside audible warning devices, located at the East Main Street Station, are designed to have adjustable noise levels and will have lower noise levels at night.

9. Sound Transit requested and received a review of its noise mitigation practices on Central Link from a special peer review panel put together by the American Public Transportation Association (APTA). The panel found that Sound Transit's commitment to noise mitigation exceeds the majority of North American light rail operations.

H

Court of Appeals of Washington,
Division 3.
SPOKANE COUNTY, a political subdivision of the State of Washington, Appellant,
v.
EASTERN WASHINGTON GROWTH MANAGEMENT HEARINGS BOARD, a statutory entity, and Kasi Harvey–Jarvis, Dan Henderson, Larry Kunz, McGlades, Inc., Neil Membrey, and Neighborhood Alliance of Spokane, Respondents.

No. 30725–5–III.
Sept. 10, 2013.

Background: County and property owner appealed decision of growth management hearings board that invalidated under Growth Management Act (GMA) the county's amendment to its comprehensive plan. The Superior Court, Spokane County, Jerome J. Leveque, J., reversed. Neighboring owners appealed. The Court of Appeals, 160 Wash.App. 274, 250 P.3d 1050,Sweeney, J., reversed decision of superior court. On remand, the Superior Court, Leveque, J., affirmed board's decision. County appealed.

Holdings: The Court of Appeals, Brown, J., held that:
(1) site-specific rezone which was done concurrently with amendment to comprehensive plan was not a project permit approval under Land Use Petition Act (LUPA) so as to vest exclusive jurisdiction in superior court over challenges to the rezone, but an amendment to a development regulation that hearings board had jurisdiction to review under GMA;
(2) finding of hearings board, that amendment to comprehensive plan violated GMA by failing to minimize and contain the intensification and infill of commercial use within logical outer boundary of Limited Area of More Intensive Rural Development (LAMIRD), was verity on appeal because county failed to assign error to it;
(3) checklist used by county in making threshold determination of environmental impact of amendment was inadequate under State Environmental Policy Act (SEPA);
(4) evidence supported hearing board's finding that continuing validity of county's amendment to comprehensive plan would substantially interfere with fulfilling the environmental protection goal of GMA; and
(5) hearings board accorded county's planning actions the required deference.

Judgment affirmed.

West Headnotes

[1] Administrative Law and Procedure 15A 795

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(E) Particular Questions, Review of
15Ak795 k. Jurisdictional questions. Most Cited Cases

Administrative Law and Procedure 15A 796

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(E) Particular Questions, Review of
15Ak796 k. Law questions in general. Most Cited Cases

Administrative Law and Procedure 15A 799

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(E) Particular Questions, Review of
15Ak799 k. Procedural questions. Most Cited Cases

Reviewing court reviews de novo, for legal error, whether an agency decision is outside the statutory authority or jurisdiction of the agency conferred by any provision of law, whether agency has engaged in unlawful procedure or decision-making process or has failed to follow a prescribed procedure, or whether agency has erroneously interpreted or applied the law. West's RCWA 34.05.570(3)(b–d).

[2] Zoning and Planning 414 1213

414 Zoning and Planning
414V Construction, Operation, and Effect
414V(A) In General
414k1211 Extrinsic Aids to Construction
414k1213 k. Construction by board or agency. Most Cited Cases

Reviewing court accords substantial weight to a hearings board's interpretation of the Growth Management Act (GMA), but that interpretation does not bind reviewing court. West's RCWA 36.70A.010 et seq.

[3] Administrative Law and Procedure 15A 749

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak749 k. Presumptions. Most Cited Cases

Administrative Law and Procedure 15A 787

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(E) Particular Questions, Review of
15Ak784 Fact Questions
15Ak787 k. Credibility. Most Cited Cases

Administrative Law and Procedure 15A 793

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(E) Particular Questions, Review of
15Ak784 Fact Questions
15Ak793 k. Weight of evidence. Most Cited Cases

On judicial review of agency order to determine whether it is supported by substantial evidence, evidence will be viewed in the light most favorable to the party who prevailed in the highest forum that exercised fact-finding authority, a process that necessarily entails acceptance of the factfinder's views regarding the credibility of witnesses and the weight to be given reasonable but competing inferences. West's RCWA 34.05.570(3)(e).

[4] Administrative Law and Procedure 15A 763

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak763 k. Arbitrary, unreasonable or capricious action; illegality. Most Cited Cases

When reviewing an agency decision under the "arbitrary and capricious" standard, reviewing court

determines whether the decision constitutes willful and unreasoning action, taken without regard to or consideration of the facts and circumstances surrounding the action. West's RCWA 34.05.570(3)(i).

[5] Administrative Law and Procedure 15A 763

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak763 k. Arbitrary, unreasonable or capricious action; illegality. Most Cited Cases

Where there is room for two opinions, an agency action taken after due consideration is not arbitrary and capricious even though a reviewing court may believe it to be erroneous. West's RCWA 34.05.570(3)(i).

[6] Zoning and Planning 414 1728

414 Zoning and Planning
414X Judicial Review or Relief
414X(D) Determination
414k1727 Effect of Decision
414k1728 k. In general. Most Cited Cases

Law of the case doctrine barred county, following appellate court decision that hearings board had jurisdiction under Growth Management Act (GMA) to review county's comprehensive plan amendment and a current rezone, from arguing on a subsequent appeal in same case that hearings board lacked jurisdiction to review the rezone because it was a site-specific land use decision within the superior court's exclusive jurisdiction under Land Use Petition Act (LUPA). West's RCWA 36.70A.030(4, 7), 36.70A.280(1)(a), 36.70A.290(2), 36.70B.020(4), 36.70C.020(2)(a).

[7] Zoning and Planning 414 1579

414 Zoning and Planning
414X Judicial Review or Relief
414X(A) In General
414k1579 k. Jurisdiction. Most Cited Cases

Site-specific rezone by county, which occurred concurrently with county's amendment to comprehensive plan, was not a "project permit approval" under Land Use Petition Act (LUPA) so as to vest exclusive jurisdiction in superior court over challenges to the rezone, but was instead an amendment to a development regulation that growth management hearings board had jurisdiction to review under Growth Management Act (GMA); rezone was not authorized by existing comprehensive plan, but required a change of property's existing comprehensive plan category from Urban Reserve to Limited Development Area (Commercial), and was therefore inexorably intertwined with amendment making that change. West's RCWA 36.70A.030(4, 7), 36.70A.280(1)(a), 36.70A.290(2), 36.70B.020(4), 36.70C.020(2)(a), 36.70C.030(1)(a)(ii).

[8] Zoning and Planning 414 1579

414 Zoning and Planning
414X Judicial Review or Relief
414X(A) In General
414k1579 k. Jurisdiction. Most Cited Cases

A site-specific rezone is a "project permit approval" within the superior court's exclusive jurisdiction under the Land Use Petition Act (LUPA) if it is authorized by a then-existing comprehensive plan and, by contrast, is an amendment to a development regulation under the Growth Management Act (GMA), and therefore reviewable by a hearings board, if it implements a comprehensive plan amendment. West's RCWA 36.70A.030(4, 7), 36.70A.280(1)(a), 36.70A.290(2), 36.70B.020(4), 36.70C.020(2)(a),

36.70C.030(1)(a)(ii).

[9] Zoning and Planning 414 1343

414 Zoning and Planning
414VII Administration in General
414k1335 Proceedings in General
414k1343 k. Administrative review. Most Cited Cases

A county's planning action is clearly erroneous under the Growth Management Act (GMA) if it leaves a hearings board with a firm and definite conviction that a mistake has been committed. West's RCWA 36.70A.320(1, 3).

[10] Zoning and Planning 414 1044

414 Zoning and Planning
414II Validity of Zoning Regulations
414II(A) In General
414k1044 k. Conformity of regulations to comprehensive or general plan. Most Cited Cases

To comply with Growth Management Act, (GMA) a development regulation need not strictly adhere to comprehensive plan but must generally conform to it. West's RCWA 36.70A.040(3)(d), (4)(d), (5)(d), 36.70A.130(1)(d); WAC 365–196–805(1).

[11] Zoning and Planning 414 1615

414 Zoning and Planning
414X Judicial Review or Relief
414X(B) Proceedings
414k1615 k. Assignment of errors and briefs. Most Cited Cases

Finding of growth management hearings board, that amendment to county's comprehensive plan failed to minimize and contain the intensification and infill of commercial use within logical outer boundary of Limited Area of More Intensive Rural Development (LAMIRD), and therefore violated Growth Management Act (GMA), was a verity on appeal because county did not assign error to it. West's RCWA 36.70A.070(5)(d)(iv); WAC 365–196–425(6)(c)(i)(B–E); RAP 10.3(g, h).

[12] Environmental Law 149E 595(2)

149E Environmental Law
149EXII Assessments and Impact Statements
149Ek584 Necessity for Preparation of Statement, Consideration of Factors, or Other Compliance with Requirements
149Ek595 Particular Projects
149Ek595(2) k. Land use in general. Most Cited Cases

Checklist used by county in making threshold determination as to environmental impact of proposed amendment to comprehensive plan and concurrent site-specific rezone changing designation of property to Limited Development Area (Commercial) was inadequate under State Environmental Policy Act (SEPA); checklist ignored probable impacts of any future commercial development that the amendment would allow, improperly postponed environmental analysis to the project review stage, and lacked required particularity in failing to address, for example, the probable impacts on water quality. West's RCWA 43.21C.030(2)(c); WAC 197–11–330(1).

[13] Zoning and Planning 414 1160

414 Zoning and Planning
414III Modification or Amendment; Rezoning
414III(A) In General
414k1158 Particular Uses or Restrictions
414k1160 k. Changes to comprehensive or general plan. Most Cited Cases

Finding of hearings board, that the continuing validity of county's amendment to its comprehensive plan would substantially interfere with fulfilling the environmental protection goal of the Growth Management Act (GMA), was supported by evidence that county, in failing comply with State Environmental Policy Act (SEPA) when adopting amendment, threatened a critical aquifer recharge area with high susceptibility and disused the best available science for mitigating probable environmental impacts. West's RCWA 36.70A.030(5)(b), 36.70A.060(2), 36.70A.070(5)(c)(iv), 36.70A.170(1)(d), 36.70A.172(1), 36.70A.302(1), 43.21C.030(2)(c); WAC 197–11–330(1), 365–196–200(5)(b), 365–196–485(1)(b), (2), (3)(a, c, d).

[14] Zoning and Planning 414 1343

414 Zoning and Planning
414VII Administration in General
414k1335 Proceedings in General
414k1343 k. Administrative review. Most Cited Cases

Hearings board accorded county's planning actions the required deference in invalidating under Growth Management Act (GMA) the county's comprehensive plan amendment and concurrent rezone that changed property's designation to Limited Development Area (Commercial); hearings board initially presumed the amendment and rezone were valid but ultimately found them clearly erroneous in light of entire record and GMA's goals and requirements. West's RCWA 34.05.570(3)(c), 36.70A.320(1, 3), 36.70A.3201.

[15] Zoning and Planning 414 1620

414 Zoning and Planning
414X Judicial Review or Relief
414X(C) Scope of Review
414X(C)1 In General
414k1620 k. In general. Most Cited Cases

Deference under Growth Management Act (GMA) to county planning actions that are consistent with GMA's goals and requirements supersedes deference under Administrative Procedure Act (APA) to administrative adjudications, and, thus, reviewing court will not defer to a hearings board if it fails to accord a county the required deference. West's RCWA 34.05.570, 36.70A.3201.

[16] Zoning and Planning 414 1730

414 Zoning and Planning
414X Judicial Review or Relief
414X(D) Determination
414k1730 k. Costs; attorney fees. Most Cited Cases

Regulatory Reform Act did not authorize an award of attorney fees to neighboring owners, as respondents to county's unsuccessful appeal from decision of growth management hearings board that county's amendment to comprehensive plan and concurrent site-specific rezone violated Growth Management Act (GMA) and State Environmental Policy Act (SEPA); Regulatory Reform Act did not apply to the comprehensive plan amendment or concurrent rezone, and neighboring owners did not prevail before county commissioners or a hearing examiner. West's RCWA 4.84.370, 36.70A.010 et seq., 43.21C.010 et seq.

[17] Zoning and Planning 414 1730

414 Zoning and Planning
414X Judicial Review or Relief
414X(D) Determination
414k1730 k. Costs; attorney fees. Most Cited Cases

Equal Access to Justice Act did not authorize an award of attorney fees to neighboring property owners, as respondents to county's unsuccessful appeal from hearings board's decision that county's amendment to comprehensive plan and concurrent site-specific rezone violated Growth Management Act (GMA) and State Environmental Policy Act (SEPA). West's RCWA 4.84.340 et seq., 36.70A.010 et seq., 43.21C.010 et seq.

****676** David W. Hubert, Attorney at Law, Spokane, WA, for Appellant.

Richard Kirk Eichstaedt, Center for Justice, Frederick Joseph Dullanty Jr., Attorney at Law, Nathan Graham Smith, Attorney at Law, Spokane, WA, for Respondents.

Diane L. McDaniel, Attorney at Law, Olympia, WA, for Other Parties.

BROWN, J.

561** ¶ 1 Spokane County appeals for the second time an Eastern Washington Growth Management Hearings Board decision that invalidated the County's planning actions in amendment 07–CPA–05. *See* ***562Spokane County v. E. Wash., Growth Mgmt. Hr'gs Bd. (Spokane County I),* 160 Wash.App. 274, 250 P.3d 1050, *review denied*, 171 Wash.2d 1034, 257 P.3d 662 (2011) (holding the hearings board had subject matter jurisdiction to review amendment 07–CPA–05). The hearings board decided the County had failed to comply with the Growth Management Act (GMA), chapter 36.70A RCW, and the State Environmental Policy Act (SEPA), chapter 43.21C RCW, when it adopted amendment 07–CPA–05. The superior court affirmed on remand from *Spokane County I.*

¶ 2 Although *Spokane County I* explained the hearings board's jurisdiction extended to both the comprehensive plan amendment and the concurrent rezone, the County asserts the hearings board lacks jurisdiction over the rezone. Specifically, the County contends the hearings board lacked authority to review the rezone because it is a site-specific land use decision within the superior court's exclusive jurisdiction under the Land Use Petition Act (LUPA), chapter 36.70C RCW. We again reject this contention because the rezone was not authorized by the then-existing comprehensive plan, but rather implements the comprehensive plan amendment, over which the hearings board had jurisdiction. Additionally, we reject the County's contentions that the hearings board's decision fails to accord proper deference, lacks substantial evidence, erroneously interprets and applies the law, and is arbitrary and capricious. Accordingly, we affirm.

FACTS

¶ 3 In December 2004, McGlades LLC purchased a 4.2 acre land parcel in Spokane County, on which the prior owners had operated a produce store that did not conform to the property's Urban Reserve zone designation. In June 2005, McGlades obtained building and restaurant permits, and expanded its nonconforming use into a market and bistro. McGlades soon applied unsuccessfully****677** for a conditional use permit, requesting further expansion to include ***563** an asphalt driveway and drive-through espresso service, asphalt parking lot with spaces for 39 vehicles, outdoor dining and entertainment with seating for 64 patrons, and on-site alcohol consumption. McGlades then proposed amendments to the County's comprehensive plan map and zoning map that would change the property's comprehensive plan category and zone designation to Limited Development Area (Commercial). In July 2006, while the County contemplated the proposal, McGlades obtained a temporary use permit and presumably began expansion. But McGlades soon closed its business when the temporary use permit expired in January 2007. McGlades does not participate in this second appeal. The facts are unchanged from *Spokane County I,* 160 Wash.App. at 278–80,

250 P.3d 1050.

¶ 4 In September 2007, the County issued a SEPA environmental checklist and corresponding determination of nonsignificance for McGlades's proposal and seven others. The County concluded SEPA did not require environmental impact statements because the proposals presented "no probable significant adverse impacts." Administrative Record (AR) at 59, 63. Specifically, the County characterized the proposals as nonproject actions, leaving much of the required environmental analysis "[t]o be determined if site specific developments are proposed." AR at 43. Neighboring landowners Dan Henderson, Larry Kunz, and Neil Membrey unsuccessfully appealed the County's threshold determination to the County Hearing Examiner.

¶ 5 On December 21, 2007, the Board of County Commissioners passed Resolution 07–1096, adopting McGlades's proposal along with seven others during the annual comprehensive plan amendment cycle. The resolution incorporated McGlades's proposal as amendment 07–CPA–05. Neighboring landowners Kasi Harvey–Jarvis, Dan Henderson, Larry Kunz, and Neil Membrey, along with the Neighborhood Alliance of Spokane (collectively the Neighbors), successfully appealed the resolution to the hearings board. The hearings board decided (1) amendment 07–CPA–05 designated***564** a new Limited Area of More Intensive Rural Development (LAMIRD) without observing applicable GMA requirements, (2) the environmental checklist was inadequate under SEPA because it did not fully disclose or carefully consider amendment 07–CPA–05's probable long-term effects, and (3) amendment 07–CPA–05 is invalid because its continued validity would substantially interfere with fulfilling the GMA's goals of promoting urban growth, reducing sprawl, and protecting the environment.

¶ 6 The superior court reversed the hearings board's decision upon the County's appeal and this court reversed the superior court's decision upon the Neighbors' appeal. *Spokane County I,* 160 Wash.App. 274, 250 P.3d 1050. On remand, the superior court affirmed the hearings board's decision. The County again appealed to this court.

REVIEW STANDARD

[1] ¶ 7 We review a hearings board decision under the Administrative Procedure Act (APA), chapter 34.05 RCW. *Feil v. E. Wash. Growth Mgmt. Hr'gs Bd.,* 172 Wash.2d 367, 376, 259 P.3d 227 (2011); *see* RCW 34.05.510. We apply APA standards directly to the hearings board record, performing the same function as the superior court. *City of Redmond v. Cent. Puget Sound Growth Mgmt. Hr'gs Bd.,* 136 Wash.2d 38, 45, 959 P.2d 1091 (1998); *see* RCW 34.05.526. The party challenging the hearings board decision (here the County) bears the burden of proving it is invalid. RCW 34.05.570(1)(a). The decision is invalid if it suffers from at least one of nine enumerated infirmities. RCW 34.05.570(3). We must grant relief from the decision if, as relevant here:

> (b) The order is outside the statutory authority or jurisdiction of the agency conferred by any provision of law;
>
> (c) The agency has engaged in unlawful procedure or decision-making process, or has failed to follow a prescribed procedure;
>
> ***565** d) The agency has erroneously interpreted or applied the law;
>
> ****678** (e) The order is not supported by evidence that is substantial when viewed in light of the whole record ...; [or]
>
> ....
>
> (i) The order is arbitrary or capricious.

RCW 34.05.570(3)(b)-(e), (i).

[2] ¶ 8 Our review is de novo under RCW 34.05.570(3)(b) through (d), determining whether the decision contains a legal error. *Kittitas County v. E. Wash. Growth Mgmt. Hr'gs Bd.*, 172 Wash.2d 144, 155, 256 P.3d 1193 (2011). We accord a hearings board's interpretation of the GMA "substantial weight." *King County v. Cent. Puget Sound Growth Mgmt. Hr'gs Bd.*, 142 Wash.2d 543, 553, 14 P.3d 133 (2000). But the interpretation does not bind us. *City of Redmond*, 136 Wash.2d at 46, 959 P.2d 1091.

[3] ¶ 9 We apply the substantial evidence review standard to challenges under RCW 34.05.570(3)(e), determining whether there exists " 'a sufficient quantity of evidence to persuade a fair-minded person of the truth or correctness of the order.' " *City of Redmond*, 136 Wash.2d at 46, 959 P.2d 1091 (quoting *Callecod v. Wash. State Patrol*, 84 Wash.App. 663, 673, 929 P.2d 510 (1997)). We view the evidence "in the light most favorable to ... 'the party who prevailed in the highest forum that exercised fact-finding authority.' " *City of Univ. Place v. McGuire*, 144 Wash.2d 640, 652, 30 P.3d 453 (2001) (quoting *State ex rel. Lige & Wm. B. Dickson Co. v. County of Pierce*, 65 Wash.App. 614, 618, 829 P.2d 217 (1992)). Doing so " 'necessarily entails accept[ing] the factfinder's views regarding the credibility of witnesses and the weight to be given reasonable but competing inferences.' " *Id.* (quoting *Lige & Wm. B. Dickson Co.*, 65 Wash.App. at 618, 829 P.2d 217).

[4][5] ¶ 10 We apply the arbitrary and capricious review standard to challenges under RCW 34.05.570(3)(i), determining whether the decision constitutes " 'willful and unreasoning action, taken without regard to or consideration ***566** of the facts and circumstances surrounding the action.' " *City of Redmond*, 136 Wash.2d at 46–47, 959 P.2d 1091 (quoting *Kendall v. Douglas, Grant, Lincoln & Okanogan Counties Pub. Hosp. Dist. No. 6*, 118 Wash.2d 1, 14, 820 P.2d 497 (1991)). " 'Where there is room for two opinions, an action taken after due consideration is not arbitrary and capricious even though a reviewing court may believe it to be erroneous.' " *Id.* at 47, 959 P.2d 1091 (quoting *Kendall*, 118 Wash.2d at 14, 820 P.2d 497).

ANALYSIS

A. Law of the Case

[6] ¶ 11 The Neighbors argue *Spokane County I* precludes the County's contention that the hearings board lacked subject matter jurisdiction over the rezone. The County responds *Spokane County I* solely decided the hearings board had jurisdiction over the comprehensive plan amendment. We agree with the Neighbors but, as explained below, we choose to clarify the principles we established in *Spokane County I*.

¶ 12 "The law of the case doctrine provides that once there is an appellate court ruling, its holding must be followed in all of the subsequent stages of the same litigation." *State v. Schwab*, 163 Wash.2d 664, 672, 185 P.3d 1151 (2008) (citing *Roberson v. Perez*, 156 Wash.2d 33, 41, 123 P.3d 844 (2005)). Thus, " 'questions determined on appeal, or which might have been determined had they been presented, will not again be considered on a subsequent appeal if there is no substantial change in the evidence.' " *Folsom v. County of Spokane*, 111 Wash.2d 256, 263, 759 P.2d 1196 (1988) (quoting *Adamson v. Traylor*, 66 Wash.2d 338, 339, 402 P.2d 499 (1965)). We retain discretion on whether to apply the doctrine:

> The appellate court may at the instance of a party review the propriety of an earlier decision of the appellate court in the same case and, where justice would best be served, decide the ***567** case on the basis of the appellate court's opinion of the law at the time of the later review.
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> RAP 2.5(c)(2).

¶ 13 In *Spokane County I*, the superior court ruled

the hearings board lacked jurisdiction to review the comprehensive plan amendment and concurrent rezone because they together constituted a site-specific land use decision within the superior court's exclusive****679** jurisdiction under LUPA. 160 Wash.App. at 280, 250 P.3d 1050. The Neighbors sought this court's relief, contending "the change here, site specific or not, amounted to an amendment of the County's comprehensive plan and therefore review was properly with the Hearings Board" under the GMA. *Id.* McGlades responded "this was a site-specific rezone over which the Hearings Board had no jurisdiction." *Id.* The County deferred to McGlades's argument on this issue. Resp't Spokane County's Resp. Br. at 5, *Spokane County I,* 160 Wash.App. 274, 250 P.3d 1050 (No. 28350–0–III). We reversed the superior court and affirmed the hearings board, reasoning:

> Growth management hearings boards have exclusive authority to rule on challenges alleging that a governmental agency is not in compliance with the requirements of the GMA. The hearings boards have jurisdiction to review petitions challenging whether a county's comprehensive plan, development regulations, and permanent amendments to the plan comply with the GMA. A hearings board does "not have jurisdiction to decide challenges to site-specific land use decisions because site-specific land use decisions do not qualify as comprehensive plans or development regulations."
>
> *Site-specific rezones authorized by an existing comprehensive plan are treated differently from amendments to comprehensive plans or development regulations.* [LUPA] governs site-specific land use decisions and the superior court has exclusive jurisdiction over petitions that challenge site-specific land use decisions. However, "[t]he superior court may decide only whether a site-specific land use decision complies with a comprehensive plan and/or development regulation," *not whether the rezone complies with the GMA.* LUPA does not apply to local ***568** land use decisions "that are subject to review by a quasi-judicial body created by state law, such as ... the growth management hearings board."
>
> ....
>
> The GMA does not make a distinction between site-specific and general comprehensive plan map amendments. Nor does the GMA recognize a single reclassification approach of "site specific Comprehensive Plan Maps," urged by McGlades. The Hearings Board had jurisdiction to review the petition.
>
> ....
>
> We ... reverse the decision of the superior court ruling that the Eastern Washington Growth Management Hearings Board did not have jurisdiction over the comprehensive plan amendment.

Id. at 280–81, 283, 286, 250 P.3d 1050 (second alteration and first omission in original) (emphasis added) (citations omitted).

¶ 14 In sum, *Spokane County I* held the hearings board had GMA authority to consider the Neighbors' petition. Because the Neighbors' petition alleged "Spokane County unlawfully amend[ed] the Spokane County Comprehensive Plan *and County Zoning map,*" AR at 1 (emphasis added), the *Spokane County I* court explained the hearings board had subject matter jurisdiction to review both the comprehensive plan amendment and concurrent rezone under the GMA, thereby rejecting McGlades's site-specific rezone arguments. Contrary to law of the case principles, the County again contends, as did McGlades in *Spokane County I,* that the hearings board lacked jurisdiction to review the rezone because it is a site-specific land use decision within the superior court's exclusive jurisdiction under LUPA. Even so, we exercise our discretion to further clarify the rule we established in

Spokane County I.

B. Jurisdiction

¶ 15 The issue is whether the hearings board had subject matter jurisdiction to review amendment 07–CPA–05's***569** rezone under the GMA. The County contends the rezone is within the superior court's exclusive jurisdiction under LUPA, We review the hearings board's assertion of jurisdiction de novo. RCW 34.05.570(3)(b); *Kittitas County,* 172 Wash.2d at 155, 256 P.3d 1193.

¶ 16 Certain local governments like Spokane County must "adopt a comprehensive plan under [the GMA] and development regulations that are consistent with and implement the comprehensive plan." ****680**RCW 36.70A.040(3)(d), (4)(d), (5)(d). If a county amends its comprehensive plan, it must concurrently adopt or amend consistent implementing development regulations. WAC 365–196–805(1). A comprehensive plan is a county's "generalized coordinated land use policy statement." RCW 36.70A.030(4). Development regulations are a county's "controls placed on development or land use activities ..., including ... zoning ordinances." RCW 36.70A.030(7). But a "decision to approve a project permit application" is not a development regulation, even if it appears in a legislative resolution or ordinance. *Id.* Instead, a project permit approval is a "land use decision" under LUPA. RCW 36.70C.020(2)(a). Project permit applications include proposals for "site-specific rezones authorized by a comprehensive plan" but exclude proposals for "the adoption or amendment of a comprehensive plan ... or development regulations." RCW 36.70B.020(4).

¶ 17 Regional hearings boards have exclusive jurisdiction to review petitions alleging a county did not comply with the GMA in adopting or amending its comprehensive plan, or development regulations.[FN1] Former RCW 36.70A.280(1)(a) (2003); former RCW 36.70A.290(2) (1995); *Somers v. Snohomish County,* 105 Wash.App. 937, 945, 21 P.3d 1165 (2001). Additionally, hearings boards may review petitions alleging a county did not comply with SEPA in ***570** adopting or amending its comprehensive plan or development regulations. Former RCW 36.70A.280(1)(a), .290(2). But hearings boards "do not have jurisdiction to decide challenges to site-specific land use decisions because [those] decisions do not qualify as comprehensive plans or development regulations." *Woods v. Kittitas County,* 162 Wash.2d 597, 610, 174 P.3d 25 (2007); *see* RCW 36.70A.030(4), (7); RCW 36.70B.020(4); RCW 36.70C.020(2)(a). Instead, the superior court has exclusive jurisdiction under LUPA to review site-specific land use decisions not subject to review by quasi-judicial agencies like hearings boards. Former RCW 36.70C.030(1)(a)(ii) (2003); *Woods,* 162 Wash.2d at 610, 174 P.3d 25.

FN1. The Eastern Washington Growth Management Hearings Board has jurisdiction over such petitions arising from counties "east of the crest of the Cascade Mountains," including Spokane County. Former RCW 36.70A.250(1)(a) (1994).

¶ 18 Here, whether the hearings board had subject matter jurisdiction to review amendment 07–CPA–05's rezone depends on whether it is an amendment to a development regulation under the GMA or a project permit approval under LUPA. *Woods,* 162 Wash.2d at 610, 174 P.3d 25; *see* RCW 36.70A.030(7); RCW 36.70B.020(4). The rezone was certainly site specific. *See Woods,* 162 Wash.2d at 611 n. 7, 174 P.3d 25 (stating a site-specific rezone is a change in the zone designation of a " 'specific tract' " at the request of " 'specific parties' " (quoting *Cathcart–Maltby–Clearview Cmty. Council v. Snohomish County,* 96 Wash.2d 201, 212, 634 P.2d 853 (1981))). But the parties dispute whether the rezone was or needed to be "authorized by a comprehensive plan." RCW 36.70B.020(4).[FN2]

FN2. We address the same dispute in a sim-

> ilar case with consistent reasoning. *See Kittitas County v. Kittitas County Conservation Coal.*, 176 Wash.App. 38, 308 P.3d 745 (2013).

¶ 19 Under RCW 36.70B.020(4), a site-specific rezone is a project permit approval solely if "authorized by a comprehensive plan"; otherwise, it is "the adoption or amendment of a ... development regulation[ ]." We must interpret this language so as to give it meaning, significance, and effect. *See In re Parentage of J.M.K.*, 155 Wash.2d 374, 393, 119 P.3d 840 (2005) (stating a court must not "simply ignore" express terms when interpreting a statute); ***571** *State ex rel. Baisden v. Preston*, 151 Wash. 175, 177, 275 P. 81 (1929) (stating a court must interpret a statute as a whole so that, if possible, " 'no clause, sentence, or word shall be superfluous, void, or insignificant' " (quoting *Wash. Mkt. Co. v. Hoffman*, 101 U.S. 112, 115–16, 25 L.Ed. 782 (1879))); *Murray v. Dep't of Labor & Indus.*, 151 Wash. 95, 102, 275 P. 66 (1929) (a court must, if possible, interpret a statute so as to give **every word** or phrase "meaning" as well as "significance and **effect**" (internal quotation marks omitted)). As we noted in *Spokane County I*, to be "authorized by a comprehensive plan" within the meaning of RCW 36.70B.020(4), the rezone had to be "allowed ****681** by an *existing* comprehensive plan." 160 Wash.App. at 281–83, 250 P.3d 1050 (emphasis added); *see also Woods*, 162 Wash.2d at 612 n. 7, 613, 174 P.3d 25; *Wenatchee Sportsmen Ass'n v. Chelan County*, 141 Wash.2d 169, 179–80, 4 P.3d 123 (2000).

[7] ¶ 20 The County argues it initially sought a site-specific rezone of McGlades's property but, under local zoning codes, the rezone was not possible without changing the property's existing comprehensive plan category from Urban Reserve to Limited Development Area (Commercial). The County explains it made the necessary change by amending the comprehensive plan and concurrently rezoning the property. Nonetheless, the County contends the rezone was "separate and distinct" from the comprehensive plan amendment. Appellant Spokane County's Opening Br. at 11. We disagree. Notably, the County concedes the rezone required a comprehensive plan amendment to take effect. This inexorably intertwined the rezone and the comprehensive plan amendment, making them interdependent and putting them in the same basket for hearings board review. In other words, the rezone was premised on and carried out the comprehensive plan amendment. Therefore, the rezone is not a project permit approval under LUPA because the then-existing comprehensive plan did not authorize it. Instead the rezone is an amendment to a development regulation under the GMA because it implements the comprehensive plan amendment. Thus, the hearings ***572** board's decision is within its statutory authority. *See* RCW 34.05.570(3)(b).

¶ 21 Dictum in *Coffey v. City of Walla Walla*, 145 Wash.App. 435, 187 P.3d 272 (2008), does not require a different conclusion. There, the city amended its comprehensive plan but did not rezone the property. *Id.* at 438, 187 P.3d 272. The *Coffey* court held the superior court lacked subject matter jurisdiction to review the comprehensive plan amendment under LUPA because the hearings board had exclusive jurisdiction to do so under the GMA. *Id.* at 441, 187 P.3d 272. The *Coffey* court continued,

> It is not uncommon for those hoping to develop property to seek both a comprehensive plan amendment and a rezone of property in the same proceeding. Anyone seeking to challenge both aspects of a ruling granting both requests would by statute have to appeal to two entities: the [hearings board] for the comprehensive plan amendment and superior court for the rezone.

Id. at 442, 187 P.3d 272. This statement was unnecessary to the *Coffey* court's holding because the city amended its comprehensive plan but did not rezone the property. Additionally, this statement is true solely if a rezone is site specific and authorized by a then-existing comprehensive plan. In making this

statement, the *Coffey* court did not consider whether a rezone that implements a comprehensive plan amendment can be an amendment to a development regulation.

[8] ¶ 22 Considering all, we hold a site-specific rezone is a project permit approval under LUPA if it is authorized by a then-existing comprehensive plan and, by contrast, is an amendment to a development regulation under the GMA if it implements a comprehensive plan amendment. In sum, the hearings board had subject matter jurisdiction to review amendment 07–CPA–05's rezone for compliance with both the GMA and SEPA. *See* former RCW 36.70A.280(1)(a), .290(2).

***573** C. Hearings Board Decisions

¶ 23 The issue is whether the hearings board erred by invalidating amendment 07–CPA–05 on grounds the County did not comply with the GMA or SEPA in adopting it. We review the hearings board's factual findings for substantial evidence, legal conclusions de novo, and order for arbitrariness or capriciousness. RCW 34.05.570(3)(d)-(e), (i); *Kittitas County*, 172 Wash.2d at 155, 256 P.3d 1193; *City of Redmond*, 136 Wash.2d at 46–47, 959 P.2d 1091.

[9] ¶ 24 A hearings board may decide a petition alleging a county did not comply with the GMA or SEPA in adopting or amending its comprehensive plan or development regulations. Former RCW 36.70A.280(1)(a), .290(2). The petitioner (here the Neighbors) bears the burden of proving noncompliance. RCW 36.70A.320(2). ****682** But a county has "broad discretion in adapting the requirements of the GMA to local realities." *Quadrant Corp. v. Cent. Puget Sound Growth Mgmt. Hr'gs Bd.*, 154 Wash.2d 224, 236, 110 P.3d 1132 (2005); *see* former RCW 37.70A.320(1) (1997). Thus, a hearings board must presume validity and find compliance unless the county's planning action is "clearly erroneous in view of the entire record before the board and in light of the goals and requirements of [the GMA]." RCW 36.70A.320(1), (3). A county's planning action is clearly erroneous if it leaves a hearings board with a " 'firm and definite conviction that a mistake has been committed.' " *King County*, 142 Wash.2d at 552, 14 P.3d 133 (quoting *Dep't of Ecology v. Pub. Util. Dist. No. 1*, 121 Wash.2d 179, 201, 849 P.2d 646 (1993)).

¶ 25 Where a hearings board finds noncompliance with the GMA or SEPA, it may wholly or partially invalidate the county's planning action if "continued validity ... would substantially interfere with the fulfillment of the goals of [the GMA]." Former RCW 36.70A.302(1) (1997). The GMA's goals include, as relevant here:

> ***574** 1) Urban growth. Encourage development in urban areas where adequate public facilities and services exist or can be provided in an efficient manner.
>
> (2) Reduce sprawl. Reduce the inappropriate conversion of undeveloped land into sprawling, low-density development.
>
> ....
>
> (10) Environment. Protect the environment and enhance the state's high quality of life, including air and water quality, and the availability of water....

RCW 36.70A.020(1)-(2), (10). On appropriate facts, SEPA noncompliance may substantially interfere with fulfilling the GMA's environmental protection goal. *Davidson Serles & Assocs. v. Cent. Puget Sound Growth Mgmt. Hr'gs Bd.*, 159 Wash.App. 148, 158, 244 P.3d 1003 (2010); *see* WASH. STATE DEP'T OF ECOLOGY, STATE ENVIRONMENTAL POLICY ACT HANDBOOKK § 7, at 75 (1998 & Supp.2003).

[10] ¶ 26 We begin with GMA noncompliance. The County challenges the hearings board's decision

that amendment 07–CPA–05 designated a new LAMIRD without observing applicable GMA requirements. A comprehensive plan amendment must "conform to [the GMA]." RCW 36.70A.130(1)(d). But "the GMA is not to be liberally construed." *Woods*, 162 Wash.2d at 612 & n. 8, 614, 174 P.3d 25 (citing *Skagit Surveyors & Eng'rs, LLC v. Friends of Skagit County*, 135 Wash.2d 542, 565, 958 P.2d 962 (1998)). Thus, a comprehensive plan must obey the GMA's clear mandates. *See Thurston County v. W. Wash. Growth Mgmt. Hr'gs Bd.*, 164 Wash.2d 329, 341–42, 190 P.3d 38 (2008). A newly adopted or amended development regulation must be "consistent with and implement the comprehensive plan." RCW 36.70A.040(3)(d), (4)(d), (5)(d); RCW 36.70A.130(1)(d); *see* WAC 365–196–805(1). But "a comprehensive plan is a 'guide' or 'blueprint' to be used when making land use decisions." *Citizens for Mount Vernon v. City of Mount Vernon*, 133 Wash.2d 861, 873, 947 P.2d 1208 (1997) (quoting *Barrie v. Kitsap County*, 93 Wash.2d 843, 849, 613 P.2d 1148 (1980)). Thus, a development regulation need not strictly adhere but ***575** must "generally conform" to the comprehensive plan. *Id.* (quoting *Barrie*, 93 Wash.2d at 849, 613 P.2d 1148).

¶ 27 A county's comprehensive plan must contain "a rural element including lands that are not designated for urban growth." RCW 36.70A.070(5); *see* WAC 365–196–425. This rural element "may allow for limited areas of more intensive rural development, including necessary public facilities and public services." RCW 36.70A.070(5)(d); *see* WAC 365–196–425(6). A county must "minimize and contain the existing areas or uses of more intensive rural development" by adopting measures providing they "shall not extend beyond the [ir] logical outer boundary ..., thereby allowing a new pattern of low-density sprawl." RCW 36.70A.070(5)(d)(iv); *see* WAC 365–196–425(6)(c)(i)(B)–(E). Existing areas "are clearly identifiable and contained [within] ... a logical boundary delineated predominately by the built environment." RCW 36.70A.070(5)(d)(iv); WAC 365–196–425(6)(c)(i)(C). In fixing a LAMIRD's logical outer boundary, the county must address "the need to preserve the character of existing natural neighborhoods ****683** and communities," "physical boundaries, such as ... streets and highways, and land forms and contours," and "the prevention of abnormally irregular boundaries." RCW 36.70A.070(5)(d)(iv)(A)-(C); *see* WAC 365–196–425(6)(c)(i)(D)(I)–(III).

¶ 28 Consistent with these rules, the County's rural element allows for LAMIRDs in Policy RL.5.2:

> The intensification and infill of commercial ... areas shall be allowed in rural areas consistent with the following guidelines:
>
> a) The area is clearly identified and contained by logical boundaries, outside of which development shall not occur. These areas shall be designated and mapped within the Limited Rural Development category of the Comprehensive Plan map.
>
> b) The character of neighborhoods and communities is maintained.
>
> ....
>
> ***576** d) The intensification is limited to expansion of existing uses or infill or new uses within the designated area....

SPOKANE COUNTY COMPREHENSIVE PLAN (SCCP): RURAL LAND USE POLICY RL.5.2(a)-(b), (d). The County designed this policy to advance Goal RL.5a: "Provide for ... commercial uses in rural areas that serve the needs of rural residents and are consistent with maintaining rural character." SCCP: RURAL LAND USE GOAL RL.5a.

¶ 29 Here, the hearings board decided the comprehensive plan amendment did not conform to RCW

36.70A.070(5)(d)(iv)(A) through (C), while the concurrent rezone was not consistent with and did not implement Goal RL.5a or Policy RL.5.2(a) through (b) and (d). The County raises four arguments in opposition.

[11] ¶ 30 First, the County argues the hearings board erroneously found amendment 07–CPA–05 noncompliant with the GMA because it is based on the pre-amendment comprehensive plan and development regulations, which complied with the GMA. However, an amendment's GMA compliance is independent from that of a pre-amendment planning document. *See* RCW 36.70A.040(3)(d), (4)(d), (5)(d); RCW 36.70A.070; RCW 36.70A.130(1)(d). Notably, the hearings board found amendment 07–CPA–05 failed to minimize and contain the intensification and infill of commercial use within the logical outer boundary the comprehensive plan originally fixed in 2001. This finding is a verity on appeal because the County did not assign error to it. *See* RAP 10.3(g)-(h); *Hilltop Terrace Homeowner's Ass'n v. Island County*, 126 Wash.2d 22, 30, 891 P.2d 29 (1995). Indeed, a staff report to the county commissioners supports this finding, stating,

> The requested change from Urban Reserve to Limited Development Area (Commercial) is generally not consistent with Policy RL.5.2 [and, thus, the GMA].
>
> The Limited Development Area ... Commercial was designated south of Day Mt. Spokane Road and adjacent to both side [sic] ***577** of Highway 2 based on existing land uses, zones, comprehensive planning policies and the public process that resulted in the adoption of the original GMA County Comprehensive Plan in November of 2001. If approved the Limited Development Area Commercial would be extended to the north side of Day Mt. Spokane Road and to property which is not fronting or adjacent to Limited Development Areas with actual frontage of Highway 2.

AR at 553. Accordingly, the County's argument fails.

¶ 31 Second, the County argues the hearings board erroneously interpreted Goal RL.5a and Policy RL.5.2 as requiring public necessity for McGlades's market and bistro because the GMA does not require such need and the comprehensive plan is a mere guide. But the GMA provides LAMIRDs may contain "necessary public facilities and public services." RCW36.70A.070(5)(d). And, amendment 07–CPA–05 would not generally conform to the comprehensive plan if it provided commercial uses in rural areas regardless of local need. The County cannot escape its obligation to observe Goal RL.5a and Policy RL.5.2 by characterizing them as a mere guide.

****684** ¶ 32 Third, the County argues the hearings board erroneously found no demonstrated public necessity for McGlades's market and bistro, considering the full-service restaurants existing nearby, because the community gave widespread support for the business. But desires are different than needs. The County does not identify any evidence demonstrating public need. Instead, the County suggests public desire is enough because the GMA offers flexibility, ensuring community-oriented planning responsive to local circumstances. We do not reweigh the evidence. Even if we disagreed with the hearings board, it is a verity that amendment 07–CPA–05 established an improper outer LAMIRD boundary.

¶ 33 Finally, the County argues the hearings board erroneously found McGlades's market and bistro disrupted the neighborhood's rural character because the business assimilated***578** well in an increasingly urban area. But the County does not dispute the hearings board's assessment of increased traffic, noise, and lighting. Again, we do not reweigh the evidence. And again, even if we disagreed with the hearings board, it is a verity that amendment

07–CPA–05 established an improper outer LAMIRD boundary.

¶ 34 In sum, the record shows the comprehensive plan amendment does not conform to the GMA, while the concurrent rezone is not consistent with and does not implement the comprehensive plan. A sufficient quantity of evidence exists to persuade a fair-minded person the County did not comply with the GMA in adopting amendment 07–CPA–05. In reaching this decision, the hearings board correctly interpreted and applied the law upon thorough reasoning with due consideration for the facts. Therefore, the hearings board did not err in finding GMA noncompliance.

[12] ¶ 35 We turn now to SEPA noncompliance. The County challenges the hearings board's decision that the environmental checklist was inadequate under SEPA because it did not fully disclose or carefully consider amendment 07–CPA–05's probable long-term effects. Under SEPA, a county must include an environmental impact statement with any proposal the lead agency's responsible official decides would "significantly affect[ ] the quality of the environment." RCW 43.21C.030(2)(c); WAC 197–11–330(1). An agency must make this threshold determination where, as here, the proposal is an "action" [FN3] and is not "categorically exempt." [FN4] Former WAC 197–11–310(1) (2003). The agency must use an ***579** environmental checklist to assist its analysis and must document its conclusion in a determination of significance or nonsignificance. Former WAC 197–11–315(1) (1995); WAC 197–11–340(1), –360(1).

FN3. *See* WAC 197–11–704(2)(b)(ii). Specifically, amendment 07–CPA–05 is a nonproject action because it involves "[t]he adoption or amendment of comprehensive land use plans or zoning ordinances." *Id.*

FN4. *See* RCW 43.21C.229, .450; WAC 197–11–305, –800; SPOKANE COUNTY CODE 11.10.070–.075, .180. Additionally, while a county may forego SEPA analysis if its comprehensive plan and development regulations "provide adequate analysis of and mitigation for the specific adverse environmental impacts of the project action," this exception does not apply to amendment 07–CPA–05 because it is a nonproject action. RCW 43.21C.240(1); *see also* RCW 43.21C.240(2); WAC 197–11–158.

¶ 36 The agency must base its threshold determination on "information reasonably sufficient to evaluate the environmental impact of a proposal." WAC 197–11–335. In GMA planning, the agency should tailor the "scope and level of detail of environmental review" to fit the proposal's specifics. WAC 197–11–228(2)(a). Thus, for a nonproject action, such as a comprehensive plan amendment or rezone, the agency must address the probable impacts of any future project action the proposal would allow. WASH. STATE DEP'T OF ECOLOGY, *supra*, § 4.1, at 66; *see* WAC 197–11–060(4)(c)–(d). The purpose of these rules is to ensure an agency fully discloses and carefully considers a proposal's environmental impacts before adopting it and "at the earliest possible stage." *King County v. Wash. State Boundary Review Bd.*, 122 Wash.2d 648, 663–64, 666, 860 P.2d 1024 (1993); *see* WAC 197–11–060(4)(c)–(d). An agency may not postpone environmental analysis to a later implementation stage if ****685** the proposal would affect the environment without subsequent implementing action. RICHARD L. SETTLE, THE WASHINGTON STATE ENVIRONMENTAL POLICY ACT § 13.01[1], at 13–15 to –16 (1987 & Supp.2010); *see* WAC 197–11–060(5)(d)(i)–(ii).

¶ 37 Here, the hearings board found the County's checklist ignored the probable impacts of any future commercial development amendment 07–CPA–05 would allow and improperly postponed environmental analysis to the project review stage. The County raises

two arguments in opposition.

¶ 38 First, the County argues the hearings board contradicted its later statement that future commercial development is speculative given the property's existing growth. This claimed inconsistency makes no difference because McGlades clearly intended to reopen and expand its market ***580** and bistro under the proposal.[FN5] And, the proposal would allow McGlades or its successors to replace the business with a variety of other commercial uses. [FN6] Either result could significantly affect environmental quality, as discussed below. Regardless, the hearings board properly recognized the checklist could not postpone environmental analysis to the project review stage because amendment 07–CPA–05 approved the property's existing nonconforming use, thereby affecting the environment even if McGlades or its successors never pursue subsequent project action.

FN5. McGlades's application for a conditional use permit requested expansion to include an asphalt driveway and drive-through espresso service, asphalt parking lot with spaces for 39 vehicles, outdoor dining and entertainment with seating for 64 patrons, and on-site alcohol consumption. The hearing examiner noted this expansion "is likely if the site is rezoned." AR at 178. The hearing examiner clarified, "McGlades ... seeks to reopen the business, and to expand it under the [Limited Development Area (Commercial)] zone." AR at 172.

FN6. The Limited Development Area (Commercial) zone designation allows taverns and pubs, theaters and performing arts centers, circuses, storage facilities, business complexes, financial institutions, vehicle repair shops, mortuary service centers, medical service centers, and scientific research facilities. SPOKANE COUNTY ZONING CODE 14.612.220.

¶ 39 Second, the County argues the hearings board undervalued the checklist's thorough contents. But the checklist failed to adequately address the proposal. Apart from reciting it in a background section with seven other comprehensive plan amendments and concurrent rezones, the checklist did not mention amendment 07–CPA–05. Assuming this omission was a scrivener's error, the checklist still lacked required particularity. Though amendment 07–CPA–05 varied greatly from the other seven proposals, the checklist attempted to address them all with broad generalizations. The checklist did not tailor its scope or level of detail to address the probable impacts on, for example, water quality, resulting from amendment 07–CPA–05 specifically. While the property is near potable water wells in a Critical Aquifer Recharge Area with high susceptibility, the proposal could "allow an on-site [wastewater disposal] system that will fail thus resulting in the degradation of the local environment." AR at 562. Despite these concerns, the ***581** checklist repeated formulaic language postponing environmental analysis to the project review stage and assuming compliance with applicable standards. Thus, the checklist lacked information reasonably sufficient to evaluate the proposal's environmental impacts.

¶ 40 In sum, the record shows the County failed to fully disclose or carefully consider amendment 07–CPA–05's environmental impacts before adopting it and at the earliest possible stage. This is a sufficient quantity of evidence to persuade a fair-minded person the County did not comply with SEPA in adopting the proposal. In reaching this decision, the hearings board correctly interpreted and applied the law upon thorough reasoning with due consideration for the facts. Therefore, the hearings board did not err in finding SEPA noncompliance.

[13] ¶ 41 We turn now to invalidity based on GMA and SEPA noncompliance. The County challenges the hearings board's determination that

amendment 07–CPA–05 is invalid because its continued validity would substantially interfere with fulfilling the ****686** GMA's environmental protection goal. To fulfill this goal, the GMA requires a county to designate critical areas and adopt development regulations protecting them. RCW 36.70A.060(2), .070(5)(c)(iv), .170(1)(d); WAC 365–196–485(2), (3)(a), (c)-(d). Critical areas include "areas with a critical recharging effect on aquifers used for potable water." RCW 36.70A.030(5)(b); WAC 365–196–200(5)(b). A county must use "the best available science in developing policies and development regulations to protect the functions and values of critical areas." RCW 36.70A.172(1); WAC 365–196–485(1)(b), (3)(d).

¶ 42 Here, the hearings board found by failing to comply with SEPA in adopting amendment 07–CPA–05, the County threatened a Critical Aquifer Recharge Area with high susceptibility and disused the best available science for mitigating probable environmental impacts. This, the hearings board concluded, substantially interfered with fulfilling the GMA's environmental protection goal. The County ***582** argues the hearings board ignored the permit review McGlades's market and bistro underwent at each expansion in the years preceding the comprehensive plan amendment and concurrent rezone. But the County failed to adopt any such environmental analysis, incorporate it by reference, or include it by addendum. *See* WAC 197–11–600, –625 to –635. The mere existence of additional supporting documents cannot excuse the County's failure to include them in the planning process.

¶ 43 The record shows the County's SEPA noncompliance threatened a Critical Aquifer Recharge Area with high susceptibility and disused the best available science for mitigating probable environmental impacts. This is a sufficient quantity of evidence to persuade a fair-minded person amendment 07–CPA–05's continued validity would substantially interfere with fulfilling the GMA's environmental protection goal. In reaching this decision, the hearings board correctly interpreted and applied the law upon thorough reasoning with due consideration for the facts. Therefore, the hearings board did not err in determining invalidity on SEPA grounds.

¶ 44 Moreover, we note the hearings board additionally determined invalidity on GMA grounds, specifying that amendment 07–CPA–05's continued validity would substantially interfere with fulfilling the GMA's urban growth promotion and sprawl reduction goals. The County vaguely assigned error to this determination then abandoned the error claim by failing to argue it. *See* RAP 10.3(a)(6), (g)-(h); *Howell v. Spokane & Inland Empire Blood Bank,* 117 Wash.2d 619, 624, 818 P.2d 1056 (1991). Thus, the hearings board did not err in determining invalidity on GMA grounds.

¶ 45 Considering all, the hearings board's decision is supported by substantial evidence in light of the whole record, does not erroneously interpret or apply the law, and is not arbitrary or capricious. *See* RCW 34.05.570(3)(d)-(e), (i). Therefore, we conclude the hearings board did not err by invalidating amendment 07–CPA–05.

***583** D. Deference

[14] ¶ 46 The issue is whether the hearings board erred by failing to accord the County's planning actions proper deference. The County contends the hearings board engaged in an unlawful procedure or decision-making process, or failed to follow a prescribed procedure, by withholding such deference. We review the hearings board's procedures and decision-making processes de novo. RCW 34.05.570(3)(c); *Kittitas County,* 172 Wash.2d at 155, 256 P.3d 1193.

[15] ¶ 47 A hearings board must defer to a county's planning action if it is consistent with the GMA's goals and requirements. Former RCW

36.70A.3201 (1997); *Quadrant Corp.* 154 Wash.2d at 238, 110 P.3d 1132. GMA deference to county planning actions supersedes APA deference to administrative adjudications. *Quadrant Corp.*, 154 Wash.2d at 238, 110 P.3d 1132. Thus, we will not defer to a hearings board if it fails to accord a county the required deference. *Id.* But a hearings board accords a county the required deference by properly applying the GMA's clearly erroneous review standard. *Id.*

¶ 48 Here, the hearings board initially presumed the County's comprehensive plan ****687** amendment and concurrent rezone were valid but ultimately found them clearly erroneous in light of the entire record and the GMA's goals and requirements. Again, the hearings board's decision is supported by substantial evidence in light of the whole record, does not erroneously interpret or apply the law, and is not arbitrary or capricious. Thus, the hearings board properly applied the GMA's clearly erroneous review standard. *See* RCW 36.70A.320(1), (3); *King County*, 142 Wash.2d at 552, 14 P.3d 133. By doing so, the hearings board accorded the County's planning actions the required deference. *See Quadrant Corp.*, 154 Wash.2d at 238, 110 P.3d 1132. In sum, the hearings board did not engage in an unlawful procedure or decision-making process, or fail to follow a prescribed procedure. *See* RCW 34.05.570(3)(c).

***584** E. Attorney Fees and Costs

[16][17] ¶ 49 The Neighbors request an award of attorney fees and costs, citing chapter 4.84 RCW. The Regulatory Reform Act, RCW 4.84.370, does not authorize an award because it does not apply to the County's comprehensive plan amendment or concurrent rezone, and the Neighbors did not prevail before the county commissioners or hearing examiner. *See Heller Bldg., LLC v. City of Bellevue*, 147 Wash.App. 46, 64, 194 P.3d 264 (2008); *Tugwell v. Kittitas County*, 90 Wash.App. 1, 15, 951 P.2d 272 (1997). Likewise, the Equal Access to Justice Act, RCW 4.84.340 through .360, does not authorize an award because it does not apply against the hearings board. *See Duwamish Valley Neighborhood Pres. Coal. v. Cent. Puget Sound Growth Mgmt. Hr'gs Bd.*, 97 Wash.App. 98, 100–01, 982 P.2d 668 (1999). Therefore, we deny the Neighbors' request.

¶ 50 Affirmed.

WE CONCUR: KULIK, J., and SIDDOWAY, A.C.J.

Wash.App. Div. 3,2013.
Spokane County v. Eastern Washington Growth Management Hearings Bd.
176 Wash.App. 555, 309 P.3d 673

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H

Supreme Court of Washington,
En Banc.

Craig RETTKOWSKI, and Gale Rettkowski, Patrick Quirk, Richard Quirk, Richard Dreger, Dale Dreger, and Dean Dreger, Merwin and Elaine Houger, Everett Cole, August and Randy Dreger, Herman F. Rux, Jr., Rux Farms, William Dreger, and John C. Watson, Respondents,
and
Wilbur Security, Inc., Respondent,
v.
The DEPARTMENT OF ECOLOGY, John Rosman, William E. Rosman, and Keith Nelson, Appellants,
and
Sinking Creek Surface Water Project and Pollution Control Hearings Board, Appellants,
Clarence Wagner, Robert J. Bauer, Robert Rosman, and James F. Rosman, Defendants.

No. 59086–9.
Sept. 9, 1993.
Reconsideration Denied Nov. 1, 1993.
As Amended Nov. 1, 1993.

Irrigation farmers filed petition for review and writ of certiorari respecting Department of Ecology cease and desist orders which precluded irrigation farmers from appropriating ground water in creek basin. The Superior Court, Lincoln County, Richard W. Miller, J., concluded that orders exceeded Department's authority. Ranchers, Department, and Board appealed. The Supreme Court, Durham, J., held that: (1) Department did not have authority to issue cease and desist orders, and (2) Superior Court possessed inherent authority to invalidate cease and desist orders.

Affirmed.

Guy, J., dissented and filed opinion in which Utter, J., joined.

West Headnotes

[1] Administrative Law and Procedure 15A 305

15A Administrative Law and Procedure
15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents
15AIV(A) In General
15Ak303 Powers in General
15Ak305 k. Statutory basis and limitation. Most Cited Cases

Administrative agency may only do that which it is authorized to do by legislature.

[2] Water Law 405 1613

405 Water Law
405VII Appropriation of Waters
405VII(B) Administrative Regulation of Appropriation
405k1612 Administrative Bodies, in General
405k1613 k. Powers and authority. Most Cited Cases
(Formerly 405k127)

Department of Ecology did not have authority to issue cease and desist orders, precluding irrigation farmers from appropriating ground water in creek basin, without first utilizing statutory general adjudication to determine existence, amount, and priorities

of water rights claimed by farmers and ranchers in creek basin. West's RCWA 90.03.110, 90.03.160–90.03.170, 90.03.190.

[3] Water Law 405 1580

405 Water Law
405VII Appropriation of Waters
405VII(A) Nature and Elements in General
405k1578 Priorities
405k1580 k. First in time, first in right. Most Cited Cases
(Formerly 405k140)

Statute governing surface water appropriators' and ground water appropriators' rights does not provide that surface water rights are automatically superior to ground water rights; statute merely emphasizes potential connections between ground water and surface water and makes evident legislature's intent that ground water rights be considered a part of overall water appropriation scheme, subject to paramount rule of first in time, first in right. West's RCWA 90.44.030.

[4] Administrative Law and Procedure 15A 387

15A Administrative Law and Procedure
15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents
15AIV(C) Rules, Regulations, and Other Policymaking
15Ak385 Power to Make
15Ak387 k. Statutory limitation. Most Cited Cases

Administrative agency cannot modify or amend statute through its own regulation.

[5] Water Law 405 1589

405 Water Law
405VII Appropriation of Waters
405VII(A) Nature and Elements in General
405k1588 Nature and Extent of Rights Acquired
405k1589 k. In general. Most Cited Cases
(Formerly 405k144)

Water appropriation rights permit holders have vested property interest in their water rights to extent that water is beneficially used.

[6] Water Law 405 1613

405 Water Law
405VII Appropriation of Waters
405VII(B) Administrative Regulation of Appropriation
405k1612 Administrative Bodies, in General
405k1613 k. Powers and authority. Most Cited Cases
(Formerly 405k140)

Pollution Control Hearings Board cannot adjudicate priorities between water users. West's RCWA 43.21B.110(2)(c).

[7] Water Law 405 1613

405 Water Law
405VII Appropriation of Waters
405VII(B) Administrative Regulation of Appropriation
405k1612 Administrative Bodies, in General
405k1613 k. Powers and authority. Most Cited Cases
(Formerly 405k140)

Department of Ecology cannot determine alleg-

edly senior water rights among water users outside context of statutory general adjudication. West's RCWA 90.03.110, 90.03.160–90.03.170, 90.03.190.

[8] Water Law 405 1820

405 Water Law
405XI General Adjudication of All Riparian, Appropriative, Reserved, and Other Rights in Watercourse, Water Body, or Basin
405k1820 k. In general. Most Cited Cases
(Formerly 405k152(.5))

Statutory "general adjudication" respecting water rights is process whereby all those claiming right to use waters of river or stream are joined in single action to determine water rights and priorities between claimants. West's RCWA 90.03.110, 90.03.160–90.03.170, 90.03.190.

[9] Water Law 405 1011

405 Water Law
405I In General
405k1006 Ownership Of, and Title To, Waters
405k1011 k. Trust imposed on public waters in general. Most Cited Cases
(Formerly 405k3)

"Public trust doctrine" prohibits state from disposing of its interest in waters of state in such a way that public's right of access is substantially impaired, unless action promotes overall interests of public.

[10] Administrative Law and Procedure 15A 229

15A Administrative Law and Procedure
15AIII Judicial Remedies Prior to or Pending Administrative Proceedings
15Ak229 k. Exhaustion of administrative remedies. Most Cited Cases

Water Law 405 1650

405 Water Law
405VII Appropriation of Waters
405VII(B) Administrative Regulation of Appropriation
405k1649 Administrative Proceedings and Review
405k1650 k. In general. Most Cited Cases
(Formerly 405k128)

Adequate remedy at law for irrigation farmers challenging authority of Department of Ecology to issue cease and desist orders, precluding farmers from appropriating ground water in creek basin, was to allow Pollution Control Hearings Board to rule on farmers' prior motion to quash before Board. West's RCWA 43.21B.110(1)(b), 90.03.110, 90.03.160–90.03.170, 90.03.190.

[11] Water Law 405 1672

405 Water Law
405VII Appropriation of Waters
405VII(C) Private Civil Actions to Determine, Establish, or Protect Rights
405k1672 k. Jurisdiction and venue. Most Cited Cases
(Formerly 405k152(.5))

Superior court possessed inherent authority to invalidate Department of Ecology's ultra vires cease and desist orders, which precluded irrigation farmers from appropriating ground water in creek basin without first utilizing statutory general adjudication to determine existence, amount, and priorities of water rights claimed by farmers and ranchers in creek basin. West's RCWA 90.03.110, 90.03.160–90.03.170, 90.03.190.

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DURHAM, Judge.

A group of ranchers who water their cattle at the aptly named Sinking Creek have complained to the Department of Ecology (Ecology) for over two decades about the detrimental effect on the creek's flow of groundwater pumping by irrigation farmers in the surrounding area. After numerous investigations, Ecology determined that there was a connection between the groundwater withdrawals and the diminished flow of the creek. Ecology also decided that the water rights of the various ranchers were superior to those possessed by the irrigation farmers. Accordingly, Ecology issued cease and desist orders which prohibited the irrigation farmers ****234** from making any further groundwater withdrawals. Through a complicated procedural history which will be explained below, the dispute was brought to this court to decide if Ecology possesses the authority to issue these orders. We hold that it does not. We also hold that the trial court correctly exercised its jurisdiction in hearing this matter.

Sinking Creek is a non-navigable stream located in Lincoln County just south of the town of Wilbur. With the exception of the Pollution Control Hearings Board (PCHB) and Ecology, the remaining appellants are all cattle ranchers (Ranchers) who claim to have traditionally watered their ***222** cattle at the creek or its adjacent ponds and springs. These Ranchers claim pre–1917 riparian rights to the water in Sinking Creek. They also claim subflow irrigation rights for irrigation of pasture and annual crops on their land. Some of these rights are supported by claims filed pursuant to RCW 90.14; others are not. The Ranchers assert priority dates going as far back as 1883. There has never been a formal adjudication of the waters in or surrounding Sinking Creek.

On the other side of this dispute is a group of irrigation farmers (Irrigators) who own farms and wells in the surrounding area. The Irrigators own 29 certificates of groundwater rights obtained pursuant to RCW 90.44. The first groundwater permit for irrigation in this area was issued by Ecology's predecessor agency in the early 1950s. The last groundwater permit was issued by Ecology in 1979. These permits specify a maximum amount of groundwater that may be pumped, and state that “authorization to make use

of public waters of the state is subject to existing rights". Clerk's Papers (CP), at 997. At least some of the Ranchers have actively opposed the granting of further groundwater permits since 1968.

In the mid–1960s, Ecology began receiving complaints from the Ranchers that the creek and its attendant springs were flowing less and drying up earlier than normal. The Ranchers blamed this decreased flow on the concurrent increase in groundwater withdrawals by neighboring Irrigators. In 1967, Ecology instituted a groundwater level monitoring program. Groundwater pumping from the Irrigators' wells increased twenty-fold in the period from 1968 through 1979. In 1978, Ecology undertook a more comprehensive study of the problem, culminating in a 1982 report which concluded that the diminished amount of surface water in the area was at least partially due to increased groundwater withdrawals. In 1985, an Ecology study of respondent Rettkowski's aquifer showed measurable water level changes 4 1/2 miles away when his well was pumped at 2,800 gallons per minute. This study predicted a rate of permanent water level decline in the area of 1 or 2 feet per year due to proposed groundwater withdrawals.

***223** In early 1989, a number of the Ranchers once again petitioned Ecology to do something to restore the flow of surface water in the Sinking Creek area. In the spring of that year, Ted Olson from Ecology visited with appellants Rosman and Nelson, and toured their ranches to witness the problem himself. Based primarily on these visits and discussions, Olson concluded that the Ranchers had water rights superior to those of the Irrigators. On June 7, 1990, Olson sent a letter to his supervisor, Hedia Adelsman, outlining his findings as to the priorities of the Nelson and Rosman water claims. He also forwarded this report to the Rosmans, who sent back a "corrected" copy of the report.

On September 22, 1989, Ecology notified the Irrigators about an upcoming meeting to discuss the water problems in the Sinking Creek area. This letter also alerted the Irrigators to the possibility that Ecology would regulate groundwater withdrawals. On October 5, 1989, Ecology held a meeting to discuss the decreased amount of surface water in the area and to encourage the Ranchers and Irrigators to agree to a solution. Similar meetings were held on March 29, 1990, and May 21, 1990. At this last meeting, Olson warned that if a negotiated settlement was not reached by July 1, 1990, Ecology would issue regulatory orders to reduce water use based on priority dates.

****235** On July 15, 1990, the Irrigators sent a letter to appellants Rosman and Nelson stating their wish to avoid litigation and settle the situation amicably. Therein, they proposed three different solutions, ranging from more efficient use of wells and irrigation water to the outright purchase of the ranchers' land by the Irrigators. Nonetheless, Ecology issued a letter to the Irrigators 5 days later which warned that Ecology had "no alternative except to issue orders regulating the use of ground water for irrigation to protect senior surface water rights." CP, at 875.

On August 31, 1990, Ecology issued cease and desist orders to the Irrigators. The orders contained a lengthy "findings of fact" section which included a unilateral determination by Ecology of the existence and validity of the water rights ***224** claims of the Ranchers, and a determination that they were senior in time to the Irrigators. These orders mandated that the Irrigators "cease and desist from any further withdrawals of ground water after October 1, 1990". *E.g.*, CP, at 71. The Irrigators were also informed that they could appeal these orders to the PCHB. There has never been a formal adjudication of water rights in the Sinking Creek basin. The Irrigators timely appealed, and the PCHB stayed Ecology from enforcing these orders. The PCHB also scheduled a 2–week hearing on the orders to begin on November 21, 1991.

On August 20, 1991, the Irrigators filed a petition for review and a writ of certiorari in the Lincoln

County Superior Court. In their petition, the Irrigators requested that the court review the legality of Ecology's orders, vacate those orders, enjoin Ecology from further action until such a time as the water rights in the Sinking Creek basin had been adjudicated, and order Ecology to petition for such an adjudication of rights. On November 19, 1991, the Superior Court ruled that the Irrigator's arguments should first be heard by the PCHB, but retained concurrent jurisdiction so that the Irrigators could renew their petition/writ after the PCHB had an opportunity to rule.

Meanwhile, on September 20, 1991, the Irrigators filed a motion to quash Ecology's orders with the PCHB. The three arguments the irrigators raised in this motion were that Ecology exceeded its statutory authority, that the irrigators were denied due process, and that the orders were facially invalid. On November 1, 1991, the PCHB denied their motion. The PCHB ruled that Ecology was acting within its statutory jurisdiction and that the orders were not facially invalid. It also ruled that it did not have the jurisdiction to consider the constitutional issue raised.

Following this denial, the Irrigators once again took up their cause in the superior court. They filed a motion to stay the proceedings before the PCHB and renewed their petitions/writs. They also appealed the PCHB's order. The Superior Court granted the stay and set a hearing to decide the issues raised in the previous petitions/writs.

***225** Following this hearing, the Superior Court ruled in favor of the Irrigators. On the issue of its own jurisdiction, the court ruled that the PCHB ruling was an appealable final decision, that the irrigators had exhausted their administrative remedies, that the court had inherent power under our constitution to review agency action that is violative of fundamental rights, and that the court had original jurisdiction to hear the Irrigators' due process claims. Addressing the due process issue, the court held that Ecology violated the Irrigators' due process rights by issuing its orders without a predeprivation notice, or an opportunity to be heard and to present evidence on their own behalf. The court also held that Ecology exceeded the scope of its statutory authority by conducting an extrajudicial adjudication of water rights. Moreover, the court held that the cease and desist orders were invalid on their face because they failed to specify which statute, rule, regulation, directive or order the Irrigators had violated.

It is this decision of the Superior Court that the Ranchers, Ecology and the PCHB now challenge. Although numerous issues and arguments are raised, the decisive inquiries****236** are whether Ecology possesses the statutory power to: (1) determine the priorities of water rights in the basin, and (2) issue enforcement orders consistent therewith.

Our review of the statutory framework and relevant cases convinces us that both questions must be answered in the negative. The authority to adjudicate and enforce water rights in these circumstances is specifically granted to the superior courts by RCW 90.03. Accordingly, we affirm the ruling of the Superior Court.

We recognize that litigation of these complex issues can be protracted, especially in the first few trials. As the law develops, however, the process will become more refined. If we begin this undertaking with the correct—rather than expedient—methodology, we will ultimately encourage settlement and more rapid resolution of these disputes. The allocation of water rights in this state is of such great magnitude that we cannot tolerate a “cheap and easy” solution.

***226** [1] The resolution of this case turns on a fundamental rule of administrative law—an agency may only do that which it is authorized to do by the Legislature. *In re Puget Sound Pilots Ass'n*, 63 Wash.2d 142, 146 n. 3, 385 P.2d 711 (1963); *Neah*

Bay Chamber of Commerce v. Department of Fisheries, 119 Wash.2d 464, 469, 832 P.2d 1310 (1992). The Administrative Procedure Act of 1988 (APA), RCW 34.05, specifically provides that a court "shall grant relief from an agency order ... if it determines that ... [t]he order is outside the statutory authority or jurisdiction of the agency conferred by any provision of law". RCW 34.05.570(3)(b).

[2][3] Under RCW 90.03 (hereinafter the Water Code), a "first in time, first in right" rule is followed for appropriations of both groundwater and surface water. RCW 90.03.010. Ecology claims that it was attempting to follow this rule when it issued the cease and desist orders to the Irrigators.[FN1] While Ecology cannot point to any statute which specifically authorizes the procedures it followed in issuing these orders, it argues that it derives inherent authority to do so from the penumbra of a number of statutes. Primarily, Ecology rests upon its enabling statute as vesting it with the plenary authority to protect senior water rights from encroachment or diminution by junior appropriators. That statute proclaims***227** that Ecology "shall regulate and control the diversion of water in accordance with the rights thereto". RCW 43.21A.064(3). Ecology additionally points out that it is authorized to issue regulatory orders "whenever it appears to [Ecology] that a person is violating or is about to violate any of the provisions of [the Water Code]". RCW 43.27A.190.

FN1. Ecology also claims that RCW 90.44.030 explicitly gives priority to surface water appropriators vis-a-vis ground water appropriators. That section of the statute states that:

> to the extent that any underground water is part of or tributary to the source of any surface stream or lake, or that the withdrawal of ground water may affect the flow of any spring, water course, lake, or other body of surface water, the right of an appropriator and owner of surface water shall be superior to any *subsequent* right hereby authorized to be acquired in or to ground water.
>
> (Italics ours.) RCW 90.44.030. The word "subsequent" would be irrelevant if the Legislature intended to always allow surface water rights to trump ground water rights. *See Clark v. Pacificorp*, 118 Wash.2d 167, 183, 822 P.2d 162 (1991) (statutes are to be interpreted so that no part is deemed superfluous). Rather, this section of the statute merely emphasizes the potential connections between ground water and surface water, and makes evident the Legislature's intent that ground water rights be considered a part of the overall water appropriation scheme, subject to the paramount rule of "first in time, first in right." *See Ellensburg v. State*, 118 Wash.2d 709, 713, 826 P.2d 1081 (1992) (related statutes must be read together to achieve a harmonious overall statutory scheme).

[4] However, these broad enabling statutes are silent as to how Ecology is to determine water rights in a regulatory context. This silence is even more telling when compared to the elaborate general adjudication process for determining water rights entrusted to the superior courts by RCW 90.03. Nowhere in Ecology's enabling statutes was it vested with similar authority to conduct general adjudications or even regulatory adjudications of water ****237** rights. An administrative agency cannot modify or amend a statute through its own regulation. *State v. Thompson*, 95 Wash.2d 753, 759, 630 P.2d 925 (1981). The absence of a specific grant to Ecology to determine water rights, coupled with an explicit grant to another branch of government to do exactly that, makes Ecology's determination of such rights seemingly ultra vires.

Since Ecology has no explicit statutory authority to rely upon, it asks instead that we extend a number of previous cases to allow it the authority to make "tentative determinations" of the priorities of existing water rights in order to regulate. *Funk v. Bartholet,* 157 Wash. 584, 594, 289 P. 1018 (1930); *Mack v. Eldorado Water Dist.,* 56 Wash.2d 584, 587, 354 P.2d 917 (1960); *Stempel v. Department of Water Resources,* 82 Wash.2d 109, 116, 508 P.2d 166 (1973). Ecology argues that it only "tentatively determined" that the Irrigators' rights were junior to those of the Ranchers, and that a final determination would occur if the PCHB hearings were allowed to proceed.

There are two problems with this argument. First, the concept of "tentative determinations" in the cases cited by Ecology was developed in a different context.[FN2] Each of those cases dealt with the authority of Ecology (or its predecessor ***228** agency) to grant permits to appropriate water. The inquiry in that situation is relatively straightforward: is there water available to apportion, is the proposed use beneficial and not detrimental to the public interest, and is there any conflict with existing water rights. RCW 90.03.290. In the permitting situation, Ecology's determination is limited to tentatively determining whether there are existing water rights with which the proposed use will conflict. *Funk,* at 594; *Stempel,* at 115–16, 508 P.2d 166. Ecology investigates an application for a permit to tentatively determine the existence of water rights [FN3] and the availability of water.

FN2. Indeed, there is nothing "tentative" about Ecology's orders, which shut off every irrigation well in the Sinking Creek basin.

FN3. The Irrigators have vigorously disputed the existence, amount, and priorities of the Ranchers' claims in this case.

[5] Once the permit has been granted, the situation is significantly different. Permit holders have a vested property interest in their water rights to the extent that the water is beneficially used. *Department of Ecology v. Acquavella,* 100 Wash.2d 651, 655–56, 674 P.2d 160 (1983). *See also Department of Ecology v. United States Bur. of Reclamation,* 118 Wash.2d 761, 767, 827 P.2d 275 (1992) (recognizing permit holder's property interest in water rights). Unlike the permitting process, in which Ecology only tentatively determines the existence of claimed water rights, a later decision that an existing permit conflicts with another claimed use and must be regulated necessarily involves a determination of the *priorities* of the conflicting uses. In order to properly prioritize competing claims, it is necessary to examine when the use was begun, whether the claim had been filed pursuant to the water rights registration act, RCW 90.14 and whether it had been lost or diminished over time. These determinations necessarily implicate important property rights. It is because of the complicated nature of such inquiries, and their far-reaching effect, that the Legislature has entrusted the superior courts with responsibility therefor. RCW 90.03.110.

The second problem with Ecology's argument that it was only "tentatively determining" water rights is that the PCHB ***229** has no jurisdiction to conduct adjudicative hearings regarding such rights. The statute creating the PCHBspecifically forbids it to conduct hearings on "[p]roceedings by [Ecology] relating to general adjudications of water rights". RCW 43.21B.110(2)(c). Both Ecology and the PCHB argue that this case did not involve a general adjudication, but rather an appeal of an administrative order issued by Ecology, which would be within the jurisdiction of the PCHB. RCW 43.21B.110(1)(b), (c).

[6][7] This bootstrap argument is unpersuasive. The administrative orders in ****238** question were based upon Ecology's determinations of the existence, quantities, and relative priorities of various legally held water rights. Ecology cannot sustain the argument that it conducted only a little, or a limited, or a

tentative, adjudication, so that it is then permitted to have the PCHB conduct a more thorough adjudication. The PCHB *cannot* adjudicate priorities between water users. Nor can Ecology determine allegedly senior water rights outside of the context of a general adjudication.

[8] "A general adjudication, pursuant to RCW 90.03, is a process whereby all those claiming the right to use waters of a river or stream are joined in a single action to determine water rights and priorities between claimants." *Acquavella*, at 652, 674 P.2d 160. Although initiated by Ecology, this adjudication is conducted under the auspices of the superior court. RCW 90.03.110. Ecology's role in such an adjudication is to advise the court as to the parties claiming a right in the body of water, as well as the priority, amount, and validity of such rights. RCW 90.03.110, . 160–.170, .190. However, these determinations are not made by Ecology sua sponte. Rather, hearings are conducted by Ecology at which all parties claiming water from a particular basin get to present evidence as to their claims, examine the evidence of other parties claiming a right to use water, and, if warranted, question the validity of such other competing claims. RCW 90.03.160–.200. A general adjudication ensures that all interested parties are heard in a formal adjudicative setting and that adequate due process is afforded to all.

***230** Were Ecology allowed to allocate water resources solely on the basis of its own determination of priorities, general adjudications might become unnecessary. Ecology could circumvent the general adjudication process by conducting minor, ad hoc investigations and subsequent piecemeal adjudications throughout the state. This result could prove detrimental to the general adjudication process statewide in light of Ecology's statutory role as the initiator of general adjudications in the superior court. RCW 90.03.110. There would be no reason to grant a petition to initiate a general adjudication if Ecology could conduct its own investigation and solve the conflict as it sees fit. We have previously refused the pleas of potential appropriators to narrow the scope and use of general adjudications, and we can see no reason to treat Ecology differently. *McLeary v. Department of Game*, 91 Wash.2d 647, 651, 591 P.2d 778 (1979).

A good analogy to the general adjudication process is found in bankruptcy law. Indeed, general adjudications are especially designed to respond to the "bankruptcy" of an aquifer such as is occurring in the Sinking Creek basin. The bankruptcy process is generally used when a person's or company's liabilities exceed its assets and creditors are demanding to be paid. One commentator has described it thusly:

> In bankruptcy, with an inadequate pie to divide and the looming discharge of unpaid debts, the disputes center on who is entitled to shares of the debtor's assets and how these shares are to be divided.

Elizabeth Warren, *Bankruptcy Policy*, 54 U.Chi.L.Rev. 775, 785 (1987). Here, the demands on the aquifer exceed its capacity to meet all those demands, and the dispute is over who is entitled to the water that is available.

The bankruptcy code also assigns certain classes of debt priority over other classes of debt, just as the Water Code assigns priorities based on time. *See generally* Richard B. Herzog, Jr., *Bankruptcy, a Concise Guide for Creditors and Debtors* 95–96 (1983). However, even a claim in the most protected class of debt in bankruptcy is not guaranteed payment. The debtor may have procedural or substantive defenses against ***231** the claimant, the claimant may havepreviously agreed to subordinate its claim, or there may be other flaws in the claim. *See generally* David L. Buchbinder, *Fundamentals of Bankruptcy* 349–69 (1991). In such cases, a claim which facially appears to possess priority may be relegated to a junior position. Similarly, under the Water Code, a claim which allegedly dates back to the turn of the ****239** century

may be found, upon closer examination, to be flawed for a variety of reasons. Ecology's orders assumed that the Ranchers' claims were entirely valid without ever undertaking the formal statutory process necessary to make such a determination.

In bankruptcy, a trustee administers the estate in order to collect all its assets, prioritize the debts, and pay the debtors in order of priority. Under the Water Code, that "trustee" is the superior court. Just as the goal of bankruptcy is to satisfy the debtors while preserving the business, the goal of the Water Code is to satisfy water users without drying up the aquifer. In order to assure that protracted litigation does not lead to destruction of the aquifer, explicit authority is provided for the superior court to regulate the stream or other water involved during the pendency of the proceedings. RCW 90.03.210. Such regulation is to be ordered "according to the schedule of rights specified in [Ecology's] report". RCW 90.03.210. Of course, Ecology's report is prepared after it conducts extensive evidentiary hearings as to the rights claimed in the contested body of water. RCW 90.03.160–.190. Nonetheless, Ecology's conclusions as to the priority and amounts of the rights claimed will be the basis for governing appropriations until such a time as a final decree has been entered and all appeals exhausted. Much of what Ecology attempted to accomplish through the ad hoc adjudication conducted here could have been legally accomplished by following these provisions of the Water Code.

[9] Although not raised in the initial briefing of the two public entities in this case (Ecology and the PCHB), appellants Rosman and the Sinking Creek Project, as well as the amicus curiae Washington Environmental Council, also contend that the public trust doctrine justifies Ecology's regulation of ***232** water resources.[FN4] The public trust doctrine evolved out of the public necessity for access to navigable waters and shorelands. *Orion Corp. v. State,* 109 Wash.2d 621, 640, 747 P.2d 1062 (1987), *cert. denied,* 486 U.S. 1022, 108 S.Ct. 1996, 100 L.Ed.2d 227 (1988). It is partially encapsulated in the language of our state constitution which reserves state ownership in "the beds and shores of all navigable waters in the state". Const. art. 17, § 1. The doctrine has always existed in the State of Washington. *Caminiti v. Boyle,* 107 Wash.2d 662, 670, 732 P.2d 989 (1987), *cert. denied,* 484 U.S. 1008, 108 S.Ct. 703, 98 L.Ed.2d 654 (1988). The doctrine prohibits the State from disposing of its interest in the waters of the state in such a way that the public's right of access is substantially impaired, unless the action promotes the overall interests of the public. *Caminiti,* at 670, 732 P.2d 989.

> FN4. Ecology has, however, adopted these public trust arguments as its own in its reply brief. Reply Brief of Appellant Ecology, at 26–29.

We do not find the public trust doctrine germane to resolving the issues before us today. There are two threshold problems with relying on the public trust doctrine in this situation. First, we have never previously interpreted the doctrine to extend to non-navigable waters or groundwater.[FN5] Second, the duty imposed by the public trust doctrine devolves upon the State, not any particular agency thereof. Nowhere in Ecology's enabling statute is it given the statutory authority to assume the State's public trust duties and regulate in order to protect the public trust.

> FN5. We similarly do not need to address the scope of the doctrine today.

However, there is an even more fundamental problem with relying on this doctrine to justify Ecology's actions. The appellants argue that, since the water in question is being squandered, the public trust doctrine allows Ecology to regulate to preserve this precious and limited resource. However, the issue in this case has never been Ecology's ability to regulate generally, which is admitted. Rather, at issue is Ecology's specific ability to establish and prioritize

water rights unilaterally, without a general adjudication, tothe detriment of other water users. Even assuming for the sake ***233** of argument that the public trust doctrine places on Ecology some affirmative****240** duty to protect and preserve the waters of this state, the doctrine could provide no guidance as to *how* Ecology is to protect those waters.[FN6] That guidance, which is crucial to the decision we reach today, is found only in the Water Code.

> FN6. For instance, if the public trust doctrine grants Ecology plenary authority to protect waters of this state, Ecology could utilize this doctrine in the Sinking Creek dispute by taking away the riparian rights of the Ranchers, which should leave more water in the creek. *Cf. National Audubon Soc'y v. Superior Court,* 33 Cal.3d 419, 189 Cal.Rptr. 346, 658 P.2d 709 (utilizing public trust doctrine to cut off rights of riparian owners), *cert. denied,* 464 U.S. 977, 104 S.Ct. 413, 78 L.Ed.2d 351 (1983). Alternatively, they could shut off both the Ranchers and the Irrigators under the guise of protecting the public trust.

There still remains the question of whether the trial court properly acted in this case. We conclude that it did. The trial court initially became involved when the Irrigators filed a petition for review and writ of certiorari in the superior court primarily seeking review of the legality of Ecology's actions. Article 4, section 6 of our constitution grants superior courts the power to issue writs of certiorari. Statutorily, this writ is meant to issue when

> an inferior tribunal, board or officer, exercising judicial functions, has exceeded the jurisdiction of such tribunal, board or officer ... or to correct any erroneous or void proceeding ... and there is no appeal, nor in the judgment of the court, any plain, speedy and adequate remedy at law.

RCW 7.16.040.

[10] In the normal course of proceedings, the "plain, speedy and adequate remedy at law" for challenging an agency action is found in the APA. In the case at hand, the putatively proper course for an appeal of the cease and desist orders was an appeal to the PCHB. RCW 43.21B.110(1)(b). As the Irrigators initially brought their motion to quash before the PCHB, the Superior Court was correct in deciding that the adequate remedy at law for the Irrigators was to allow the PCHB to rule on the motion. At this point it was possible that the PCHB itself would recognize that the orders were invalid and grant the motion.

***234** [11] Once the PCHB had issued its final order denying the Irrigators' motion, which specifically upheld Ecology's authority to issue the cease and desist orders, there was no longer an adequate remedy at law. The Irrigators would have been forced to endure a protracted and expensive hearing by a body which had no authority to adjudicate water rights. The Irrigators' proper remedy lay in the authority of the Superior Court. *Pierce Cy. Sheriff v. Civil Serv. Comm'n,* 98 Wash.2d 690, 693–94, 658 P.2d 648 (1983). The Superior Court possessed the inherent authority to grant the Irrigators relief and invalidate Ecology's erroneous orders.

To summarize, we hold that Ecology had no authority to issue these cease and desist orders without first utilizing a general adjudication pursuant to RCW 90.03 in order to determine the existence, amount, and priorities of the water rights claimed in the Sinking Creek basin. The Superior Court properly exercised its authority, and we affirm its order holding the cease and desist orders null and void. Although the conclusion Ecology reached as to the relative priorities of the water rights in the Sinking Creek basin may ultimately prove to be correct, the only method of ascertaining this will be through a general adjudication.

ANDERSEN, C.J., and BRACHTENBACH, SMITH, JOHNSON and MADSEN, JJ., concur.

GUY, Justice (dissenting).

The majority holds that Ecology lacked the authority to issue cease and desist orders to the Irrigators. I dissent.

The cease and desist orders Ecology issued were aimed at regulating the Irrigators' perceived impairment of the water rights of the Ranchers. The orders therefore rested on a prior assessment that the Ranchers' rights were senior to those of the Irrigators. According to the majority, Ecology's prior assessment of the priority of rights was invalid because it was outside ****241** the statutorily authorized general adjudication procedures. I disagree.

***235** ECOLOGY ACTION NOT AN ADJUDICATION

Ecology's action was not an adjudication as defined under RCW 90.03.110–.245; Ecology made a tentative assessment of rights for the purpose of regulating the diversion of water from Sinking Creek. A general adjudication under the water code, RCW 90.03, determines the rights of all those claiming water rights in a given body of water, and the priority of each right is determined relative to all others. RCW 90.03.120 and .200. That did not occur here. Ecology's action did not affect all water rights claimed in the water resource; and even for those rights it did affect, it did not determine the priority of each relative to the others.

Ecology's action did not constitute a general adjudication even in the most basic sense. As a general proposition, adjudication of an issue determines legal rights so as to preclude relitigation of that same issue. Ecology's tentative assessment of the priority of rights between the Irrigators and the Ranchers had no preclusive effect on later litigation, as would an adjudication. If a general adjudication of water rights in Sinking Creek is ever conducted, Ecology's tentative assessment here would have no preclusive effect whatsoever on those proceedings. It is true that decisions of administrative agencies may be accorded preclusive effect in subsequent litigation. *State v. Dupard,* 93 Wash.2d 268, 275, 609 P.2d 961 (1980). This requires, however, that the agency follow procedures not substantially different from court procedures. *Dupard,* at 275, 609 P.2d 961. Because Ecology's assessment of priorities here was made in a fashion substantially different from a court proceeding, preclusion could not occur. What occurred was simply a tentative assessment of rights for the purpose of a regulatory action.

Moreover, this court has previously recognized that such tentative assessments are not adjudications. In *Funk v. Bartholet,* 157 Wash. 584, 289 P. 1018 (1930), the Supervisor of Hydraulics—the predecessor to the Director of Ecology—issued permits to a certain corporation to appropriate waters. An objection to the issuance of the permits was raised on the ***236** ground that issuance of the permits effectively adjudicated property rights. *Bartholet,* at 592–93, 289 P. 1018. This court rejected this contention and declared the supervisor's action was not an adjudication of any rights. *Bartholet,* at 594, 289 P. 1018. The court explained that in issuing the permits, "the supervisor is called upon to tentatively determine" such questions as whether the appropriation will conflict with any existing rights, but that any such "tentative decision" is not an adjudication of private rights. *Bartholet,* at 594, 289 P. 1018; *see also Stempel v. Department of Water Resources,* 82 Wash.2d 109, 115–16, 508 P.2d 166 (1973) (determinations of existing rights during issuance of water use permits are tentative and not adjudications); *United States v. State Water Resources Control Bd.,* 182 Cal.App.3d 82, 103, 227 Cal.Rptr. 161 (1986), *review denied* (Sept. 18, 1986) (state's estimate of whether there is sufficient surplus water to issue water permit is not an adjudication of water rights). Although courts preside over general adjudi-

cations and ultimately review administrative decisions upon appeal, we should not judicially usurp Ecology's primary regulatory role.

If Ecology's action in making the tentative assessment of rights was not an adjudication, the more fundamental question emerges as to whether Ecology has the statutory authority to take the kind of regulatory action it took here when there has yet been no adjudication and when the water rights affected are in dispute. I would hold that it does.

STATUTORY AUTHORITY OF DIRECTOR

RCW 43.21A.064(3) provides that the director of Ecology "shall regulate and control the diversion of water in accordance with the rights thereto". This statutory authority is plenary; the director's power ****242** is not limited to the regulation of rights only as determined in a general adjudication under RCW 90.03.110–.245. Furthermore, RCW 43.27A.190, the statute specifically authorizing cease and desist orders, likewise contains no limiting language. It authorizes Ecology to issue regulatory orders "whenever it appears to the department that a person is violating or is about to violate any of ***237** the provisions" of various water statutes, including the water codes, chapters 90.03 and 90.44 RCW.

The absence of any limiting language in these authorizing statutes is rendered more significant by the fact that the Legislature did include express limiting language in other contexts. For example, RCW 90.08.040 provides:

> *Where water rights of a stream have been adjudicated* a stream patrolman shall be appointed by the director of the department of ecology upon application of water users *having adjudicated water rights* in each particular water resource making a reasonable showing of the necessity therefor ...

(Italics mine.) Thus, where the Legislature wanted to give regulatory authority over adjudicated water rights only, it did so explicitly. This court will not, under the guise of construction, read into a statute matters that are not there. *E.g.*, *Progressive Animal Welfare Soc'y v. University of Wash.*, 114 Wash.2d 677, 688, 790 P.2d 604 (1990). The majority's position incorrectly implies that RCW 43.21A.064(3) and RCW 43.27A.190 include a condition that the director of Ecology may regulate water rights where determined through a general adjudication and not otherwise.

The majority correctly points out that its decision will not provide for a "cheap and easy" water adjudication solution. Majority, at 236. Prohibitively expensive and interminable litigation is what the majority has fashioned as a solution, and to no purpose. The relief sought by neither party was for a general adjudication, and yet that is now the only relief which the majority opines is available. The director of Ecology, upon reading the majority opinion, will surely scratch her head in wonderment that she has the responsibility for issuance of water use permits but no authority to regulate those permits. That authority, according to the majority, belongs exclusively to the courts.

Interpreting Ecology's power to regulate water rights as encompassing adjudicated water rights solely is bad policy. At the present time, only a small fraction of Washington's waters have been adjudicated. For example, the *Acquavella* ***238** litigation involves a general adjudication of water rights in the Yakima River. This litigation began in 1977, involves thousands of parties, and has twice appeared before this court. *See Department of Ecology v. Acquavella*, 100 Wash.2d 651, 674 P.2d 160 (1983) (*Acquavella* I), and *Department of Ecology v. Yakima Reservation Irrig. Dist.*, 121 Wash.2d 257, 850 P.2d 1306 (1993). The general adjudication process continues. Its complexity and longevity demonstrate why it is bad policy to limit Ecology's regulatory powers to adjudicated water rights. Doing so leaves the great majority of the state's waters outside of Ecology's regulatory authority

until there is a general adjudication as to those waters.

In addition, the majority's position leads to absurdity. Ecology unquestionably may make a tentative determination as to existing rights when issuing a water use permit. *See Funk v. Bartholet,* 157 Wash. 584, 594, 289 P. 1018 (1930). According to the majority, however, Ecology then may not again make such a tentative determination until a general adjudication has been conducted. Thus, Ecology might issue a permit with the condition that the appropriation is subject to existing rights; but if a week later it became clear that water use under the permit was impairing a senior right, Ecology could not act to protect the senior water user because that would constitute an adjudication of the water rights involved. That is an absurd result and should be avoided. *See, e.g., State ex rel. Faulk v. CSG Job Ctr.,* 117 Wash.2d 493, 500, 816 P.2d 725 (1991) (statutes should be interpreted so as to avoid absurd results).

****243** The majority's analogy to bankruptcy law is most appropriate. The requirement that the courts exclusively determine conflicting water rights claims in the format of a general adjudication shall surely result in the application of the bankruptcy law to the estates of the Ranchers and Irrigators as they pay to proceed down that yellow brick road leading to general adjudication. Not all roads need to lead to Rome, or to Oz, or to a general adjudication.

I would hold that Ecology has the statutory authority to regulate all water rights, even when no general adjudication ***239** has been made and the priority of rights is in dispute. Such regulatory action inherently involves tentative assessments as to the priority of rights, but such assessments have no preclusive effect and are not adjudications of those rights.

PUBLIC TRUST DOCTRINE

The majority's treatment of the public trust doctrine is also unsatisfactory. The public trust doctrine should be recognized as providing an alternative source of authority for the kind of action Ecology took here.

I recognize that the restriction of the public trust doctrine to navigable waters is well founded in precedent. Nonetheless, the navigability requirement is not inherent in the doctrine and should be abandoned. This becomes clear when one considers the history and theory of the public trust doctrine.

The public trust doctrine is a collection of common law principles recognizing that some types of natural resources are held in trust by government for the benefit of the public. W. Rodgers, *Environmental Law* § 2.16, at 170–71 (1977). The doctrine has been recognized since ancient times. The Institutes of Justinian, a compilation and restatement of the Roman law first published in 533 A.D., states: "[T]he following things are by natural law common to all—the air, running water, the sea and consequently the sea-shore." J.Inst. 2.1.1 (J. Moyle trans. 3d ed. 1896). *See also* J. Stevens, *The Public Trust: A Sovereign's Ancient Prerogative Becomes the People's Environmental Right,* 14 U.C. Davis L.Rev. 195, 196–97 (1980). Similarly, a statement of regional French law in the 11th century declared that " 'the public highways and byways, running water and springs, meadows, pastures, forests, heaths and rocks ... are not to be held by lords, ... nor are they to be maintained ... in any other way than that their people may always be able to use them.' " Sax, *Liberating the Public Trust Doctrine from Its Historical Shackles,* 14 U.C. Davis L.Rev. 185, 189 (1980) (quoting M. Bloch, *French Rural History* 183 (1966)). The principle was also recognized under the common law at least as early as medieval ***240** times, but with the modification that the resources declared to be "common to all" in the civil law were thought of as being inalienably owned by the sovereign—inalienable because they relate to the public good. Stevens, 14 U.C. Davis L.Rev., at 197–98.

The trust aspects of the public trust doctrine are manifested in the protection extended to those resources encompassed within the doctrine. The doctrine protects "against unfair dealing and dissipation", and it demands "results that are consistent with protection and perpetuation of the resource." W. Rodgers § 2.16, at 172. Application of the doctrine requires analysis of what public resources are committed to what public uses.

Historically, as the majority states, the public trust doctrine has been most commonly applied in relation to the public's interest in commerce over navigable waters and shorelands. *See generally*, W. Rodgers § 2.16, at 172. The doctrine is not strictly limited to such contexts, however, either in application or in theory.

For example, the United States Supreme Court in *Phillips Petroleum Co. v. Mississippi*, 484 U.S. 469, 476, 108 S.Ct. 791, 794, 98 L.Ed.2d 877 (1988) recognized that "the States have interests in lands beneath tidal waters which have nothing to do with navigation." These interests include "bathing, swimming, recreation, fishing, and mineral development." *Phillips Petroleum*, at 482, 108 S.Ct. at 798. The Court stated ****244** that "[i]t would be odd to acknowledge such diverse uses of public trust tidelands, and then suggest that the sole measure of the expanse of such lands is the navigability of the waters over them." *Phillips Petroleum*, at 476, 108 S.Ct. at 795. In light of this recognition, the Court held that the geographic scope of the public trust doctrine over tide waters and the lands beneath is determined not by navigability, but by the ebb and flow of the tide. *Phillips Petroleum*, at 479–85, 108 S.Ct. at 796–800. *See generally* Nat'l Pub. Trust Study, *Putting the Public Trust Doctrine to Work* 134 (1990) (discussing Court's rejection of navigability in *Phillips*).

***241** State courts as well have recognized the erosion of navigability and commercial interests as requirements for application of the public trust doctrine. In *National Audubon Soc'y v. Superior Ct. of Alpine Cy.*, 33 Cal.3d 419, 189 Cal.Rptr. 346, 658 P.2d 709 *cert. denied sub nom. Los Angeles Dep't of Water & Power v. National Audubon Soc'y*, 464 U.S. 977, 104 S.Ct. 413, 78 L.Ed.2d 351 (1983), the California Supreme Court applied the doctrine to non-navigable tributaries of a navigable lake. In *People ex rel. Baker v. Mack*, 19 Cal.App.3d 1040, 1046, 97 Cal.Rptr. 448 (1971) (quoting *Lamprey v. State*, 52 Minn. 181, 200, 53 N.W. 1139 (1893)), the court pointed out that

> there are innumerable waters—lakes and streams—which will never be used for commercial purposes but which have been, or are capable of being used, 'for sailing, rowing, fishing, fowling, bathing, skating' and other public purposes, and that it would be a great wrong upon the public for all time to deprive the public of those uses merely because the waters are either not used or not adaptable for commercial purposes.

This court also has extended the public trust doctrine beyond navigational and commercial interests to include "incidental rights of fishing, boating, swimming, water skiing, and other related recreational purposes". *Wilbour v. Gallagher*, 77 Wash.2d 306, 316, 462 P.2d 232, 40 A.L.R.3d 760 (1969), *cert. denied*, 400 U.S. 878, 91 S.Ct. 119, 27 L.Ed.2d 115 (1970). Moreover, in *Orion Corp. v. State*, 109 Wash.2d 621, 747 P.2d 1062 (1987), *cert. denied*, 486 U.S. 1022, 108 S.Ct. 1996 (1988), this court observed that "[t]he trust's relationship to navigable waters and shorelands resulted not from a limitation, but rather from a recognition of where the public need lay." *Orion Corp.*, at 640, 747 P.2d 1062 (citing Reed, *The Public Trust Doctrine: Is It Amphibious?*, 1 J.Envtl.L. & Litigation 107, 111 (1986)).

This court's observation in *Orion* accurately expresses the underlying concept of the public trust doctrine. As explained by the leading commentator on the public trust doctrine, Professor Joseph Sax, the doctrine is closely tied to one of the most basic con-

cerns of the legal system, namely, the protection and maintenance of social stability. Just as the law of property rights protects stability in ownership, and ***242** the criminal law protects stability within a community, just so, explains Professor Sax, "[t]he central idea of the public trust is preventing the destabilizing disappointment of expectations held in common but without formal recognition such as title." Sax, 14 U.C.Davis L.Rev., at 188. In other words, the public trust doctrine requires the protection and perpetuation of natural resources. This functions to prevent social crises that otherwise would arise due to the sudden depletion of those natural resources necessary for the stable functioning of society. Sax, 14 U.C.Davis L.Rev., at 188–89. In short, at its most basic level, the scope of the public trust doctrine is defined by the public's needs in those natural resources necessary for social stability.

Restriction of the public trust doctrine by the concept of navigability is ultimately artificial and absurd. In some jurisdictions, "navigability" means nothing more than that a canoe or rowboat can float on the waterway. *E.g.*, *Southern Idaho Fish & Game Ass'n v. Picabo Livestock, Inc.*, 96 Idaho 360, 362, 528 P.2d 1295 (1974) (navigability includes any waterway capable of being navigated by rowboat for pleasure purposes); *Lamprey v. State*, 52 Minn. 181 at 200, 53 N.W. 1139 ("so long as these ****245** lakes are capable of use for boating, even for pleasure, they are navigable"); *Muench v. Public Serv. Comm'n*, 261 Wis. 492, 506, 53 N.W.2d 514 (1952) (a navigable waterway is any water "which is capable of floating any boat, skiff, or canoe, of the shallowest draft used for recreational purposes"). Presumably the next step is to an air mattress, and then to an inner tube. It is time to recognize that the public's interest is in water as an essential natural, finite resource, not in water just as a public highway or playground. Application of the public trust doctrine should not depend on artificial concepts of navigability. That is not to say that the application of the public trust doctrine is without consideration of vested rights in private parties. The issue of takings and just compensation is one that must be appropriately addressed.

***243** CONCLUSION

I believe Ecology has the statutory authority to issue the cease and desist orders, and additionally that Ecology has the duty under the public trust doctrine to protect such public interests as exist in the waters of Sinking Creek. The majority's decision lacks a sound legal basis, will seriously and improperly interfere with Ecology's ability to regulate water rights, and ignores the interest of the people of this state in the essential natural resource of water. The decision is bad law and bad policy.

To those who cry out that the majority's unsettling opinion constitutes the end of civilization as we know it, or that the sky is truly falling, do not despair. The Legislature must now address itself to a comprehensive water policy defining duties, assigning responsibility to perform those duties, and providing funding necessary to carry out those duties. The Legislature must consider whether western water law meets today's societal needs, given the understanding that water is not an infinite resource. The Legislature must now examine the water resources of this state and determine, for example (1) who controls those resources; (2) the extent of all government allocations of those water resources; (3) the present water usage from all sources, allocated and unallocated; (4) what water resources will be available in the future; (5) what future water needs will be; (6) how water allocations should be made; (7) what public interest is involved in water allocations and use; and, (8) if water allocations are to be changed as to existing users, whether under existing law that constitutes a taking for which compensation must be paid.

The majority's opinion provides a legislative opportunity to address the difficult and politically sensitive issues involving allocation of water resources. Given the imperative that resources must be properly managed for all users—public, agricultural,

industrial, hydroelectric, fish and wildlife, recreational—the majority's opinion may lead to comprehensive,***244** well-considerated water resource management that is workable and understandable.

Utter, J. concurs with Guy, J.

Wash.,1993.
Rettkowski v. Department of Ecology
122 Wash.2d 219, 858 P.2d 232

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M E M O R A N D U M

To: James Irish, Sound Transit
Shankar Rajaram, Sound Transit

From: Steven Wolf, ATS Consulting

Date: March 26, 2015

Subject: Light Rail Vehicle and Motor Vehicle Noise Requirements

The purpose of this memo is to generally describe regulation of noise from motor vehicles and how light rail vehicles compare to other types of large motor vehicles. The memo also specifically compares Sound Transit light rail vehicle (LRV) noise to Bellevue City Code (BCC) and Washington Administrative Code (WAC) maximum noise levels for motor vehicles.

Annoyance to transportation noise has been investigated beginning in the 1970s by the Environmental Protection Agency (EPA). The subsequent noise impact criteria developed by the Federal Transit Administration (FTA), Federal Aviation Administration (FAA), Federal Highway Administration (FHWA), Federal Interagency Committee on Noise, the Department of Housing and Urban Development (HUD), and the American National Standards Institute (ANSI) is largely based upon EPA's work. The noise metric used by EPA to assess sources of transportation noise and now used by all other federal transportation agencies is the A-weighted equivalent sound level (Leq-dBA). These federal agencies provide regulatory guidance in assessing the potential effects of different sources of transportation noise on noise sensitive land uses and receivers to determine if a potential impact requires mitigation. With the exception of FAA these agencies do not regulate the noise emissions of transportation vehicles (autos, trucks, buses, light rail vehicles, etc.).

Chapter 9.18, Noise Control, of the Bellevue City Code (BCC) includes two exemptions pertaining to motor vehicles. The first exempts sounds created by motor vehicles when regulated by Chapter 173-62 of the Washington Administrative Code (WAC) and the second exempts motor vehicles in Class A EDNA's during limited day time hours and at all times for any motor vehicle in a Class B or C EDNA's. For the purposes of this memo, the second exemption is referred to as a "partial exemption".

Although Sound Transit did not rely on the first exemption in preparing its noise impact assessments and reports submitted to the City, the WAC provides a reasonable comparison based on vehicle weight. WAC 173-62 has maximum noise levels for all motor vehicles over 10,000 pounds GVWR of 86 dBA at 50 feet for speeds of 45 mph or less and 90 dBA at 50 feet for speeds over 45 mph. A Sound Transit LRV may weigh up to 105,000 pounds and is most analogous to a motor vehicle over 10,000 pounds.

Based on measurements of Sound Transit light rail vehicles on its Central Link line, the predicted maximum passby noise for a Sound Transit train with one to four cars at 50 feet for speeds of 45 mph or less would be an Lmax of 81 dBA or lower on ballast and tie track and an Lmax of 85 dBA or lower on direct fixation track. Train passby maximum noise levels for both types of trackwork do not exceed the WAC 173-62 maximum noise level of 86 dBA. At speeds of 55 mph, the maximum speed of a Sound Transit train for the East Link Project, the predicted maximum passby noise for a one to four car train on ballast and tie track at 50 feet would be 84 dBA and on direct fixation track an Lmax of 88 dBA. LRV noise levels for both types of track at 55 mph are below the WAC 173-62 maximum noise level of 90 dBA.

When the City of Tukwila approved the permit for light rail in its city in 2004, it considered this question and concluded that because each Sound Transit rail car may weigh up to 105,000 pounds, it was most analogous to a motor vehicle over 10,000 pounds.

The partial exemption in BCC 9.18.020.B.5 provides a daytime exemption for motor vehicles in Class A EDNA's and an exemption "at all times" for "any motor vehicle" in a Class B or C EDNA as stated below:

> B. The following sounds are exempt from the provisions of this chapter <u>at all times if the receiving property is in Class B and Class C EDNAs,</u> and between the hours of 7:00 a.m. and 10:00 p.m. on weekdays and 9:00 a.m. and 10:00 p.m. on weekends if the receiving property is located in a Class A EDNA (except as noted below):
>
> * * *
>
> 5. Sound created by . . . operating or testing any motor vehicle . . .

Sound Transit relied upon the partial exemption in 9.18.020.B.5 in preparing the BelRed (E340) DMP application and the BelRed (E340) Noise Report dated April 2, 2014 because all of the property covered by the BelRed DMP is either EDNA Class B or C. It is reasonable to recognize light rail vehicles as motor vehicles under the Code's partial exemption because light rail vehicles like buses provide public transportation and are similar in character to other transportation noise sources that are exempted under federal requirements and the BCC.

As noted above, the motor vehicle partial exemption does not apply to stationary noise sources such as light rail stations, parking structures, or the proposed Operation and Maintenance Satellite Facility. Sound Transit has submitted three noise reports to the City assessing operational noise from stationary noise sources in South Bellevue, Central Bellevue and BelRed.

In Class A EDNA's, such as the residential areas in South Bellevue, the partial exemption only exempts sounds from the light rail vehicle operations between the hours of 7:00am and 10:00pm on weekdays and 9:00am and 10:00pm on weekends. Therefore, the noise reports predict noise levels from light rail train operations at Class A EDNA properties outside these hours and propose mitigation to comply with the BCC.

East Link | South Bellevue to Overlake Transit Center
Contract No. RTA/AE 0143-11

Contract E320
Noise Impact Assessment Using Bellevue City Code-Operations

June 17, 2014

Prepared for:

SOUNDTRANSIT

Prepared by:

FINAL DESIGN PARTNERS.

Contract E320
Noise Impact Assessment Using Bellevue City Code - Operations

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Acronyms and Abbreviations

BCC	Bellevue City Code
dBA	A-weighted decibel
DCM	Design Criteria Manual
DF	Direct Fixation
EDNA	Environmental designation for noise abatement
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
Ldn	24-hr day-night sound level
Leq	Equivalent sound level
LRT	Light Rail Transit
LRV	Light Rail Vehicle
ROD	Record of Decision
SEL	Sound Exposure Level
ST	Sound Transit
TNM	Traffic Noise Model

1.0 Introduction

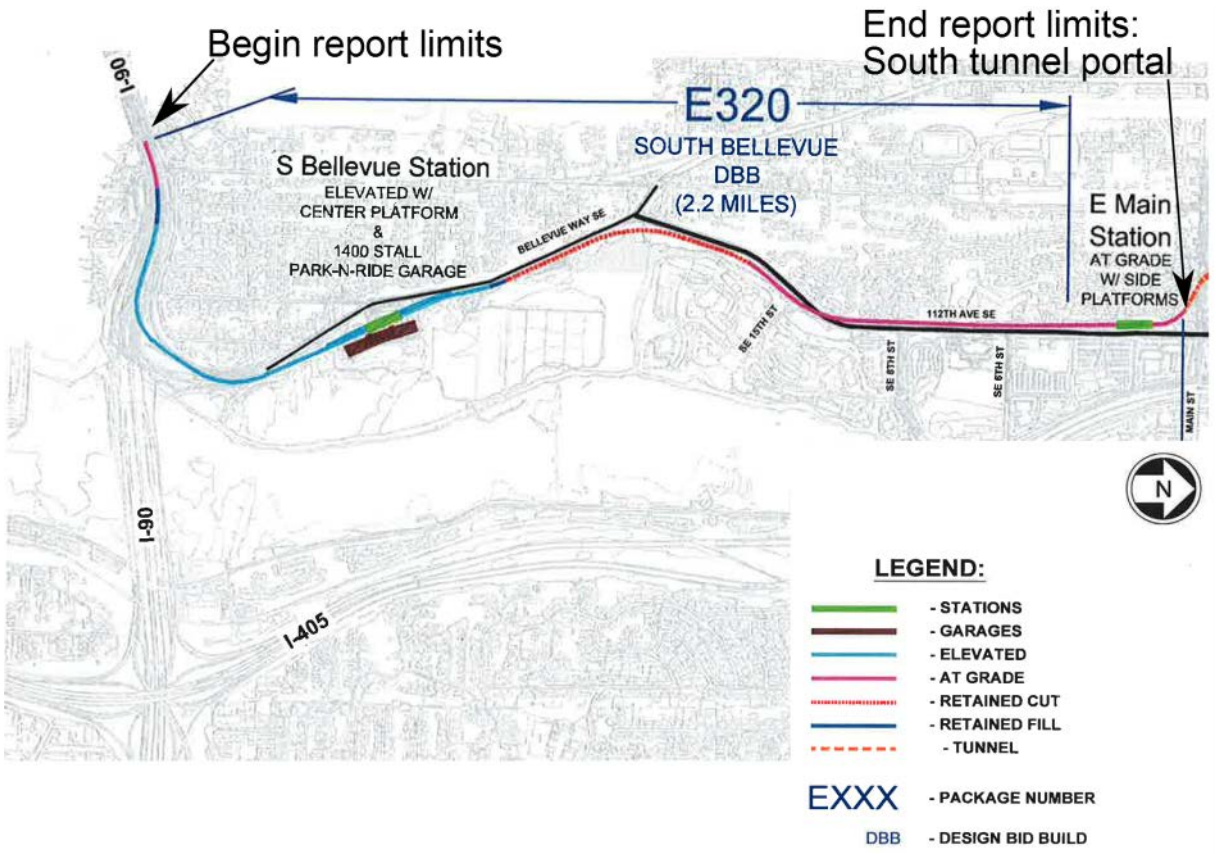
This report presents the results of the noise impact assessment of light-rail operations using the Bellevue City Code (BCC) noise limits. Included in the analysis are parcels from the beginning of the E320 Contract to the Downtown Bellevue Tunnel south portal. Figure 1-1 shows a site map illustrating the limits of the analysis presented in this report.

The noise predictions and impact assessment presented in this report are consistent with the guidelines and methodology presented in the following documents:

- Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment guidance manual (referred to in this report as the FTA guidance manual);
- Sound Transit's Link Noise Mitigation Policy, February 2004; and
- The East Link Final Environmental Impact Statement, July 2011.

The noise impact thresholds used in this report are the maximum permissible sound levels set by BCC 9.18.030. The predicted light-rail operations noise levels are compared to those thresholds. The modeling for this report initially predicted that, after installation of the mitigation required by the FTA Record of Decision, noise from train operations would comply with Chapter 9.18 of the BCC at all properties except two: El 133 and EL148, as stated in Table 4-1. In response, Sound Transit proposes to extend the noise wall to the west near parcel EL 148, as depicted on Figure 6-8, and add sound absorptive treatment to the trench walls near parcel EL 133, as depicted on Figure 6-7. With this additional mitigation, which is explained in section 4.2, this report predicts compliance with Chapter 9.18 BCC at all properties within the E320 study area.

Figure 1-1: Site Map Showing Report Limits



2.0 Bellevue City Code Noise Limits

2.1 Exemptions Applicable to Train Noise

Chapter 9.18 of the Bellevue City Code states maximum permissible sound levels within the City, and exempts noise from most vehicles from these limits. BCC 9.18.020.A.7 exempts "Sounds created by motor vehicles when regulated by Chapter 173-62 of the WAC" (Washington Administrative Code. This chapter of the WAC defines motor vehicles as being "used primarily for transporting persons or property upon public highways and required to be licensed under RCW 46.16.010 . . ."

Since this WAC does not apply to light rail vehicles, BCC 9.18.020.A.7 does not exempt sounds from such vehicles. Instead, sounds from light rail transit vehicles are partially exempted from Chapter 9.18 by BCC 9.18.020.B.5, which exempts sounds created by the operation of all motor vehicles at all times when the receiving property is in a commercial or industrial zone (Class B or C EDNA), but only during certain hours when the receiving property is in a residential zone (Class A EDNA). In residential zones, sounds from the operation of light rail transit vehicles are exempted during the defined hours of 7 a.m. to 10 p.m. weekdays and 9 a.m. to 10 p.m. on weekends.

This noise report presents predicted noise levels from train operations at Class A EDNA properties during the defined nighttime hours of 10 p.m. to 7 a.m. when a 10 dBA maximum permissible sound level reduction is in effect per BCC 9.18.030.C. This report does not predict noise levels from 7 a.m. to 9 a.m.

on weekends because the 10 dBA maximum permissible sound level reduction for nighttime noise does not apply after 7 a.m. and the noise from train operations is predicted to comply with the maximum permissible sound levels defined by BCC 9.18.030.[1]

2.2 Maximum Permissible Sound Levels

The maximum permissible sound levels for residentially zoned properties are presented in BCC 9.18.030.B. The maximum permissible sound levels are reduced by 10 dBA during nighttime hours, from 10 p.m. to 7 a.m. (BCC 9.18.030.C.1) and are increased for short duration noise events (BCC 9.18.030.C.3). The duration of the train events is between 90 seconds and 5 minutes in one hour for peak hour train headways, which is considered a short duration noise event, so the maximum permissible noise levels increase by 10 dBA. The definition of the duration of a train event is presented in the following section for various train speeds.

The maximum permissible noise levels used in this analysis are presented in Table 2-1. The levels in the table include the 10 dB reduction for nighttime noise and a 10 dB increase for short duration events. The maximum permissible sound level is only presented for Class A EDNA receiving properties because LRT noise is exempt from the BCC noise limits for Class B and Class C EDNA receiving properties per BCC 9.18.020.B.5.

Table 2-1: Maximum Permissible Sound Levels for Light Rail Vehicles

EDNA of Source	Maximum Permissible Sound Level for Class A EDNA Receiving Property, Leq(10pm to 7am), dBA
Class A	55 dBA
Class B	57 dBA
Class C	60 dBA
Source: Bellevue City Code Chapter 9.18	

BCC 9.18.030 does not specify which noise metric applies to the maximum permissible sound levels. A noise metric is a descriptor of what the reported sound level represents, such as a maximum level or an average level over a given period of time. Two different noise metrics are defined in the noise code, Leq and Ldn. Ldn cannot be used for nighttime sound levels because it is, by definition, a 24-hour noise metric. This report therefore uses Leq as the noise metric.

Chapter 9.18 BCC also does not identify what time period should be used to model noise from train operations, and does not identify how the duration of train events should be defined. As explained below, this report uses a one-hour Leq and defines the duration of train events in a manner that is consistent with the FTA's guidance manual, in order to apply the code in a conservative manner that does not understate the noise from nighttime train operations.

[1] Even though the WAC and BCC do not discuss light rail vehicle noise nor specifically identify light rail vehicles as exempt, the light rail system is a linear transportation facility that provides public transportation in a public transportation right-of-way. Light rail is similar in character to the other transportation noise sources that are exempted by the WAC and BCC, and light rail meets the intent of the transportation exemption in these codes. In addition, the authors of this assessment are unaware of any other city or county that attempts to regulate noise from the operation of light rail transit vehicles using their local code. All other jurisdictions have relied on the FTA criteria as defined in the FTA Guidance Manual as the most appropriate method of analysis.

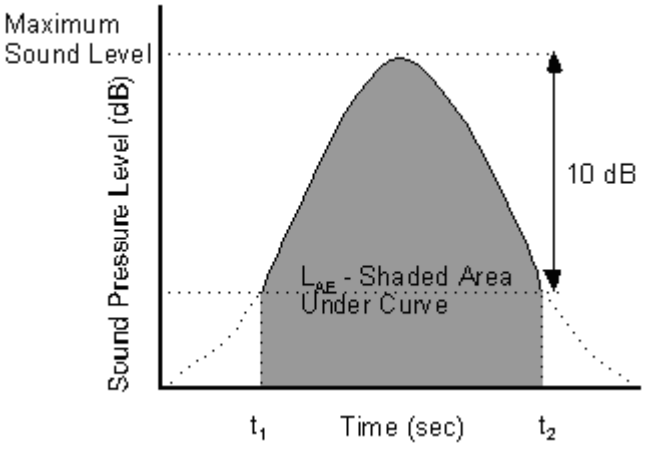
Leq is an energy average of the noise levels over a defined period of time. The noise code does not specify the period of time for the Leq. Since the noise code defines a maximum permissible noise level for nighttime hours and defines nighttime as the period between 10 p.m. to 7 a.m., it would be consistent with the code to use a 9-hour Leq corresponding to the nighttime period. However, light rail trains will not run throughout the night, and ambient noise will also be less during the middle of the night. This report therefore uses a 1-hour Leq to predict the noise from the train events during the two nighttime hours when the noise from trains will be most perceptible. For comparison purposes this report also models ambient noise during those two nighttime hours.

Using 1-hour Leq, this report predicts train noise for the 12 a.m. to 1 a.m. hour and the 6 a.m. to 7 a.m. hour. The 12 a.m. to 1 a.m. hour is the hour with the lowest ambient noise levels during which trains will be running. There will be 15 minute train headways during this hour. The 6 a.m. to 7 a.m. hour is the nighttime hour with the highest number of trains and therefore highest train noise 1-hour Leq. There will be eight-minute train headways during this hour. This report also presents the existing ambient 1-hr Leq during these same hours for reference.

2.3 Duration of Train Event

It is difficult to define train duration because it is not a fixed noise source, therefore the duration of the event will depend on train speed and train length. A possible definition for duration of a train event is to use the duration applied when calculating the sound exposure level (SEL). The SEL is a noise metric used in the FTA noise analysis and is defined in the FTA guidance manual as the level of sound accumulated over a given time interval or event. The FTA manual does not specifically state the duration of the time interval or event; however it is common practice to use the 10 dB down points to define the duration of the train event when determining the SEL. The 10 dB down points are the points before and after the maximum level that are 10 dB below the maximum. The Federal Highway Administration's Traffic Noise Model User's Guide states that as a minimum the SEL should encompass the 10 dB down points. In Figure 2-1, the 10 dB down points are at t_1 and t_2, and the duration of the event would be the time elapsed between t_1 and t_2. The time between the 10 dB down points could be interpreted as the acoustical duration of a train event.

Figure 2-1: Noise Event Illustrating 10 dB Down Points



Source: FHWA Traffic Noise Model Users Guide,

Table 2-2 shows the duration of train events using the 10 dB down point definition for a receiver at 50 feet and a 4-car train. The duration of the event using this definition does depend on the distance of the receiver from the tracks. The distance of 50 feet is commonly used as a reference distance for train noise events because the sound level at 50 feet generally exceeds the ambient noise level by at least 10 dB.

Table 2-2 shows the duration of a single train event and the duration of all train events for the hour with the most train events. The nighttime hour with the most train events is 6 a.m. to 7 a.m. During this hour the operating plan (see Table 3-2 below) shows 7.5 events in each direction, for this analysis this is rounded up to be 8 events in each direction resulting in a conservative total of 16 events in the hour. . The duration of train events in 1 hour for train speeds from 25 mph to 55 mph is between 1.5 minutes and 3.5 minutes. This duration corresponds to a 10 dBA increase to the maximum permissible sound levels for any receiving property per BCC 9.18.030.C.3.c. The 10 dBA increase is applied to the maximum permissible sound level for nighttime hours (10 p.m. to 7 a.m.).

Table 2-2: Duration of Train Events for Different Train Speeds

Train Speed:	55 mph	50 mph	45 mph	40 mph	25 mph
Train Length:	380 ft.	380 ft.	380 ft.	380 ft.	380 ft.
Duration of 1 event (seconds):	6.0 sec	6.6 sec	7.2 sec	8.2 sec	13.0 sec
Max events per hour[1]:	16	16	16	16	16
Duration of train events in 1-hour:	1.6 min	1.8 min	1.9 min	2.2 min	3.5 min
[1]There are 15 scheduled events per hour, but the calculation assumes 16 events in order to be conservative...					

The BCC does not define the duration of a train noise event and the definition presented in this section is not the only possible interpretation. An alternative interpretation is defining the time it takes the train to travel past a point. The duration of a train event using this alternative interpretation is the train length divided by the train speed, which would result in a shorter duration and therefore a higher permissible noise level (an increase of 15 dBA instead of 10 dBA per 9.18.030.C.3.c) for some train speeds than the definition of train duration adopted in this report.

2.4 Prediction Location

BCC 9.18.030.A states “the point of measurement shall be at the property boundary of the receiving property or anywhere within.” Therefore, predicted noise levels should be presented at the location within the property where the noise will be the highest. In general, noise levels decrease with distance so the highest noise levels will be at the property line closest to the LRT tracks. However, when a sound wall is located close to the property line, the sound wall will provide the highest noise reduction at the property line and the noise level may be higher somewhere between the property line and the building facade where the sound wall is less effective.

To illustrate this point, Table 2-3 shows the difference in noise reduction for a sound barrier placed 20 feet from the LRT tracks and a barrier placed close to the property line (55 feet from the LRT tracks), where the property line is 60 feet from the track. The calculations assume flat topography and an 8 feet barrier height.

As shown in Table 2-3, the predicted noise reduction for the barrier located close to (20 feet from) the tracks has very little variation with distance. Noise levels decrease with distance; therefore, the highest noise level is expected to be at the property line and not at the building facade. However, for the barrier located close to the property line (55 feet from the tracks), noise levels may be higher at 100 feet compared to the 60 feet position, because the sound barrier is about 4 decibels less effective.

Table 2-3: Effect of Sound Barrier Location on Noise Reduction

Distance to Measurement Position	Predicted Noise Reduction for barrier located 20 ft. from tracks, dB	Predicted Noise Reduction for barrier located 55 ft. from tracks, dB
60 ft.	12.6	13.3
70 ft.	12.6	10.5
80 ft.	12.5	9.6
90 ft.	12.5	9.1
100 ft.	12.5	8.9
Note: Predicted noise reduction from barrier assumes 8 ft. barrier height and flat topography.		

Any location on a receiving property further away from the LRT track than the building structure will receive noise reduction from acoustical shielding from the structure itself. Therefore, noise predictions are presented at the building facade on the property for parcels where a sound wall is located close to the property line. The prediction location (property line or building facade) is indicated in the footnote in the bottom row of Table 4-1.

3.0 Noise Impact Assessment Methodology

The noise from light-rail vehicle (LRV) operations is predicted using the FTA detailed noise analysis procedure presented in the FTA Transit Noise and Vibration Impact Assessment guidance manual[2]. The FTA detailed noise analysis procedure is a spreadsheet model that uses formulas presented in the FTA guidance manual. The formulas take into account the following specific operating characteristics of the Sound Transit system:

- Measured reference sound level of existing Sound Transit LRVs,
- train operating schedule,
- train speed, and
- track structure

ATS Consulting took reference sound level measurements on the existing ST Central Link light-rail system in April 2013[3]. Measurements were taken on at-grade, ballast-and-tie track and on direct-fixation track on an aerial structure. The measurements were made using a 3-car train consist traveling at controlled speeds during non-revenue service hours and measurements of 2-car train consists during regular revenue service hours. The results of the noise measurements showed maximum noise levels from the light rail vehicle of 79 dBA at 50 feet and 40 mph. The noise levels on the Central Link system

[2] FTA-VA-90-1003-06. May 2006.

[3] The sound level measurements of the existing ST Central Link light-rail system are documented in the report: *Noise Measurements of Existing Sound Transit Trains* dated October 16, 2013.

are about 2 decibels higher than the FTA reference noise level for LRVs. The measured maximum noise levels of the existing light rail vehicle was converted to a reference sound exposure level (SEL) which is the train passby compressed into a 1-second period. The SEL used for the predictions in this analysis is 84 dBA at 50 feet for a one-car train traveling at 50 mph for ballast-and-tie track (2 decibels higher than the FTA reference level of 82 dBA). The measured reference levels for ballast-and-tie track and direct fixation track are shown in Table 3-1.

Table 3-1: Measured SEL Reference Levels

Track-type	SEL Reference Level, dBA[1]
Ballast-and-Tie	84
Direct Fixation	88
[1]SEL reference level is for a one-car train traveling at 50 mph at 50 ft.	

The train schedule from Sound Transit's Revised 2035 Light Rail Operation Plans, shown in Table 3-2, was used for the noise predictions. Note that the revised 2035 operating schedule is different than the assumptions used in the Final EIS predictions. The revised operating schedule assumes 8 minute peak headways and 4-car train consists, while the Final EIS schedule assumed 7-minute peak headways and 3-car train consists. The operating speeds and track structure type assumed in the predictions are based on the information in the 60% design drawings.

Table 3-2: East Link Operating Plan

Hours	Headway (minutes)	Total Eastbound and Westbound Trains
5-6 a.m.	15	4
6-7 a.m.	8	7.5
7-8:30 a.m.	8	11.25
8:30 a.m.-3:00 p.m.	10	39
3-6:30 p.m.	8	26.25
6:30-10 p.m.	10	21
10 p.m.-1:00 a.m.	15	12
1-5 a.m.	0	0
Total Nighttime (10 p.m. - 7 a.m.)	-	23.5[1]
Notes: Schedule is for trains in one direction. [1]Total number of nighttime trains in one direction is rounded up to 24 when calculating predicted noise levels.		

In addition to the operating characteristics of the system, the noise formulas also account for distance from the sensitive receiver to the tracks, ground absorption effects, and noise reduction from barriers recommended in the final design noise mitigation analysis using the FTA noise impact thresholds. The sound barrier lengths and locations recommended in the final design noise mitigation analysis are summarized in Table 3-3. The locations of the barriers are shown in Figure 6-1 through Figure 6-12 in Appendix B.

Table 3-3: Recommended Sound Wall Lengths and Heights from FTA Noise Impact Analysis

Wall	Start Station	End Station	Wall Length	Wall Height	Wall Location	Comments
1WB	380+19 (E130) 405+32 (E320)	456+00	5,100 ft.	6 ft. above top of rail	On WB edge of aerial guideway	
	456+00	459+26	326 ft.	8 ft. above top of rail	On WB edge of aerial guideway	
	459+26	460+29	103 ft.	8 ft. above Bellevue Way Grade	At street level, adjacent to west trench edge	Wall height tapers as trench depth increases
	460+29	460+80	51 ft.	6 ft. above Bellevue Way Grade	At street level, adjacent to west trench edge	
	460+80	462+24	144 ft.	4 ft. above Bellevue Way Grade	At street level, adjacent to west trench edge	
1EB	407+00	418+00	1,100 ft.	4 ft. above top of rail	On EB edge of aerial guideway	
2	476+00	479+00	300 ft	Varies 6 ft. to 10 ft. above top of rail	At WB edge of guideway	
	479+00	491+00	1,200 ft.	10 ft. above top of rail	At WB edge of guideway	
	491+00	496+00	500 ft.	6 ft. above top of rail	At WB edge of guideway	
3	500+00 (north portal of road-over-rail)	508+00	800 ft.	10 ft. above top of rail	At WB edge of guideway	The wall height is the combined retaining wall and sound wall height.
	508+00	509+50	150 ft.	12 ft. above top of rail	At WB edge of guideway	
	509+50	511+00	150 ft.	14 ft. above top of rail	At WB edge of guideway	
	511+00	512+00	100 ft.	12 ft. above top of rail	At WB edge of guideway	
	512+00	514+00	200 ft.	10 ft. above top of rail	At WB edge of guideway	
4	520+00	522+50 (intersection with SE 4th St)	250 ft.	8 ft. above top of rail	At WB edge of guideway	
	522+50	522+80	30 ft.	8 ft. above top of rail	Moveable gate a maximum of 10 feet from the WB track	
	522+80 (intersection with SE 4th St)	523+20	40 ft.	8 ft. above top of rail	At WB edge of guideway	
	523+20	523+20	70 ft.	8 ft. above ground level	Wall will run perpendicular to the track until it reaches the ROW line	
	523+20	531+55 (E335 stationing)	835 ft.	6 ft. above ground level at ROW line	Along WB ROW line	Wall will be located at ROW line
	531+55 (E335 stationing)	540+15 (south tunnel portal)	860 ft.	6 ft. above ground level at ROW line	Along WB ROW line	This section of wall is included in E335 package

4.0 Noise Impact Assessment

This section presents a detailed noise impact analysis of light-rail vehicle operations. Table 4.1 states the predicted nighttime noise levels with the noise mitigation required by the Record of Decision, and compares these noise levels with the maximum permissible noise levels defined in the Bellevue City Code, which is discussed in Section 2.0. Predicted nighttime noise levels exceed the maximum permissible noise level at two parcels, EL133 and EL148. Sound Transit therefore has proposed additional mitigation, as explained in section 4.2, over and above what is required by the Record of Decision, and this additional mitigation will bring the noise levels at these parcels into compliance with the Code.

4.1 Predicted Nighttime Noise from LRVs

Table 4-1 presents the predicted nighttime noise levels for Class A EDNA land uses within the E320 contract limits. Each Class A parcel is identified in the first column of the table. Table 6-1 in Appendix B is a list of all parcel labels and corresponding street addresses. Figure 6-1 through Figure 6-12 in Appendix B show the location of all parcels with respect to the light-rail tracks, as well as the sound walls included in the analysis.

The predicted nighttime noise levels, with the mitigation required by the Record of Decision, exceed the impact threshold at two parcels: EL133 and EL148. Mitigation measures for the noise impacts at these two parcels are presented in Section 4.2.

Table 4-1: Predicted Nighttime Noise Levels, with FTA Mitigation Included

Parcel	Distance[1] (ft)	Speed (mph)	12am to 1 am				6am to 7am			
			Ambient Noise Level, Leq(12am-1am)[2], dBA	Predicted Train Noise, Leq(12am-1am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold, dBA	Ambient Noise Level, Leq(6am-7am)[2], dBA	Predicted Train Noise, Leq(6am-7am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold, dBA
EL100d	260	45	52	52	55	-3	60	55	55	0
EL100e	281	45	53	52	55	-3	61	55	55	0
EL100f	271	45	53	52	55	-3	61	55	55	0
EL100g	260	45	53	52	55	-3	61	55	55	0
EL100h	253	45	53	52	55	-3	61	55	55	0
EL100i	230	45	54	49	55	-6	62	52	55	-3
EL100j	228	45	54	48	55	-7	62	51	55	-4
EL100k	260	45	53	49	55	-6	61	52	55	-3
EL100l	270	45	50	48	55	-7	59	51	55	-4
EL100m	270	45	52	47	55	-8	60	50	55	-5
EL100n	300	45	52	46	55	-9	60	49	55	-6
EL100o	302	45	53	45	55	-10	61	48	55	-7
EL100p	305	45	53	44	55	-11	61	47	55	-8
EL101f	240	45	***62***	51	55	-4	70	54	55	-1
EL101g	230	45	62	52	55	-3	70	55	55	0

Parcel	Distance[1] (ft)	Speed (mph)	12am to 1 am				6am to 7am			
			Ambient Noise Level, Leq(12am-1am)[2], dBA	Predicted Train Noise, Leq(12am-1am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold, dBA	Ambient Noise Level, Leq(6am-7am)[2], dBA	Predicted Train Noise, Leq(6am-7am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold, dBA
EL101h	260	45	61	52	55	-3	70	55	55	0
EL101i	263	45	60	52	55	-3	68	55	55	0
EL101j	242	45	62	50	55	-5	70	53	55	-2
EL101k	235	45	***61***	49	55	-6	***70***	52	55	-3
EL101l	248	45	62	49	55	-6	71	52	55	-3
EL101m	263	45	61	49	55	-6	70	52	55	-3
EL101n	284	45	61	49	55	-6	70	52	55	-3
EL101o	260	45	61	49	55	-6	70	52	55	-3
EL101p	195	35	56	46	55	-9	68	49	55	-6
EL101q	184	35	55	47	55	-8	68	50	55	-5
EL101r	135	35	55	48	55	-7	68	51	55	-4
EL101s	120	35	52	48	55	-7	65	51	55	-4
EL101t	110	35	54	48	55	-7	67	51	55	-4
EL101u	105	35	54	48	55	-7	67	51	55	-4
EL101v	115	35	56	48	55	-7	69	51	55	-4
EL101x	120	35	54	48	55	-7	67	51	55	-4
EL101w	130	35	54	48	55	-7	67	51	55	-4
EL101y	105	35	58	49	55	-6	71	52	55	-3

Parcel	Distance[1] (ft)	Speed (mph)	12am to 1 am				6am to 7am			
			Ambient Noise Level, Leq(12am-1am)[2], dBA	Predicted Train Noise, Leq(12am-1am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold, dBA	Ambient Noise Level, Leq(6am-7am)[2], dBA	Predicted Train Noise, Leq(6am-7am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold, dBA
EL101z	170	35	53	47	55	-8	66	50	55	-5
EL103	165	35	60	49	55	-6	67	52	55	-3
EL104	165	35	55	47	55	-8	62	50	55	-5
EL106	160	35	55	47	55	-8	62	50	55	-5
EL107	180	35	59	47	55	-8	66	50	55	-5
EL108	216	35	56	46	55	-9	63	49	55	-6
EL109	233	30	***53***	46	55	-9	***60***	49	55	-6
EL110	285	30	58	47	55	-8	65	50	55	-5
EL112	247	30	54	47	55	-8	61	50	55	-5
EL114	226	40	57	46	55	-9	64	49	55	-6
EL113	287	40	54	45	55	-10	61	48	55	-7
EL115	195	40	***58***	46	55	-9	***69***	49	55	-6
EL117	146	40	57	48	55	-7	68	51	55	-4
EL118	130	40	56	48	55	-7	67	51	55	-4
EL119	120	40	58	48	55	-7	69	51	55	-4
EL121	105	40	56	49	55	-6	67	52	55	-3
EL122	100	40	49	49	55	-6	61	52	55	-3
EL124	92	40	47	49	55	-6	59	52	55	-3

Parcel	Distance[1] (ft)	Speed (mph)	12am to 1 am				6am to 7am			
			Ambient Noise Level, Leq(12am-1am)[2], dBA	Predicted Train Noise, Leq(12am-1am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold, dBA	Ambient Noise Level, Leq(6am-7am)[2], dBA	Predicted Train Noise, Leq(6am-7am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold, dBA
EL125	85	40	49	50	55	-5	60	53	55	-2
EL126	80	40	***50***	50	55	-5	***61***	53	55	-2
EL127	80	40	50	50	55	-5	60	53	55	-2
EL129	72	45	51	50	55	-5	61	53	55	-2
EL130	63	45	52	50	55	-5	63	53	55	-2
EL131	70	45	52	50	55	-5	63	53	55	-2
EL132	70	45	49	52	55	-3	59	55	55	0
EL133	70	45	49	53	55	-2	60	**56**	55	**1**
EL134	70	45	49	52	55	-3	60	55	55	0
EL135	70	45	***51***	52	55	-3	***62***	55	55	0
EL137	75	45	50	52	55	-3	61	55	55	0
EL138	75	45	60	52	55	-3	68	55	55	0
EL139	75	45	60	52	55	-3	68	55	55	0
EL140	75	45	61	52	55	-3	69	55	55	0
EL142	85	45	57	51	55	-4	64	54	55	-1
EL143	85	45	***59***	51	55	-4	***66***	54	55	-1
EL144	95	45	59	51	55	-4	67	54	55	-1
EL145	115	45	59	50	55	-5	66	53	55	-2

Parcel	Distance[1] (ft)	Speed (mph)	12am to 1 am				6am to 7am			
			Ambient Noise Level, Leq(12am-1am)[2], dBA	Predicted Train Noise, Leq(12am-1am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold, dBA	Ambient Noise Level, Leq(6am-7am)[2], dBA	Predicted Train Noise, Leq(6am-7am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold, dBA
EL148	125	45	59	55	57[5]	-2	66	**58**	57	1
EL149a	140	45	53	40	57[5]	-17	56	43	57	-14
EL149b	147	45	53	40	57[5]	-17	56	43	57	-14
EL149c	160	45	***50***	40	57[5]	-17	***54***	43	57	-14
149d	165	45	50	40	57[5]	-17	54	43	57	-14
EL149e	170	45	51	40	57[5]	-17	55	43	57	-14
EL149f	155	45	50	41	57[5]	-16	54	44	57	-13
EL149g	227	45	48	41	57[5]	-16	52	44	57	-13
EL149h	263	45	48	39	57[5]	-18	52	42	57	-15
EL151	115	45	***54***	49	57[5]	-8	***62***	52	57	-5
EL155	38	45	52	50	55	-5	61	53	55	-2
EL156	148	45	48	43	55	-12	56	46	55	-9
EL158	188	45	47	40	55	-15	55	43	55	-12
EL160	85	55	50	45	55	-10	58	48	55	-7
EL161	65	55	51	47	55	-8	59	50	55	-5
EL163	40	55	52	50	55	-5	60	53	55	-2
EL164	56	55	51	50	55	-5	59	53	55	-2
EL165	53	55	51	48	55	-7	59	51	55	-4

Parcel	Distance[1] (ft)	Speed (mph)	12am to 1 am				6am to 7am			
			Ambient Noise Level, Leq(12am-1am)[2], dBA	Predicted Train Noise, Leq(12am-1am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold, dBA	Ambient Noise Level, Leq(6am-7am)[2], dBA	Predicted Train Noise, Leq(6am-7am)[3] dBA	Nighttime Impact Threshold, Leq(1-hr)[4], dBA	Amount Exceeds Threshold , dBA
EL166	60	55	51	49	55	-6	59	52	55	-3
EL167	44	55	51	52	55	-3	60	55	55	0
EL169	116	55	48	49	55	-6	57	52	55	-3
EL174	93	55	57	45	55	-10	60	48	55	-7
EL179	80	55	58	46	55	-9	60	49	55	-6
EL181	150	55	56	42	55	-13	58	45	55	-10
EL182	135	55	56	42	55	-13	59	45	55	-10
EL183	118	55	56	43	55	-12	59	46	55	-9
EL184	110	45	56	42	55	-13	59	45	55	-10

Notes:

[1]The distance in feet. For parcels EL100d to EL151, the distance is to the property line. For parcels EL155 to EL184, the distance is to the building facade, because the predicted noise level is higher at the building facade than at the property line due to the location of the sound wall

[2] Ambient noise levels shown in bold italics are the parcels where the noise level was measured. At all other parcels the ambient noise level was estimated based on the nearest measurement and the relative distances to the roadway.

[3]Predicted train noise for 12am to 1am assumes 15 minute headways. Predicted train noise for 6am to 7am assumes 8 minute headways.

[4]Nighttime impact threshold is from the maximum permissible sound levels from the BCC applicable to train noise received in residential properties.

[5]The EDNA of source for the LRT alignment adjoining these parcels is Category B.

4.2 Summary of Predicted Impacts and Mitigation Measures

The predicted noise levels exceed the Bellevue City Code noise limit at two parcels, EL148 and EL133. The predicted noise level can be mitigated to below the BCC noise limit by extending the sound wall at parcel EL148 and providing sound absorptive treatment to the walls of the trench walls at parcel EL133. The sound absorptive treatment shall be 1" thick acoustical vermiculite cement plaster (AVCP) in accordance with E320 Specification Section 09 82 19, Sprayed Acoustic Insulation applied to the walls of the trench. Table 4-2 presents the impacted parcels, the mitigation recommendation, and the predicted mitigated sound level. The predicted mitigated sound level for both parcels is below the BCC noise limit of 55 dBA, Leq(nighttime).

Table 4-2: Summary of Predicted Impacts and Mitigation Measures

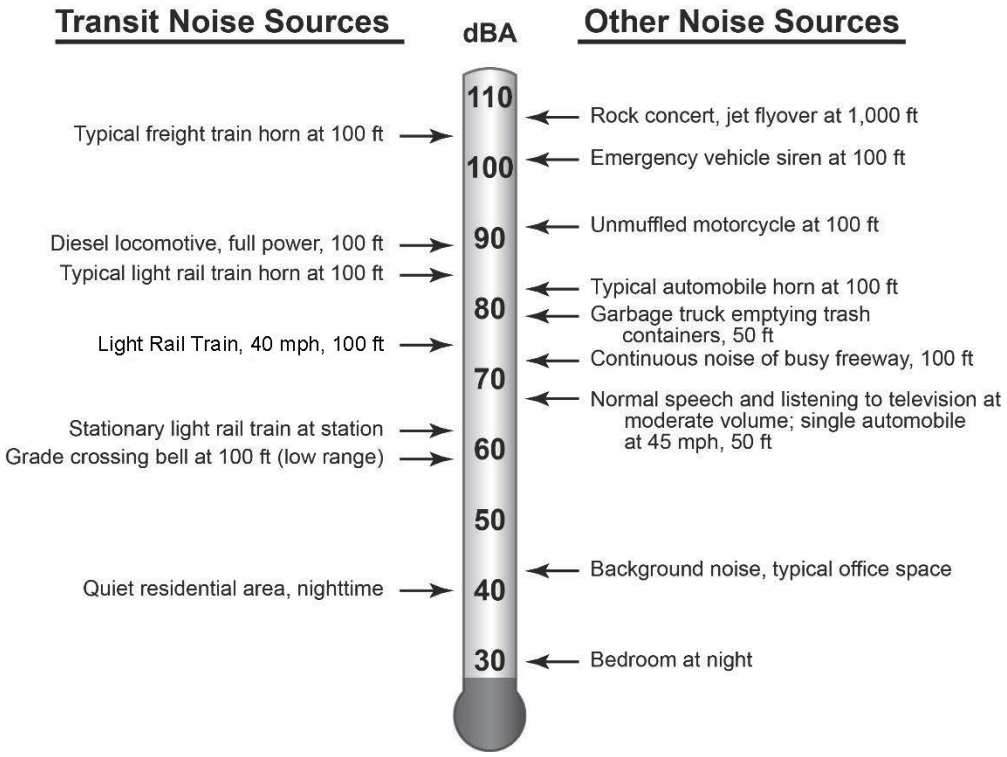
Parcel	Predicted Level , Leq(nighttime), dBA	Recommended Mitigation	Predicted Mitigated Sound Level, Leq(nighttime), dBA
EL133	56 dBA	1" thick AVCP sprayed on to the walls of the trench from EB Sta. 463+00 to the Parking Entrance Lid of the Trench at EB Sta. 465+91	54 dBA
EL148	58 dBA	Extend Wall 2 from WB 479+00 to WB 476+00 (300 feet). Height above top of rail varies from 6 feet at WB 476+00 to 10 feet at WB 479+00	48 dBA

5.0 Appendix A: Background on Noise

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally defined as unwanted or excessive sound. Sound can vary in intensity by over one million times within the range of human hearing. Therefore, a logarithmic scale, known as the decibel scale (dB), is used to quantify sound intensity and compress the scale to a more convenient range.

Sound is characterized by both its amplitude and frequency (or pitch). The human ear does not hear all frequencies equally. In particular, the ear deemphasizes low and very high frequencies. To better approximate the sensitivity of human hearing, the A-weighted decibel scale has been developed. A-weighted decibels are abbreviated as "dBA." On this scale, the human range of hearing extends from approximately 3 dBA to around 140 dBA. As a point of reference, Figure A-1includes examples of A-weighted sound levels from common indoor and outdoor sounds.

Figure 5-1: Typical Noise Levels



Using the decibel scale, sound levels from two or more sources cannot be directly added together to determine the overall sound level. Rather, the combination of two sounds at the same level yields an increase of 3 dB. The smallest recognizable change in sound level is approximately 1 dB. A 3-dB increase in the A-Weighted sound level is generally considered perceptible, whereas a 5-dB increase is readily perceptible. A 10-dB increase is judged by most people as an approximate doubling of the perceived loudness.

The two primary factors that reduce levels of environmental sounds are increasing the distance between the sound source and the receiver and having intervening obstacles such as walls, buildings, or terrain features that block the direct path between the sound source and the receiver. Factors that act to make environmental sounds louder include moving the sound source closer to the receiver, sound enhancements caused by reflections, and focusing caused by various meteorological conditions.

Following are brief definitions of the measures of environmental noise used in this study:

- *Maximum Sound Level (L_{max}):* L_{max} is the maximum sound level that occurs during an event such as a train passing. For this analysis L_{max} is defined as the maximum sound level using the slow setting on a standard sound level meter.
- *Equivalent Sound Level (L_{eq}):* Environmental sound fluctuates constantly. The equivalent sound level (L_{eq}) is the most common means of characterizing community noise. L_{eq} represents a constant sound that, over a specified period of time, has the same sound energy as the time-varying sound. L_{eq} is used by the FTA to evaluate noise effects at institutional land uses, such as schools, churches, and libraries, from proposed transit projects.
- *Day-Night Sound Level (L_{dn}):* L_{dn} is basically a 24-hour L_{eq} with an adjustment to reflect the greater sensitivity of most people to nighttime noise. The adjustment is a 10 dB penalty for all sound that occurs between the hours of 10:00 p.m. to 7:00 a.m. The effect of the penalty is that, when calculating L_{dn}, any event that occurs during the nighttime is equivalent to ten occurrences of the same event during the daytime. L_{dn} is the most common measure of total community noise over a 24-hour period and is used by the FTA to evaluate residential noise effects from proposed transit projects.
- *L_{XX}:* This is the percent of time a sound level is exceeded during the measurement period. For example, the L_{99} is the sound level exceeded during 99 percent of the measurement period. For a 1-hour period, L_{99} is the sound level exceeded for all except 36 seconds of the hour. L_1 represents typical maximum sound levels, L_{33} is approximately equal to L_{eq} when free-flowing traffic is the dominant noise source, L_{50} is the median sound level, and L_{99} is close to the minimum sound level.
- *Sound Exposure Level (SEL):* SEL is a measure of the acoustic energy of an event such as a train passing. In essence, the acoustic energy of the event is compressed into a 1-second period. SEL increases as the sound level of the event increases and as the duration of the event increases. It is often used as an intermediate value in calculating overall metrics such as L_{eq} and L_{dn}.
- *Sound Transmission Class (STC):* STC ratings are used to compare the sound insulating effectiveness of different types of noise barriers, including windows, walls, etc. Although the amount of attenuation varies with frequency, the STC rating provides a rough estimate of the transmission loss from a particular window or wall.

6.0 Appendix B: Parcel Table and Parcel Figures

Table 6-1 lists the addresses of the parcels that are referenced in this report. Figures 6-1 through 6-12 identify the proposed sound walls and the additions to the walls that this report recommends to achieve compliance with the Bellevue Noise Code. For convenience, these figures also identify "Noise Sensitive Receivers" as defined by the Federal Transit Authority by parcel number.

Table 6-1: List of Parcel Numbers and Corresponding Addresses

Parcel	Address
EL100a	unknown
EL100b	10811 SE Lake
EL100c	10815 SE Lake Rd
EL100d	10825 SE Lake Rd
EL100e	10831 SE Lake Rd
EL100f	10835 SE Lake Rd
EL100g	10843 SE Lake Rd
EL100h	10845 SE Lake Rd
EL100i	10925 SE Lake Rd
EL100j	11003 SE Lake Rd
EL100k	11011 SE Lake Rd
EL100l	11015 SE Lake Rd
EL100m	11041 SE Lake Rd
EL100n	11055 SE Lake Rd
EL100o	unknown
EL100p	11205 SE Lake Rd
EL101a	3265 106th Ave SE
EL101b	3273 106th Ave SE
EL101c	3461 108th Ave SE
EL101d	3230 108th Ave SE
EL101e	3247 109th Ave SE
EL101f	3246 109th Ave SE
EL101g	3245 110th Ave SE
EL101h	3242 110th Ave SE
EL101i	11026 SE 34th St
EL101j	3255 111th Ave SE
EL101k	3264 111th Ave SE
EL101l	3265 112th Ave SE
EL101m	3264 112th Ave SE
EL101n	1162 SE 35TH ST
EL101o	3263 113th Ave SE
EL101p	3244 113th Ave SE

Parcel	Address
EL101q	3236 113th Ave SE
EL101r	unknown
EL101s	3218 113th Ave SE
EL101t	3214 113th Ave SE
EL101u	3108 113th Ave SE
EL101v	3110 113th Ave SE
EL101x	3018 113th Ave SE
EL101w	3014 113th Ave SE
EL101y	3005 Bellevue Way SE
EL101z	11234 SE 30th St
EL103	11230 SE 30TH STREET
EL104	2831 BELLEVUE WAY SE
EL106	2811 BELLEVUE WAY SE
EL107	2821 BELLEVUE WAY SE
EL108	2809 BELLEVUE WAY SE
EL109	2705 BELLEVUE WAY SE
EL110	11047 SE 27TH PL
EL112	11048 SE 27TH PL
EL113	11044 SE 27TH PL
EL114	unknown
EL115	2548 111TH AVE SE
EL117	2532 111TH AVE SE
EL118	2522 111TH AVE SE
EL119	2508 111TH AVE SE
EL121	11038 SE 25TH ST
EL122	11024 SE 25TH ST
EL124	11017 SE 24TH PL
EL125	11023 SE 24TH PL
EL126	11022 SE 24TH PL
EL127	11016 SE 24TH PL
EL129	10923 SE 23rd Street
EL130	10929 SE 23rd Street
EL131	10935 SE 23rd Street
EL132	2234 109th Avenue SE
EL133	2228 109th Avenue SE
EL134	2222 109th Avenue SE
EL135	2216 109th Avenue SE
EL137	2128 109th Avenue SE
EL138	2113 Bellevue Way SE
EL139	2105 Bellevue Way SE
EL140	1997 Bellevue Way SE

Parcel	Address
EL142	1928 109TH AVE SE
EL143	1922 109th Avenue SE
EL144	1914 109TH AVE SE
EL145	1906 109TH AVE SE
EL148	1800 108th Avenue SE
EL149a	1650 109TH AVE SE
EL149b	1638 109th Ave SE
EL149c	1632 109th Ave SE
149d	1624 109th Ave SE
EL149e	1612 109th Ave SE
EL149f	1600 109th Ave SE
EL149g	10839 SE 14th St
EL149h	1432 109th Ave SE
EL151	1101 BELLEFIELD PARK LN
EL155	1018 111TH PL SE
EL156	1020 112TH AVE SE
EL158	1022 111TH PL SE
EL160	1012 11TH PL SE
EL161	1006 111TH PL SE
EL163	932 111TH PL SE
EL164	924 111TH PL SE
EL165	918 111TH PL SE
EL166	912 111TH PL SE
EL167	906 111TH PL SE
EL169	807 111TH PL SE
EL174	11121 SE 4TH ST
EL179	11116 SE 4TH ST
EL181	322 111TH AVE SE
EL182	314 111TH AVE SE
EL183	308 111TH AVE SE
EL184	300 111TH AVE SE
EL186	248 111TH AVE SE
EL187	240 111TH AVE SE
EL189	236 111TH AVE SE
EL190	226 111TH AVE SE
EL191	220 111TH AVE SE
EL192	212 111TH AVE SE
EL194	204 111TH AVE SE
EL195	200 111TH AVE SE
EL196	112 111TH AVE SE
EL206	11102 SE 1TH PL

Figure 6-1: Recommended Sound Walls for Parcels EL100a-EL100i and EL101a-EL101h

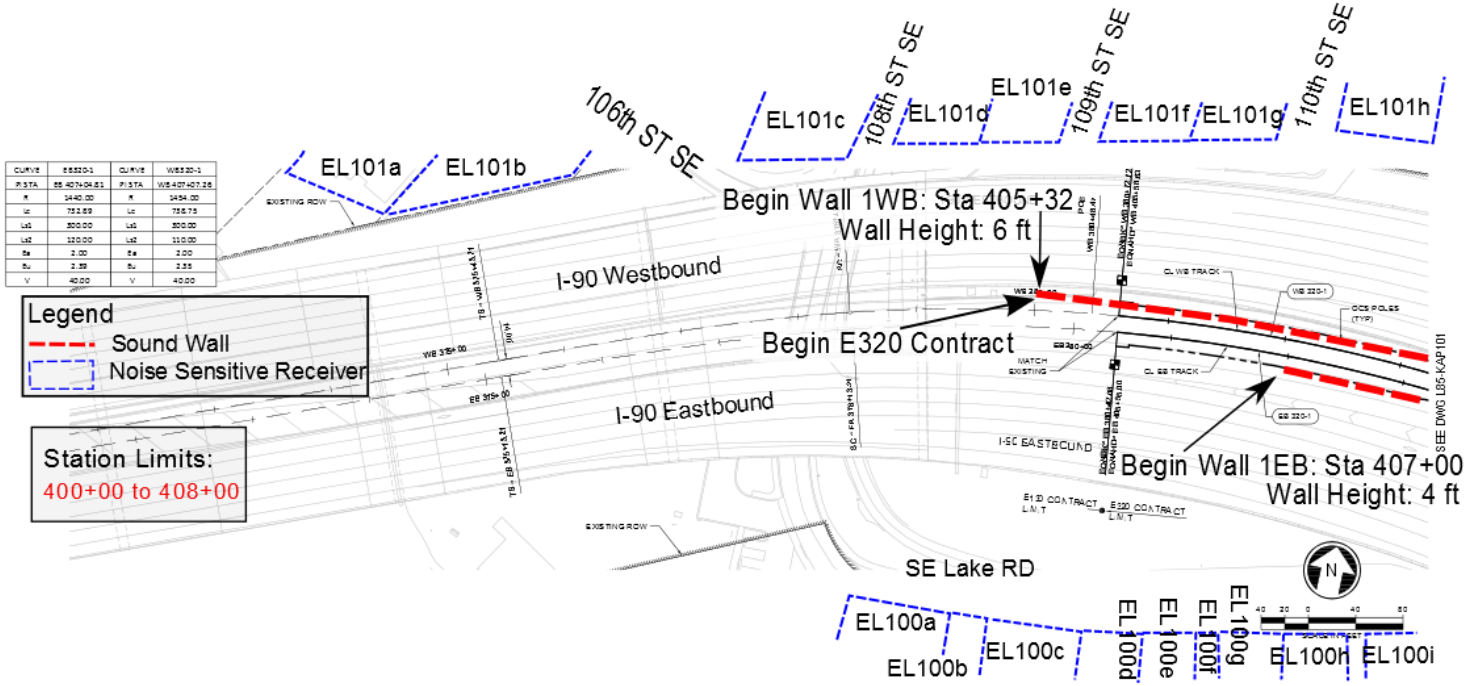


Figure 6-2: Recommended Sound Walls for Parcels EL100h-EL100p, EL101g-EL101o

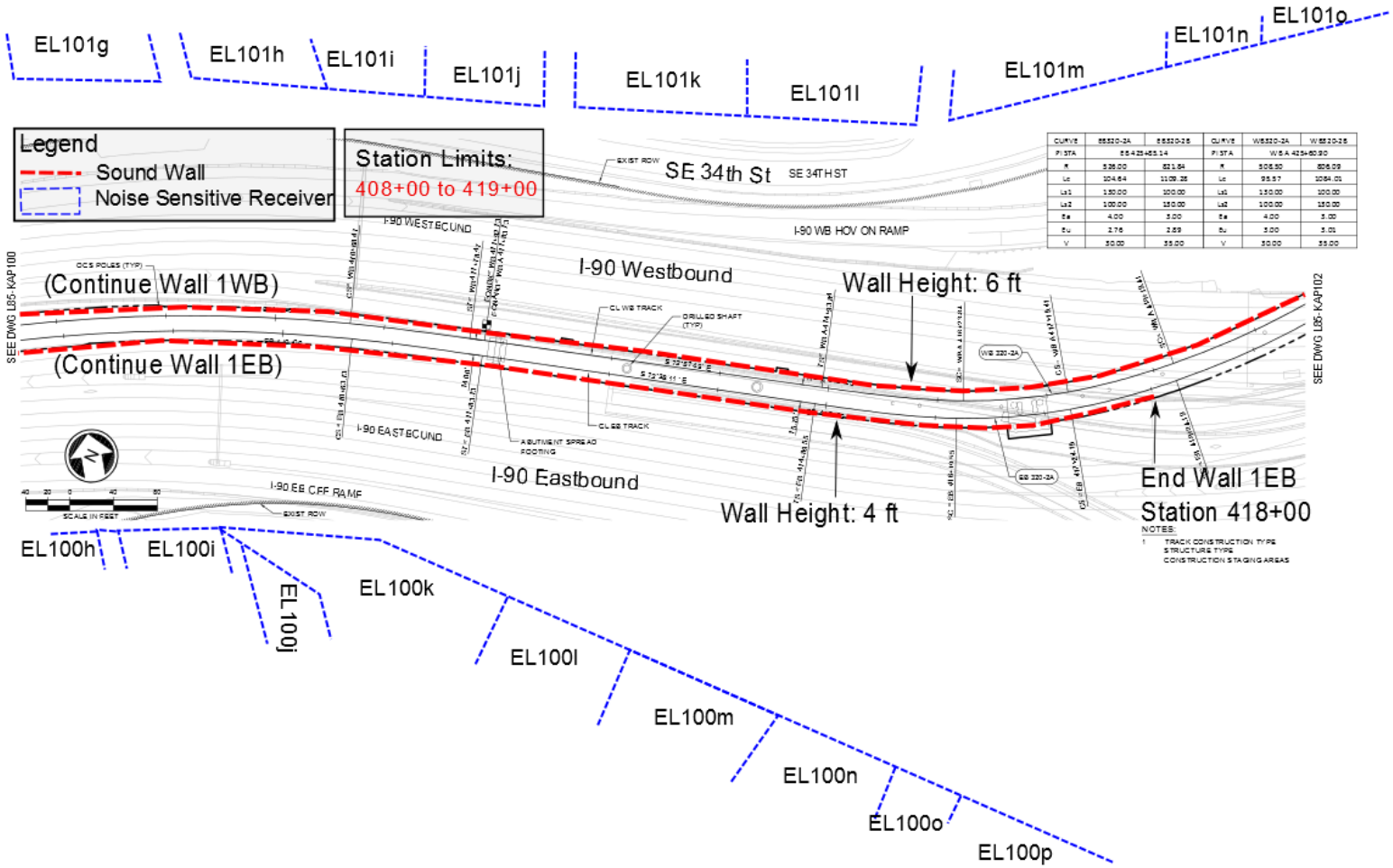


Figure 6-3: Recommended Sound Walls for Parcels EL101p-EL101s

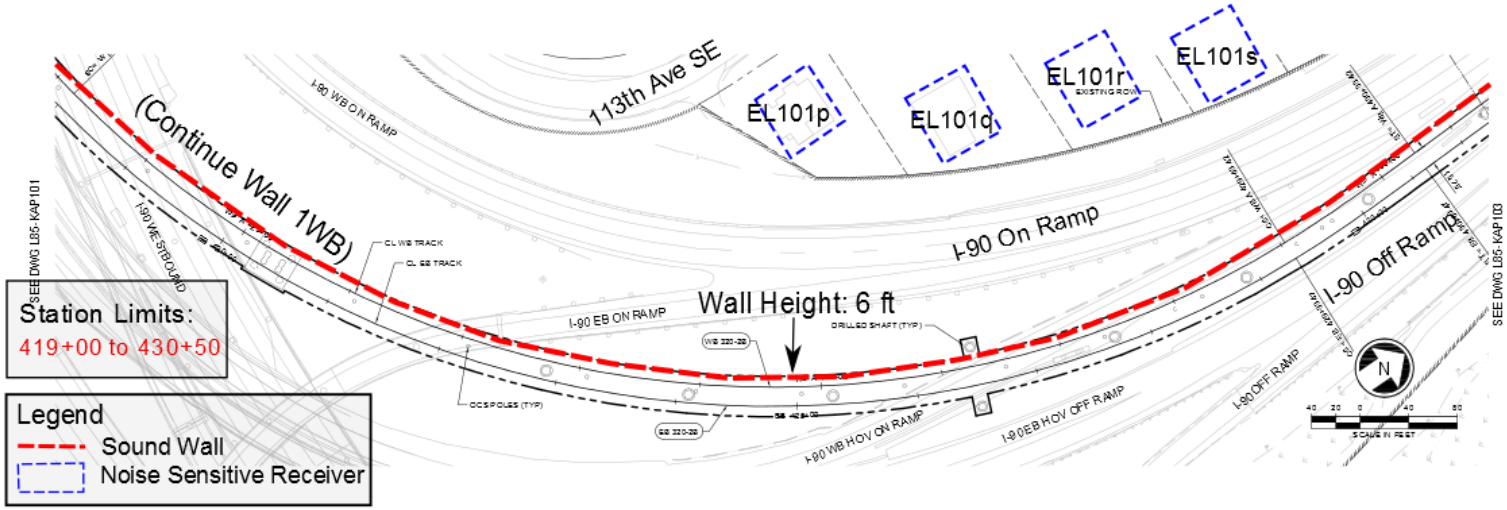


Figure 6-4: Recommended Sound Walls for Parcels EL101t-EL103

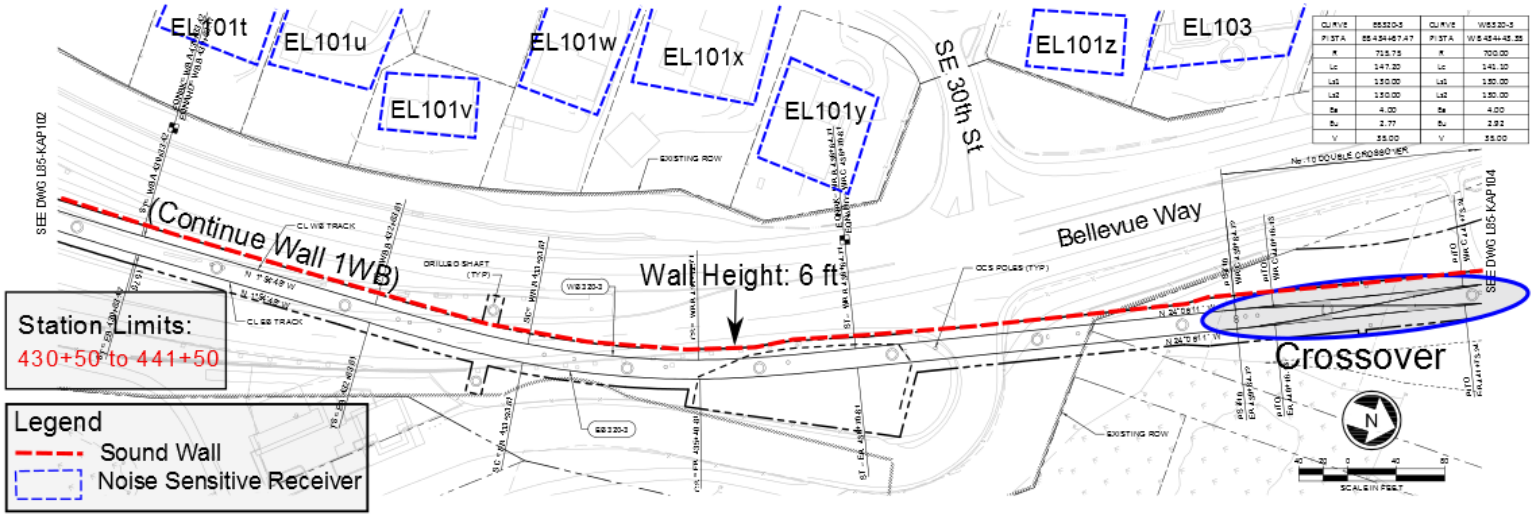


Figure 6-5: Recommended Sound Walls for EL104-EL114

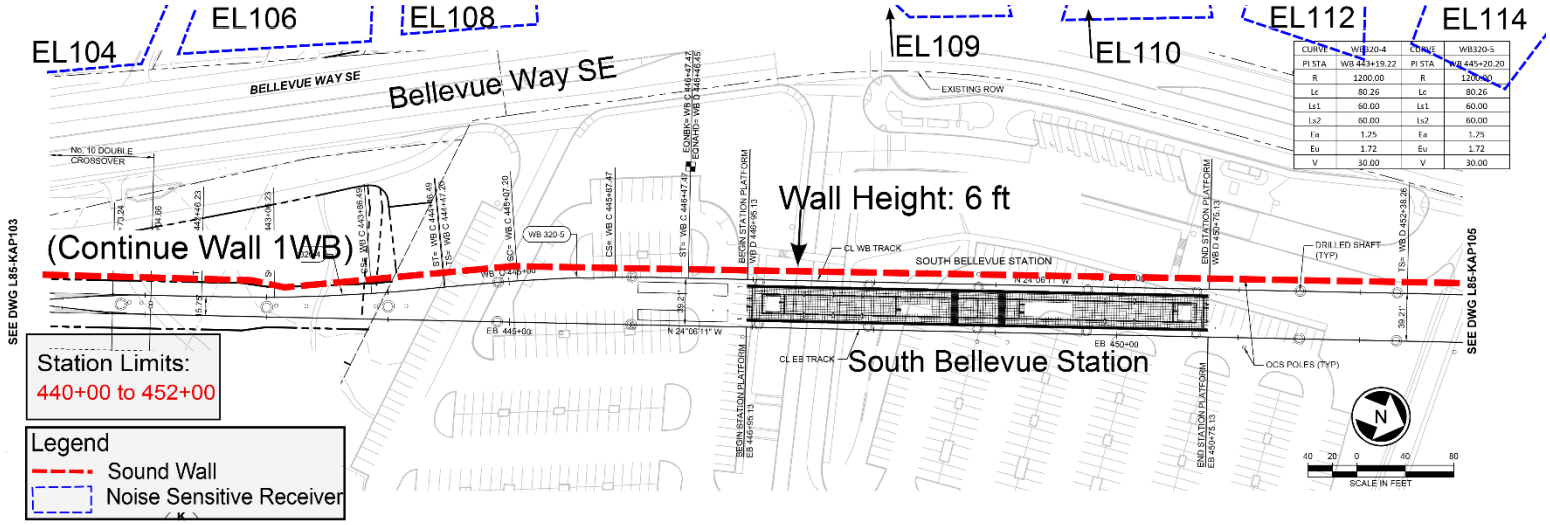


Figure 6-6: Recommended Sound Walls for Parcels EL115-EL132

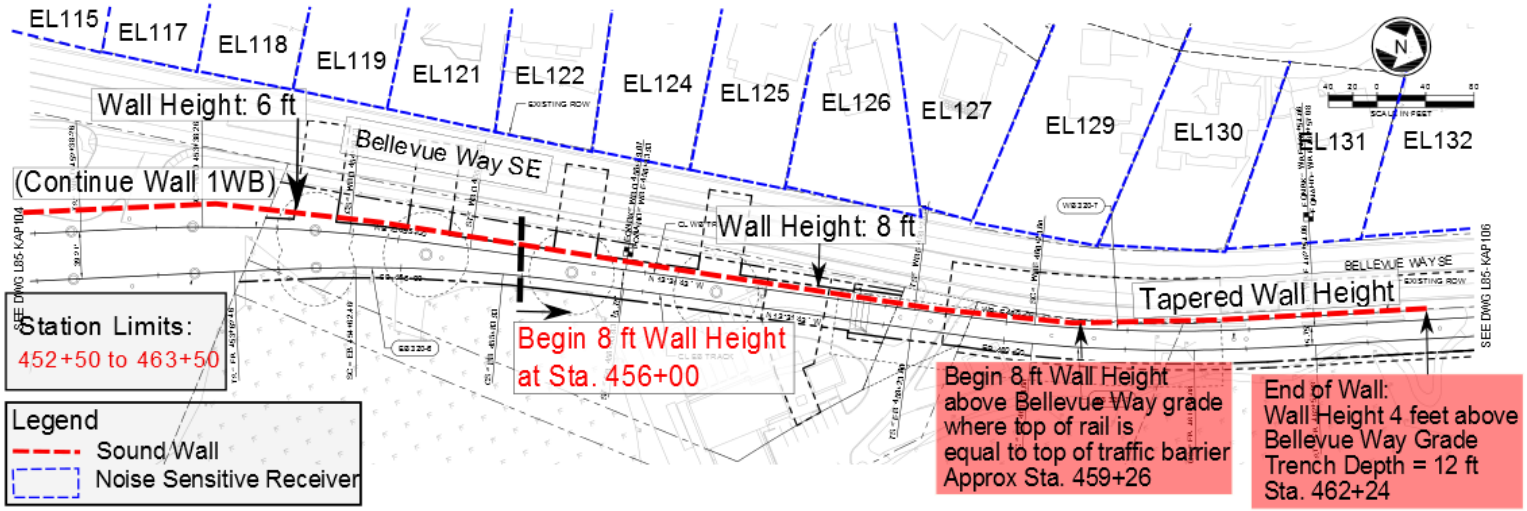


Figure 6-7: Recommended Sound Walls for Parcels EL132-EL144

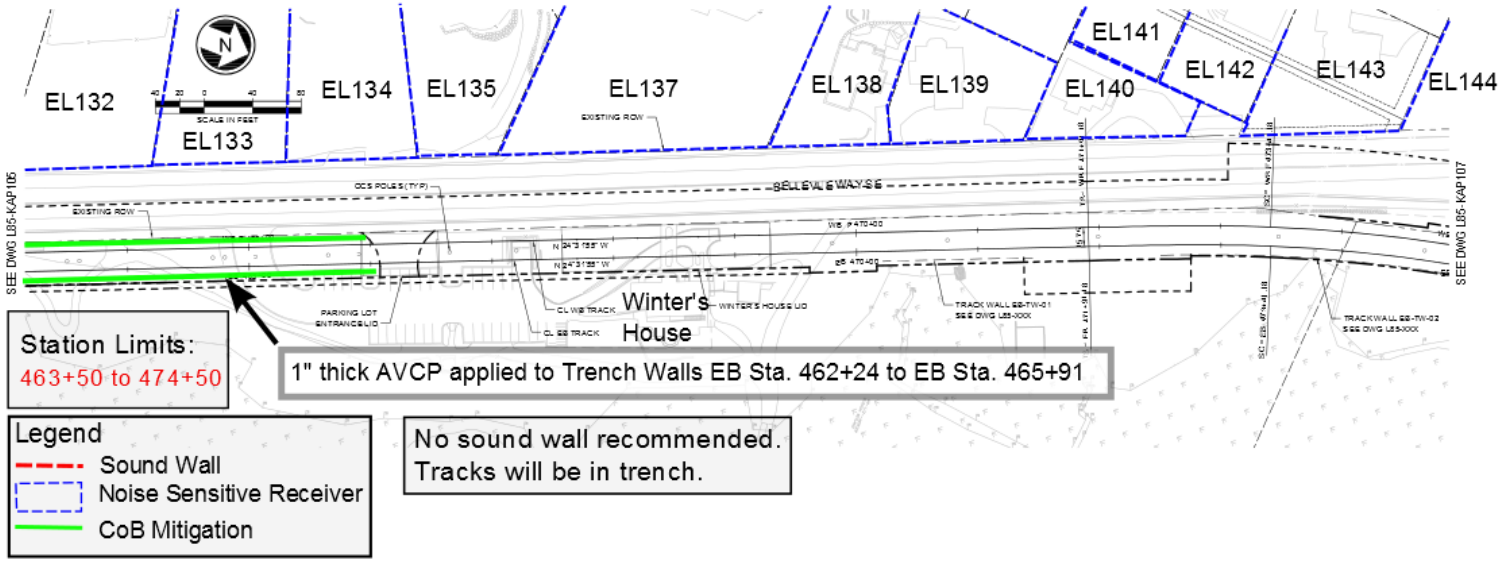


Figure 6-8: Recommended Sound Walls for Parcels EL144-EL149e

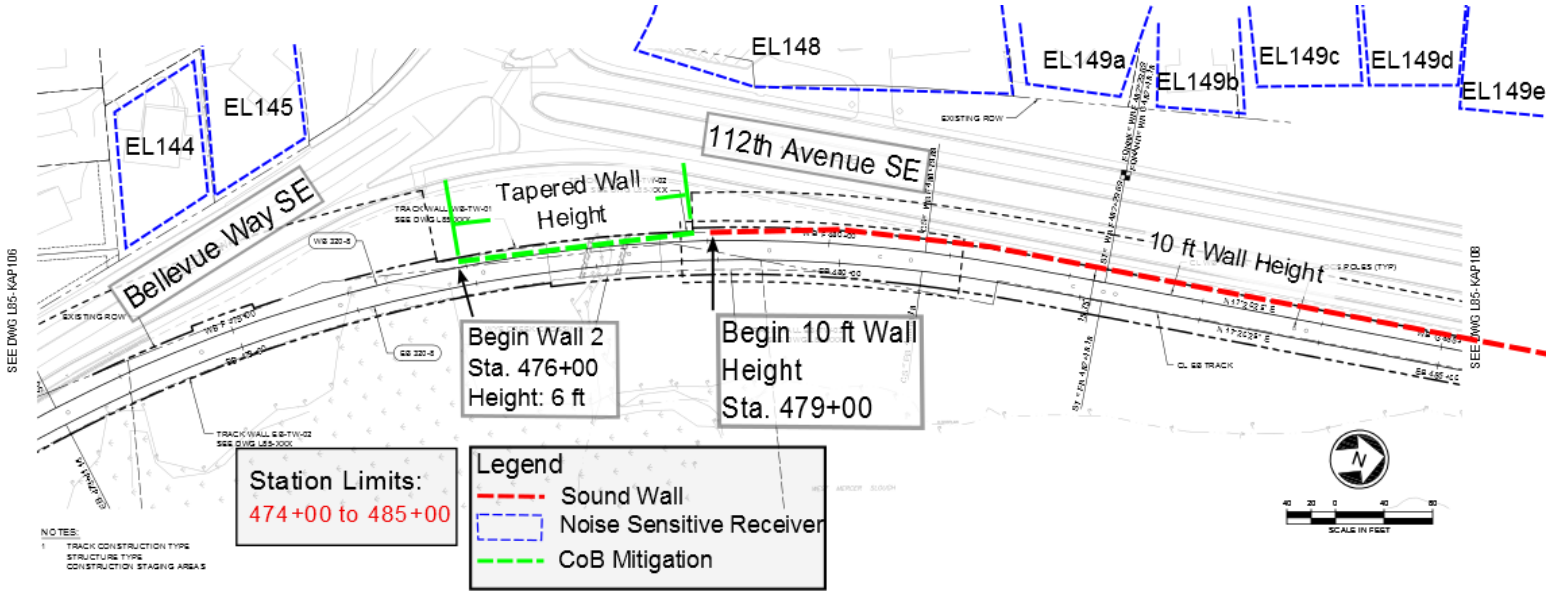


Figure 6-9: Recommended Sound Walls for Parcels EL149f-EL151d

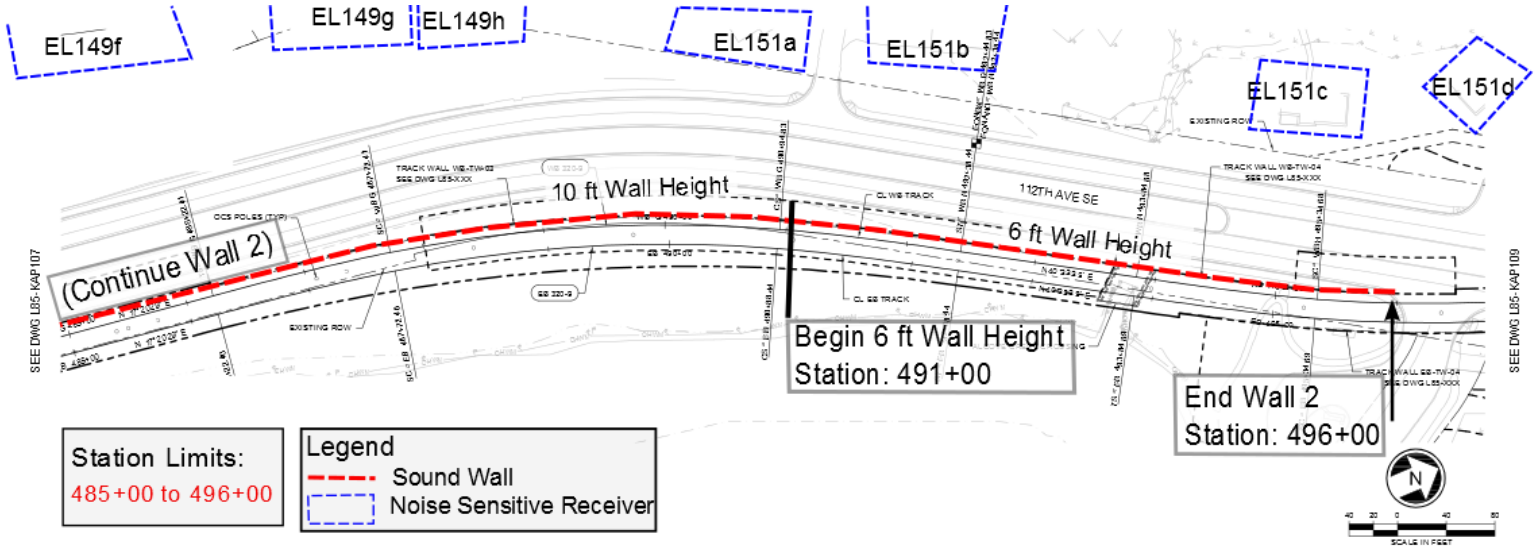


Figure 6-10: Recommended Sound Walls for Parcels EL151e-EL163

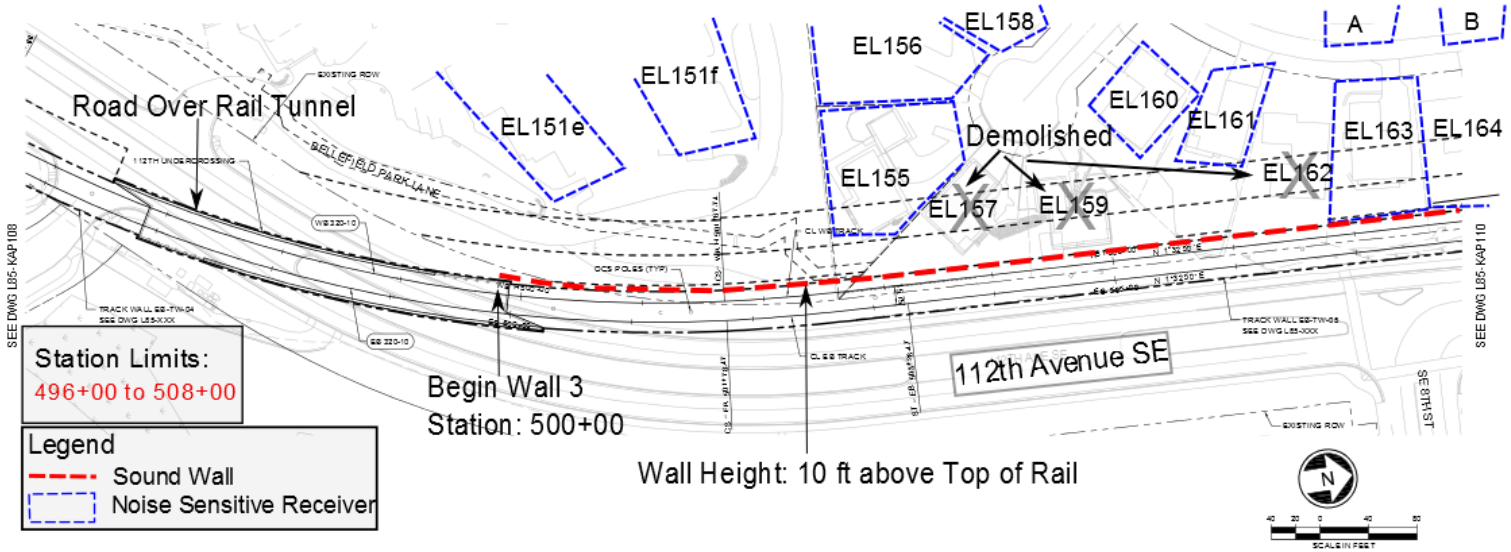


Figure 6-11: Recommended Sound Walls for Parcels EL164-EL169

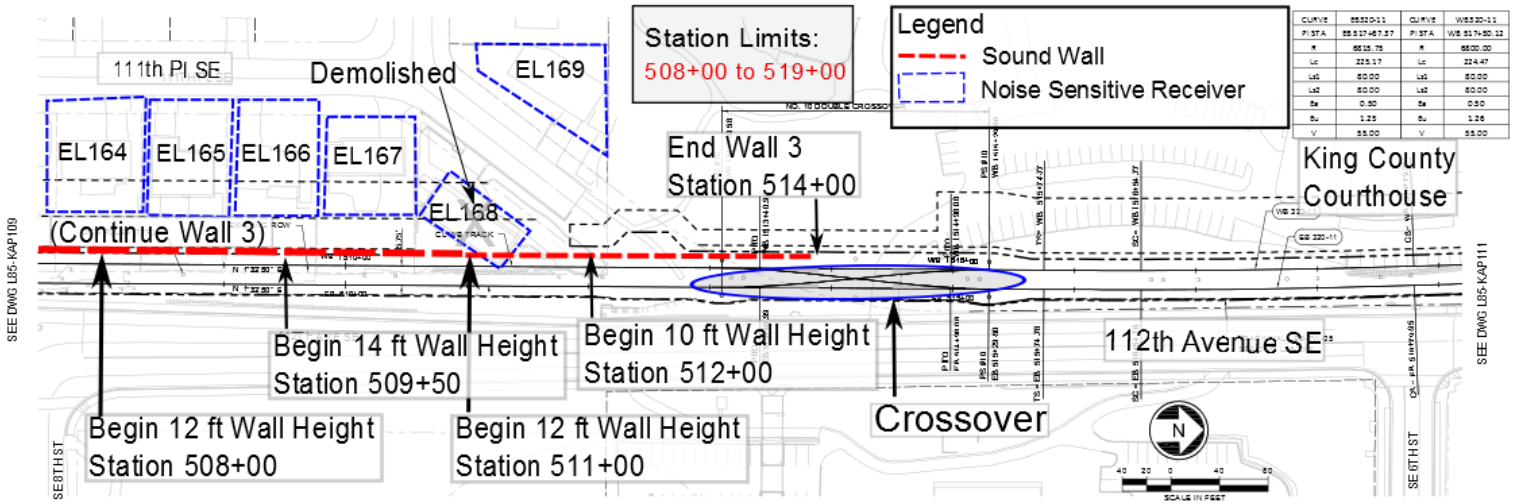
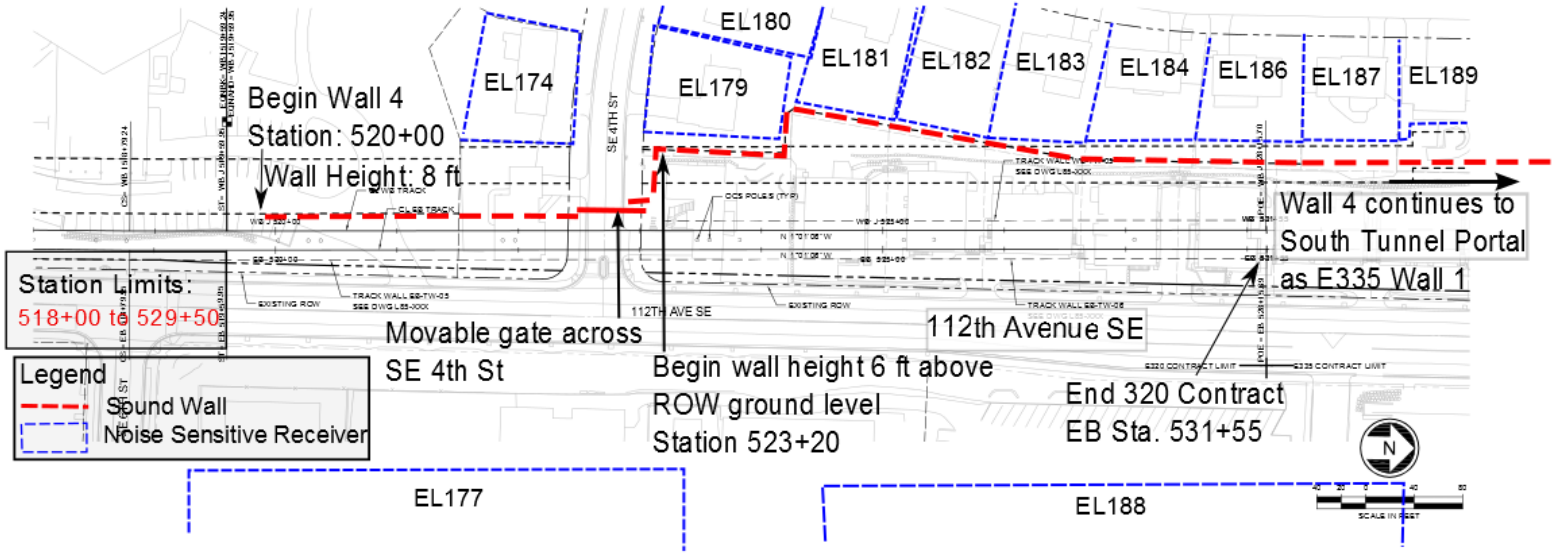


Figure 6-12: Recommended Sound Walls for Parcels EL174-EL189



ATSConsulting
acoustics, transportation + strategy

MEMORANDUM

To: James Irish, Sound Transit

From: Steven Wolf, ATS Consulting

Date: February 23, 2015

Subject: City of Bellevue Noise Impact Assessment, East Link LRT Project E320 and E335 Contracts – Mitigation to Meet Nighttime Ambient – Revision #2

INTRODUCTION

As requested by Sound Transit, ATS has prepared a noise impact assessment of the light-rail vehicle operations for the East Link LRT Project at Class A EDNA parcels along the E320 and E335 Contract alignments using the existing 12 am to 1 am and 6 am to 7 am one-hour ambient noise levels as criteria. The noise mitigation required by the Record of Decision which was determined based on compliance with the Federal Transit Administration (FTA) noise impact thresholds are presented in Table 1. The predicted one-hour nighttime train noise for the hours of 12 am to 1 am and 6 am to 7 am are presented in Table 2 for Class A EDNA parcels in the E320 and E335 Contracts (there are no Class A EDNA parcels near the project in the E340 Contract). The predicted Leq one-hour train noise is compared to the ambient noise level for these one-hour time periods.

For parcels EL100d to EL151, and EL177 (Figure A-1 through Figure A-12) the train noise is predicted at the property line. For these same parcels the ambient noise levels measured at the noise sensitive receiver building facades have been adjusted to represent the ambient levels at the property line. For parcels EL155 to EL206, EL242, and EL261 (Figure A-10 through Figure A-16) the predicted train noise and the ambient noise levels is at the building facade, because at these locations the predicted noise level is higher at the building facade than at the property line due to the location of the sound walls. Additional mitigation to meet the nighttime ambient noise levels, over and above what is required by the Record of Decision, are presented in this memo.

The train noise does not exceed the existing ambient levels at any of the E320 or E335 Class A EDNA parcels during the 6 am to 7 am one-hour period. There are two parcels, EL167 and EL169, where the predicted train noise exceeds the 12 am to 1 am ambient levels. Raising the height of the sound walls by 3 feet at of these parcels will reduce the train noise to the ambient level. Table 3 is a summary of the mitigation measures that would be added to the FTA mitigation measures to further reduce the train noise at Parcels EL167 and EL169 during the 12 am to 1 am time period.

The sound walls recommended to comply with the FTA noise impact thresholds (Table 1) and the location of the Class A EDNA parcels are shown graphically in Attachment A. The mitigation measures that would be added to the FTA mitigation measures to further reduce the train noise at Parcels EL167 and EL169 (Table 3) during the 12 am to 1 am time period are not shown on these graphics.

Table 1: Recommended Sound Wall Lengths and Heights from FTA Noise Impact Analysis

Wall	Start Station	End Station	Wall Length	Wall Height	Wall Location	Comments
1WB	380+19 (E130) 405+32 (E320)	456+00	5,100 ft.	6 ft. above top of rail	On WB edge of aerial guideway	
	456+00	459+26	326 ft.	8 ft. above top of rail	On WB edge of aerial guideway	
	459+26	460+29	103 ft.	8 ft. above Bellevue Way Grade	At street level, adjacent to west trench edge	Wall height tapers as trench depth increases
	460+29	460+80	51 ft.	6 ft. above Bellevue Way Grade	At street level, adjacent to west trench edge	
	460+80	462+24	144 ft.	4 ft. above Bellevue Way Grade	At street level, adjacent to west trench edge	
1EB	407+00	418+00	1,100 ft.	4 ft. above top of rail	On EB edge of aerial guideway	
2	476+00	479+00	300 ft	Varies 6 ft. to 10 ft. above top of rail	At WB edge of guideway	
	479+00	491+00	1,200 ft.	10 ft. above top of rail	At WB edge of guideway	
	491+00	496+00	500 ft.	6 ft. above top of rail	At WB edge of guideway	
3	500+00 (north portal of road-over-rail)	508+00	800 ft.	10 ft. above top of rail	At WB edge of guideway	The wall height is the combined retaining wall and sound wall height.
	508+00	509+50	150 ft.	12 ft. above top of rail	At WB edge of guideway	
	509+50	511+00	150 ft.	14 ft. above top of rail	At WB edge of guideway	
	511+00	512+00	100 ft.	12 ft. above top of rail	At WB edge of guideway	
	512+00	514+00	200 ft.	10 ft. above top of rail	At WB edge of guideway	

Wall	Start Station	End Station	Wall Length	Wall Height	Wall Location	Comments
4	520+00	522+50 (intersection with SE 4th St)	250 ft.	8 ft. above top of rail	At WB edge of guideway	
	522+50	522+80	30 ft.	8 ft. above top of rail	Moveable gate a maximum of 10 feet from the WB track	
	522+80 (intersection with SE 4th St)	523+20	40 ft.	8 ft. above top of rail	At WB edge of guideway	
	523+20	523+20	70 ft.	8 ft. above ground level	Wall will run perpendicular to the track until it reaches the ROW line	
	523+20	531+55 (E335 stationing)	835 ft.	6 ft. above ground level at ROW line	Along WB ROW line	Wall will be located at ROW line
	531+55 (E335 stationing)	540+15 (south tunnel portal)	860 ft.	6 ft. above ground level at ROW line	Along WB ROW line	This section of wall is included in E335 package

Table 2: Predicted Nighttime Noise Levels, with FTA Mitigation Included

Parcel	Distance[1] (ft)	Speed (mph)	12 am to 1 am					6am to 7am				
			Ambient Noise Level, Leq(12am-1am)[2,3], dBA	Predicted Train Noise, Leq(12am-1am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(12am-1am)[4] dBA	Ambient Noise Level, Leq(6am-7am)[2,3], dBA	Predicted Train Noise, Leq(6am-7am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(6am-7am)[4] dBA
EL100d	260	45	52	39	-13	Does Not Exceed Ambient		61	42	-19	Does Not Exceed Ambient	
EL100e	281	45	53	39	-14	Does Not Exceed Ambient		61	42	-19	Does Not Exceed Ambient	
EL100f	271	45	53	40	-13	Does Not Exceed Ambient		61	43	-18	Does Not Exceed Ambient	
EL100g	260	45	53	40	-13	Does Not Exceed Ambient		61	43	-18	Does Not Exceed Ambient	
EL100h	253	45	53	42	-11	Does Not Exceed Ambient		61	45	-16	Does Not Exceed Ambient	
EL100i	230	45	54	49	-5	Does Not Exceed Ambient		62	52	-10	Does Not Exceed Ambient	
EL100j	228	45	54	48	-6	Does Not Exceed Ambient		62	51	-11	Does Not Exceed Ambient	
EL100k	260	45	53	49	-4	Does Not Exceed Ambient		61	52	-9	Does Not Exceed Ambient	
EL100l	270	45	50	48	-2	Does Not Exceed Ambient		59	51	-8	Does Not Exceed Ambient	
EL100m	270	45	52	47	-5	Does Not Exceed Ambient		60	50	-10	Does Not Exceed Ambient	
EL100n	300	45	52	46	-6	Does Not Exceed Ambient		60	49	-11	Does Not Exceed Ambient	
EL100o	302	45	53	45	-8	Does Not Exceed Ambient		61	48	-13	Does Not Exceed Ambient	
EL100p	305	45	53	44	-9	Does Not Exceed Ambient		61	47	-14	Does Not Exceed Ambient	
EL101f	240	45	***62***	51	-11	Does Not Exceed Ambient		***70***	54	-16	Does Not Exceed Ambient	
EL101g	230	45	61	52	-9	Does Not Exceed Ambient		70	55	-15	Does Not Exceed Ambient	
EL101h	260	45	61	52	-9	Does Not Exceed Ambient		70	55	-15	Does Not Exceed Ambient	
EL101i	263	45	60	52	-8	Does Not Exceed Ambient		68	55	-13	Does Not Exceed Ambient	

Parcel	Distance[1] (ft)	Speed (mph)	12 am to 1 am					6am to 7am				
			Ambient Noise Level, Leq(12am-1am)[2,3], dBA	Predicted Train Noise, Leq(12am-1am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(12am-1am)[4] dBA	Ambient Noise Level, Leq(6am-7am)[2,3], dBA	Predicted Train Noise, Leq(6am-7am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(6am-7am)[4] dBA
EL101j	242	45	62	50	-12	Does Not Exceed Ambient		71	53	-18	Does Not Exceed Ambient	
EL101k	235	45	***61***	49	-12	Does Not Exceed Ambient		***70***	52	-18	Does Not Exceed Ambient	
EL101l	248	45	62	49	-13	Does Not Exceed Ambient		71	52	-19	Does Not Exceed Ambient	
EL101m	263	45	61	49	-12	Does Not Exceed Ambient		70	52	-18	Does Not Exceed Ambient	
EL101n	284	45	61	49	-12	Does Not Exceed Ambient		70	52	-18	Does Not Exceed Ambient	
EL101o	260	45	61	49	-12	Does Not Exceed Ambient		70	52	-18	Does Not Exceed Ambient	
EL101p	195	35	56	46	-10	Does Not Exceed Ambient		68	49	-19	Does Not Exceed Ambient	
EL101q	184	35	55	47	-8	Does Not Exceed Ambient		68	50	-18	Does Not Exceed Ambient	
EL101r	135	35	55	48	-7	Does Not Exceed Ambient		68	51	-17	Does Not Exceed Ambient	
EL101s	120	35	52	48	-4	Does Not Exceed Ambient		65	51	-14	Does Not Exceed Ambient	
EL101t	110	35	54	48	-6	Does Not Exceed Ambient		67	51	-16	Does Not Exceed Ambient	
EL101u	105	35	54	48	-6	Does Not Exceed Ambient		67	51	-16	Does Not Exceed Ambient	
EL101v	115	35	56	48	-8	Does Not Exceed Ambient		69	51	-18	Does Not Exceed Ambient	
EL101x	120	35	54	48	-6	Does Not Exceed Ambient		67	51	-16	Does Not Exceed Ambient	
EL101w	130	35	54	48	-6	Does Not Exceed Ambient		67	51	-16	Does Not Exceed Ambient	
EL101y	105	35	58	49	-9	Does Not Exceed Ambient		71	52	-19	Does Not Exceed Ambient	
EL101z	170	35	53	47	-6	Does Not Exceed Ambient		66	50	-16	Does Not Exceed Ambient	
EL103	165	35	60	49	-11	Does Not Exceed Ambient		67	52	-15	Does Not Exceed Ambient	
EL104	165	35	59	47	-12	Does Not Exceed Ambient		66	50	-16	Does Not Exceed Ambient	

Parcel	Distance[1] (ft)	Speed (mph)	12 am to 1 am					6am to 7am				
			Ambient Noise Level, Leq(12am-1am)[2,3], dBA	Predicted Train Noise, Leq(12am-1am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(12am-1am)[4] dBA	Ambient Noise Level, Leq(6am-7am)[2,3], dBA	Predicted Train Noise, Leq(6am-7am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(6am-7am)[4] dBA
EL106	160	35	59	47	-12	Does Not Exceed Ambient		66	50	-16	Does Not Exceed Ambient	
EL107	180	35	59	47	-12	Does Not Exceed Ambient		66	50	-16	Does Not Exceed Ambient	
EL108	216	35	59	46	-13	Does Not Exceed Ambient		66	49	-17	Does Not Exceed Ambient	
EL109	233	30	57	46	-11	Does Not Exceed Ambient		64	49	-15	Does Not Exceed Ambient	
EL110	285	30	58	47	-11	Does Not Exceed Ambient		65	50	-15	Does Not Exceed Ambient	
EL112	247	30	54	47	-7	Does Not Exceed Ambient		61	50	-11	Does Not Exceed Ambient	
EL114	226	40	57	46	-11	Does Not Exceed Ambient		64	49	-15	Does Not Exceed Ambient	
EL113	287	40	57	45	-12	Does Not Exceed Ambient		64	48	-16	Does Not Exceed Ambient	
EL115	195	40	64	46	-18	Does Not Exceed Ambient		75	49	-26	Does Not Exceed Ambient	
EL117	146	40	66	48	-18	Does Not Exceed Ambient		77	51	-26	Does Not Exceed Ambient	
EL118	130	40	66	48	-18	Does Not Exceed Ambient		77	51	-26	Does Not Exceed Ambient	
EL119	120	40	66	48	-18	Does Not Exceed Ambient		77	51	-26	Does Not Exceed Ambient	
EL121	105	40	64	49	-15	Does Not Exceed Ambient		75	52	-23	Does Not Exceed Ambient	
EL122	100	40	64	49	-15	Does Not Exceed Ambient		75	52	-13	Does Not Exceed Ambient	
EL124	92	40	66	49	-17	Does Not Exceed Ambient		77	52	-15	Does Not Exceed Ambient	
EL125	85	40	66	50	-16	Does Not Exceed Ambient		77	53	-14	Does Not Exceed Ambient	
EL126	80	40	66	50	-16	Does Not Exceed Ambient		77	53	-24	Does Not Exceed Ambient	
EL127	80	40	66	50	-16	Does Not Exceed Ambient		77	53	-24	Does Not Exceed Ambient	
EL129	72	45	56	50	-16	Does Not Exceed Ambient		67	53	-14	Does Not Exceed Ambient	

Parcel	Distance[1] (ft)	Speed (mph)	12 am to 1 am					6am to 7am				
			Ambient Noise Level, Leq(12am-1am)[2,3], dBA	Predicted Train Noise, Leq(12am-1am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(12am-1am)[4] dBA	Ambient Noise Level, Leq(6am-7am)[2,3], dBA	Predicted Train Noise, Leq(6am-7am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(6am-7am)[4] dBA
EL130	63	45	56	50	-16	Does Not Exceed Ambient		67	53	-14	Does Not Exceed Ambient	
EL131	70	45	52	50	-2	Does Not Exceed Ambient		67	53	-14	Does Not Exceed Ambient	
EL132	70	45	56	52	-4	Does Not Exceed Ambient		67	55	-12	Does Not Exceed Ambient	
EL133	70	45	56	53	-3	Does Not Exceed Ambient		67	56	-11	Does Not Exceed Ambient	
EL134	70	45	56	52	-4	Does Not Exceed Ambient		67	55	-12	Does Not Exceed Ambient	
EL135	70	45	55	52	-3	Does Not Exceed Ambient		66	55	-11	Does Not Exceed Ambient	
EL137	75	45	55	52	-3	Does Not Exceed Ambient		66	55	-11	Does Not Exceed Ambient	
EL138	75	45	64	52	-12	Does Not Exceed Ambient		70	55	-15	Does Not Exceed Ambient	
EL139	75	45	64	52	-12	Does Not Exceed Ambient		70	55	-15	Does Not Exceed Ambient	
EL140	75	45	64	52	-12	Does Not Exceed Ambient		71	55	-16	Does Not Exceed Ambient	
EL142	85	45	64	51	-13	Does Not Exceed Ambient		69	54	-15	Does Not Exceed Ambient	
EL143	85	45	64	51	-13	Does Not Exceed Ambient		69	54	-15	Does Not Exceed Ambient	
EL144	95	45	64	51	-13	Does Not Exceed Ambient		70	54	-16	Does Not Exceed Ambient	
EL145	115	45	64	50	-14	Does Not Exceed Ambient		69	53	-16	Does Not Exceed Ambient	
EL148	125	45	64	55	-9	Does Not Exceed Ambient		71	58	-13	Does Not Exceed Ambient	
EL149a	140	45	55	40	-15	Does Not Exceed Ambient		59	43	-16	Does Not Exceed Ambient	
EL149b	147	45	55	40	-15	Does Not Exceed Ambient		59	43	-16	Does Not Exceed Ambient	
EL149c	160	45	55	40	-15	Does Not Exceed Ambient		59	43	-16	Does Not Exceed Ambient	
EL149d	165	45	55	40	-15	Does Not Exceed Ambient		59	43	-16	Does Not Exceed Ambient	

Parcel	Distance[1] (ft)	Speed (mph)	12 am to 1 am					6am to 7am				
			Ambient Noise Level, Leq(12am-1am)[2,3], dBA	Predicted Train Noise, Leq(12am-1am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(12am-1am)[4] dBA	Ambient Noise Level, Leq(6am-7am)[2,3], dBA	Predicted Train Noise, Leq(6am-7am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(6am-7am)[4] dBA
EL149e	170	45	55	40	-15	Does Not Exceed Ambient		59	43	-16	Does Not Exceed Ambient	
EL149f	155	45	55	41	-14	Does Not Exceed Ambient		59	44	-15	Does Not Exceed Ambient	
EL149g	227	45	55	41	-14	Does Not Exceed Ambient		59	44	-15	Does Not Exceed Ambient	
EL149h	263	45	55	39	-16	Does Not Exceed Ambient		59	42	-17	Does Not Exceed Ambient	
EL151a	115	45	55	49	-6	Does Not Exceed Ambient		62	52	-10	Does Not Exceed Ambient	
EL155	38	45	55	50	-6	Does Not Exceed Ambient		61	53	-8	Does Not Exceed Ambient	
EL156	148	45	48	43	-5	Does Not Exceed Ambient		56	46	-10	Does Not Exceed Ambient	
EL158	188	45	47	40	-7	Does Not Exceed Ambient		55	43	-12	Does Not Exceed Ambient	
EL160	85	55	50	45	-5	Does Not Exceed Ambient		58	48	-10	Does Not Exceed Ambient	
EL161	65	55	51	47	-4	Does Not Exceed Ambient		59	50	-9	Does Not Exceed Ambient	
EL163	40	55	52	50	-2	Does Not Exceed Ambient		60	53	-7	Does Not Exceed Ambient	
EL164	56	55	51	50	-1	Does Not Exceed Ambient		59	53	-6	Does Not Exceed Ambient	
EL165	53	55	51	48	-3	Does Not Exceed Ambient		59	51	-8	Does Not Exceed Ambient	
EL166	60	55	51	49	-2	Does Not Exceed Ambient		59	52	-7	Does Not Exceed Ambient	
EL167	44	55	51	52	1	3	51	60	55	-5	Does Not Exceed Ambient	
EL169	116	55	48	49	1	3	48	57	52	-5	Does Not Exceed Ambient	
EL174	93	55	57	45	-12	Does Not Exceed Ambient		60	48	-12	Does Not Exceed Ambient	
EL179	80	55	57	46	-11	Does Not Exceed Ambient		60	49	-11	Does Not Exceed Ambient	
EL181	150	55	55	42	-13	Does Not Exceed Ambient		58	45	-13	Does Not Exceed Ambient	

Parcel	Distance[1] (ft)	Speed (mph)	12 am to 1 am					6am to 7am				
			Ambient Noise Level, Leq(12am-1am)[2,3], dBA	Predicted Train Noise, Leq(12am-1am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(12am-1am)[4] dBA	Ambient Noise Level, Leq(6am-7am)[2,3], dBA	Predicted Train Noise, Leq(6am-7am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(6am-7am)[4] dBA
EL182	135	55	56	42	-14	Does Not Exceed Ambient		59	45	-14	Does Not Exceed Ambient	
EL183	118	55	56	43	-13	Does Not Exceed Ambient		59	46	-13	Does Not Exceed Ambient	
EL184	110	45	56	42	-14	Does Not Exceed Ambient		59	45	-14	Does Not Exceed Ambient	
EL187	106	35	56	40	-16	Does Not Exceed Ambient		59	43	-16	Does Not Exceed Ambient	
EL189	93	35	56	40	-16	Does Not Exceed Ambient		59	43	-16	Does Not Exceed Ambient	
EL190	96	25	56	38	-18	Does Not Exceed Ambient		59	41	-18	Does Not Exceed Ambient	
EL191	100	25	56	38	-18	Does Not Exceed Ambient		59	41	-18	Does Not Exceed Ambient	
EL192	97	25	56	38	-18	Does Not Exceed Ambient		59	41	-18	Does Not Exceed Ambient	
EL194	93	25	56	43	-13	Does Not Exceed Ambient		59	46	-13	Does Not Exceed Ambient	
EL195	100	25	56	42	-17	Does Not Exceed Ambient		59	45	-14	Does Not Exceed Ambient	
EL196	70	25	56	44	-16	Does Not Exceed Ambient		59	47	-12	Does Not Exceed Ambient	
EL206	115	25	***53***	41	-12	Does Not Exceed Ambient		***61***	44	-17	Does Not Exceed Ambient	
Bellevue Club (EL177)	110	35	57	56	-1	Does Not Exceed Ambient		66	59	-7	Does Not Exceed Ambient	
Coast Hotel (EL242)	155	45	59	42	-17	Does Not Exceed Ambient		66	45	-21	Does Not Exceed Ambient	
Lake Bellevue Condos (EL261)	105	30	50	46	-4	Does Not Exceed Ambient		52	49	-3	Does Not Exceed Ambient	

Parcel	Distance[1] (ft)	Speed (mph)	12 am to 1 am					6am to 7am				
			Ambient Noise Level, Leq(12am-1am)[2,3], dBA	Predicted Train Noise, Leq(12am-1am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(12am-1am)[4] dBA	Ambient Noise Level, Leq(6am-7am)[2,3], dBA	Predicted Train Noise, Leq(6am-7am)[4] dBA	Amount Exceeds Ambient, dBA	Increase in Sound Wall Height to Meet Ambient, feet	Predicted Train Noise, Leq(6am-7am)[4] dBA

Notes:

[1]The distance in feet. For parcels EL100d to EL151, and EL177 the distance is to the property line. For parcels EL155 to EL206, EL242, and EL261, the distance is to the building facade, because the predicted noise level is higher at the building facade than at the property line due to the location of the sound wall

[2] Ambient noise levels shown in bold italics are the parcels where the noise level was measured. At all other parcels the ambient noise level was estimated based on the nearest measurement and the relative distances to the roadway.

[3] Ambient noise levels for parcels EL100d to EL151, and EL177 are at the property line. For parcels EL155 to EL206, EL242, and EL261, the ambient noise levels are at the building façades.

[4]Predicted train noise for 12am to 1am assumes 15 minute headways. Predicted train noise for 6am to 7am assumes 8 minute headways.

Table 3: Summary of Ambient Mitigation Measures

Parcel	Recommended Mitigation
EL167 and EL169	Increase height of Wall 3 by 3 feet from WB Sta. 509+00 to WB Sta. 513+00. The increase in height of this section of wall will be from 14 foot to 17 foot at WB Sta. 509+00 and 10 foot to 13 foot at WB Sta. 513+00.

Attachment A

E320 and E335 Alignment Plans with Class A EDNA Parcels and FTA Mitigation

Figure A-1: Recommended Sound Walls for Parcels EL100a-EL100i and EL101a-EL101h

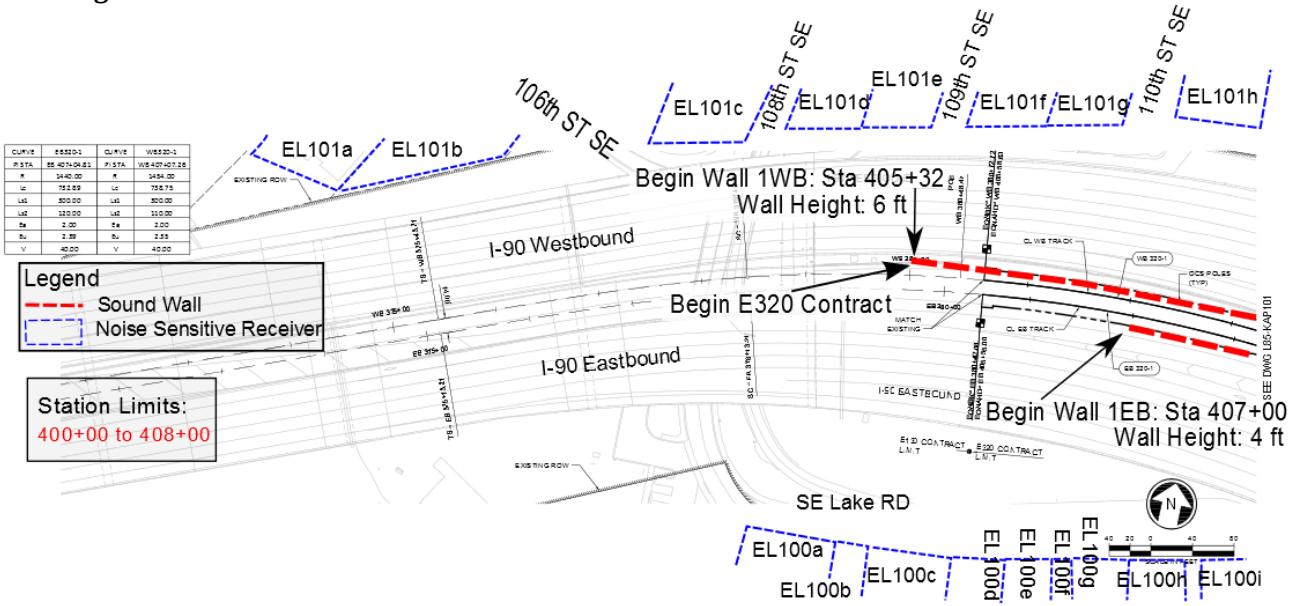


Figure A-2: Recommended Sound Walls for Parcels EL100h-EL100p, EL101g-EL101o

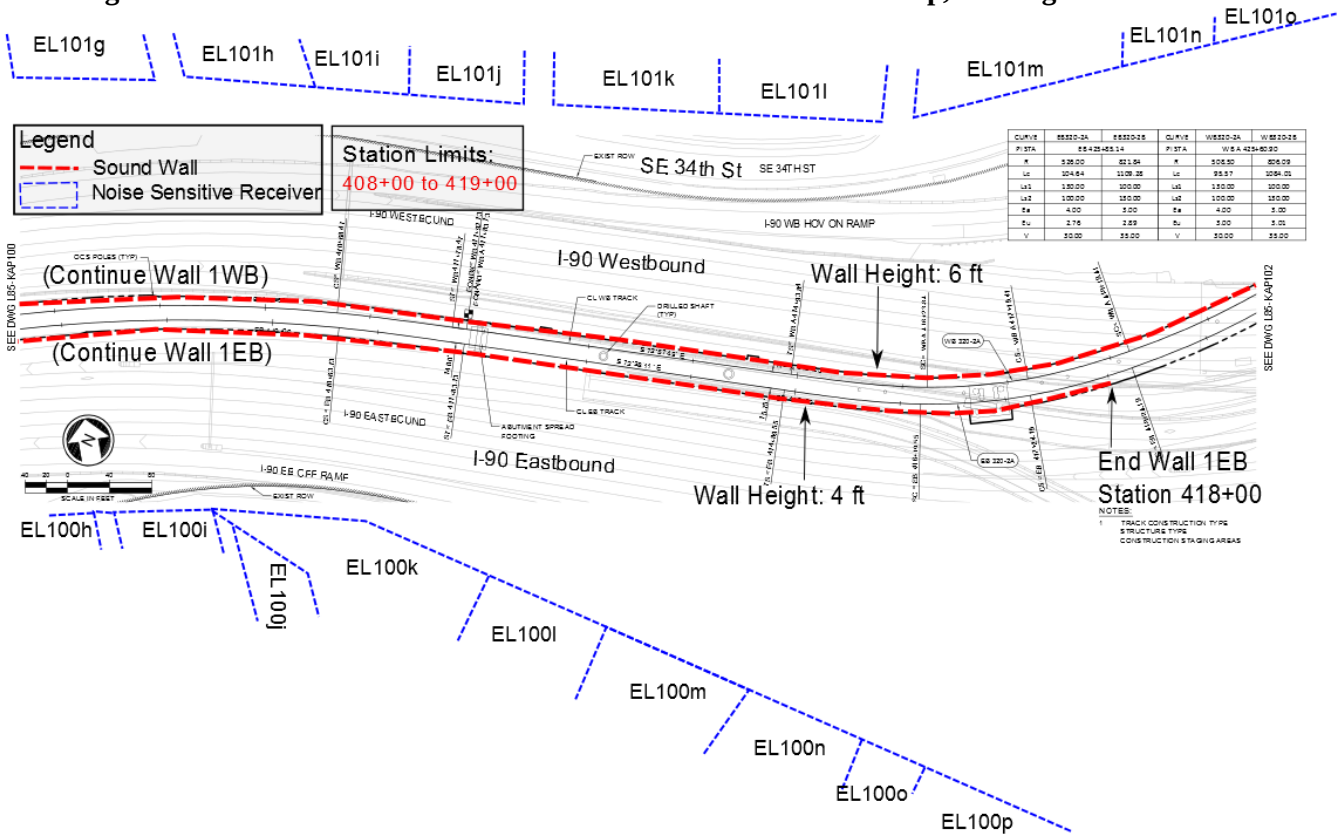


Figure A-3: Recommended Sound Walls for Parcels EL101p-EL101s

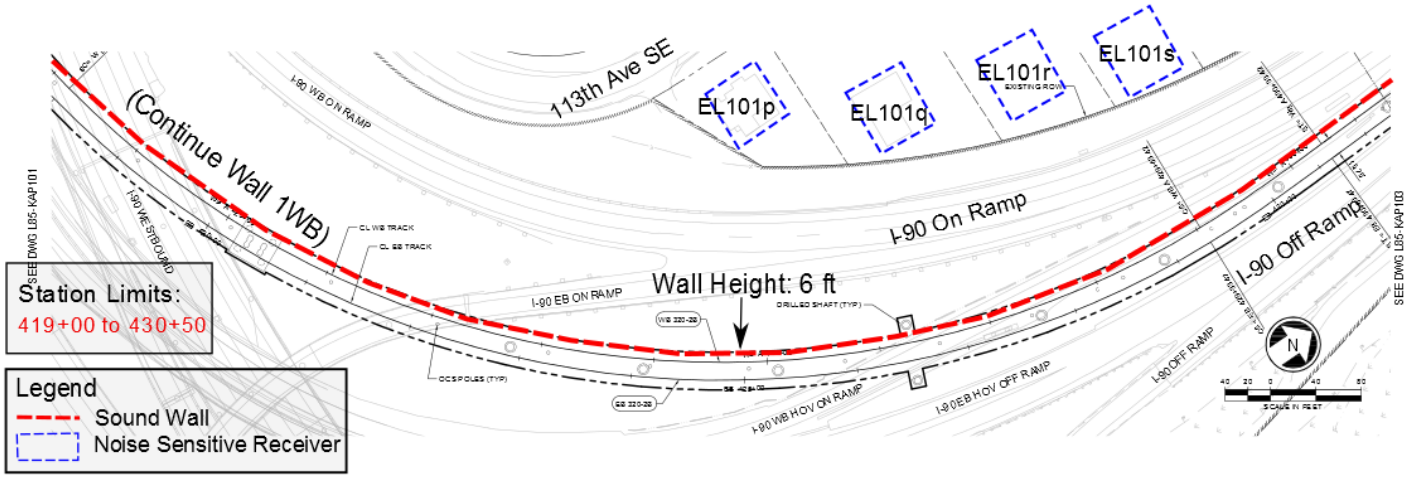


Figure A-4: Recommended Sound Walls for Parcels EL101t-EL103

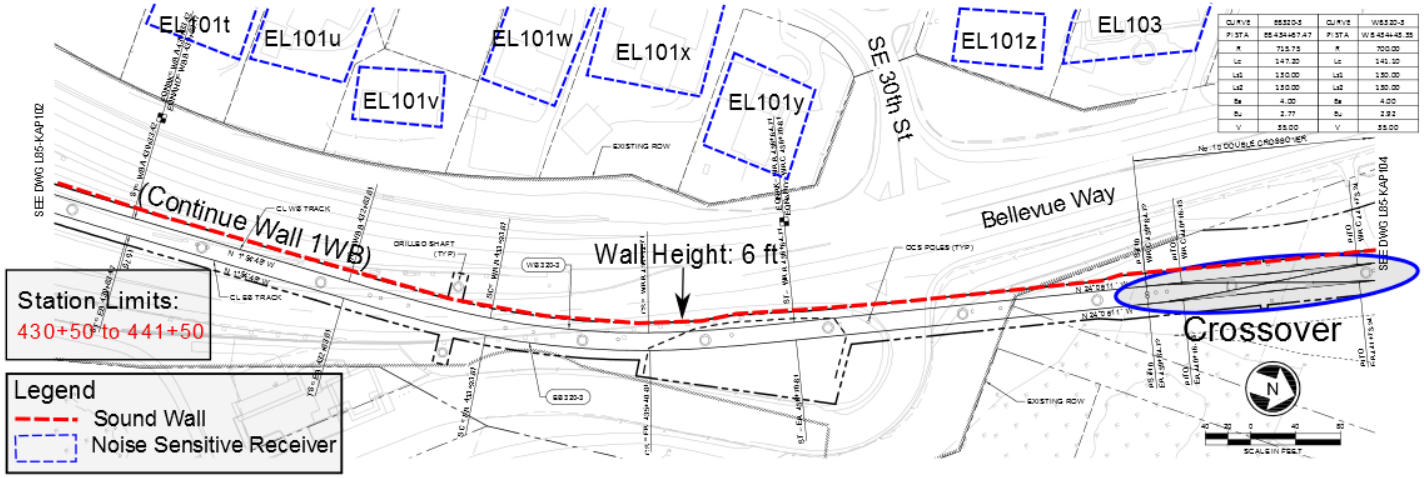


Figure A-5: Recommended Sound Walls for EL104-EL114

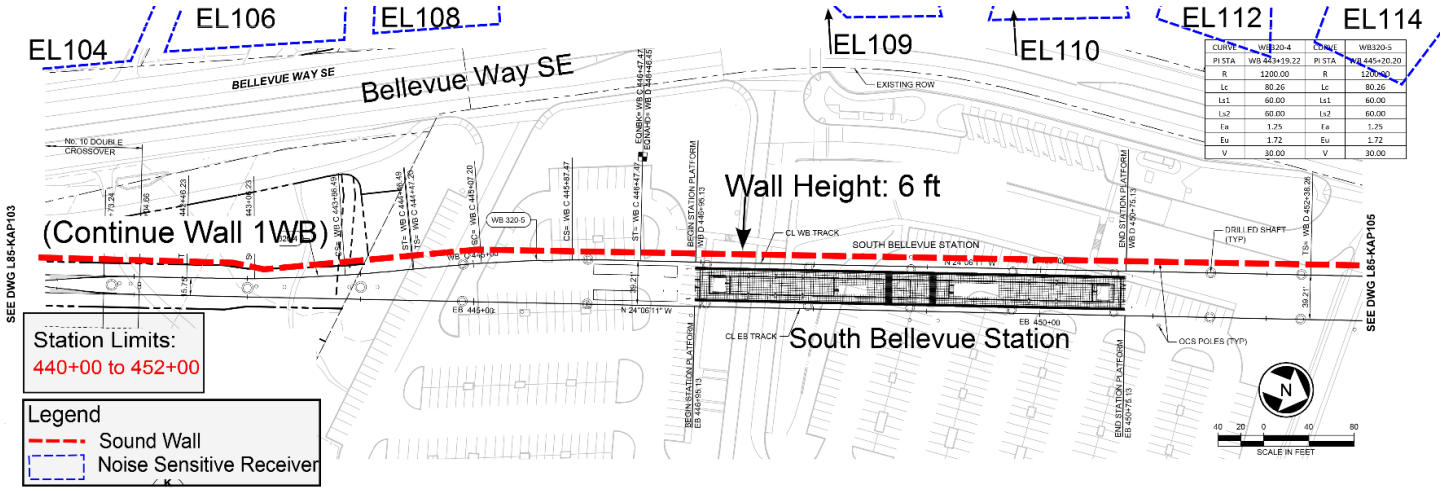


Figure A-6: Recommended Sound Walls for Parcels EL115-EL132

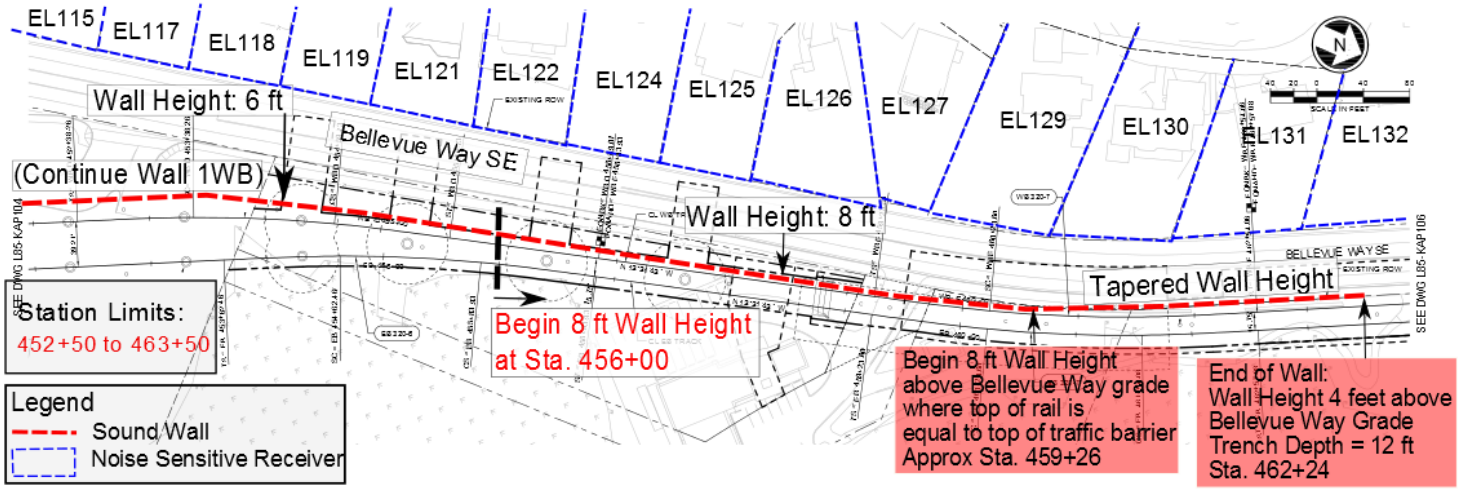


Figure A-7: Recommended Sound Walls for Parcels EL132-EL144

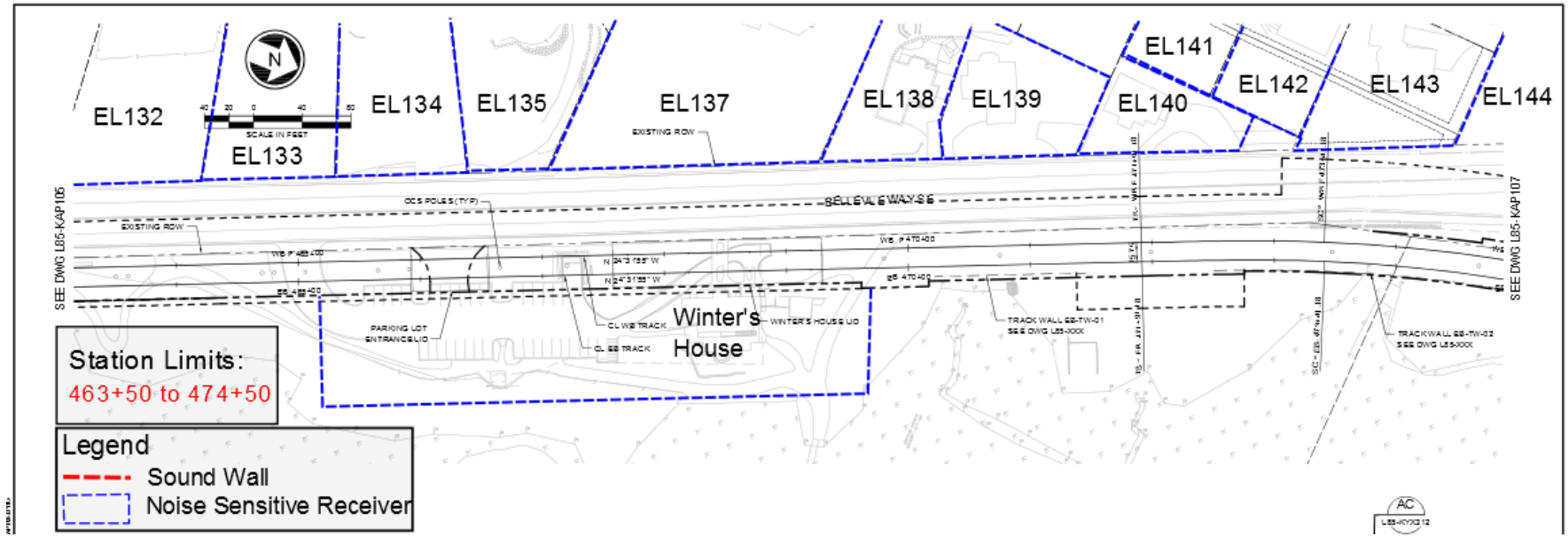


Figure A-8: Recommended Sound Walls for Parcels EL144-EL149e

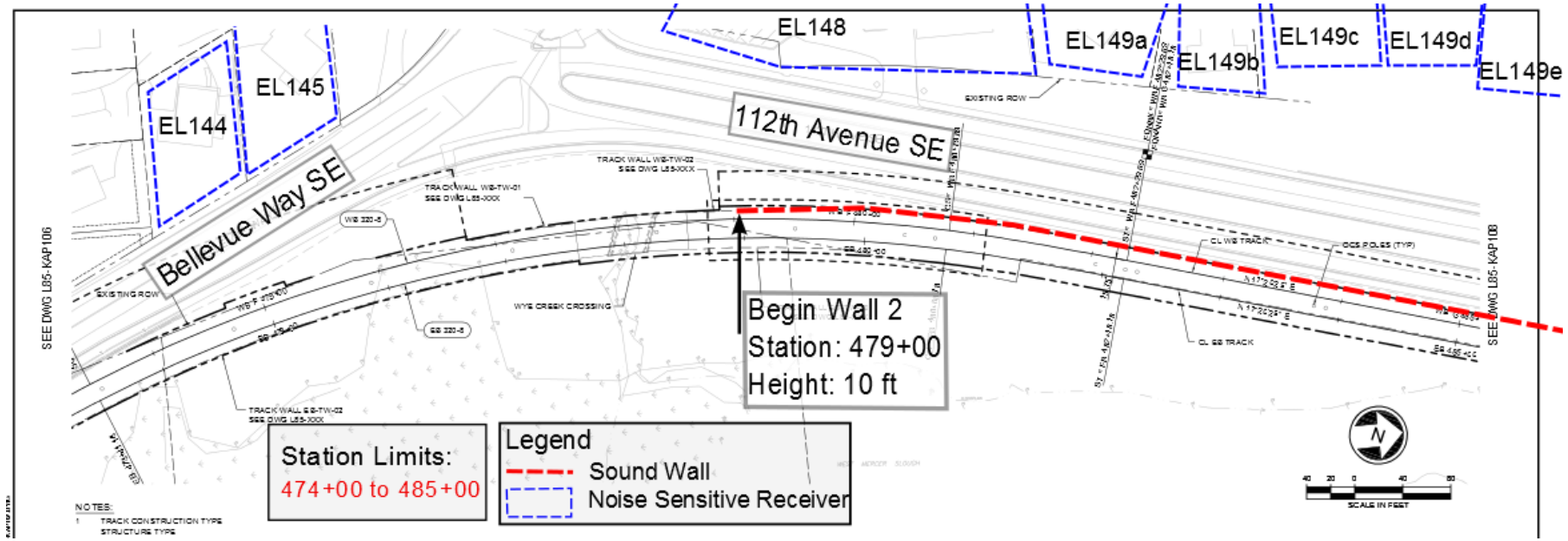


Figure A-9: Recommended Sound Walls for Parcels EL149f-EL151d

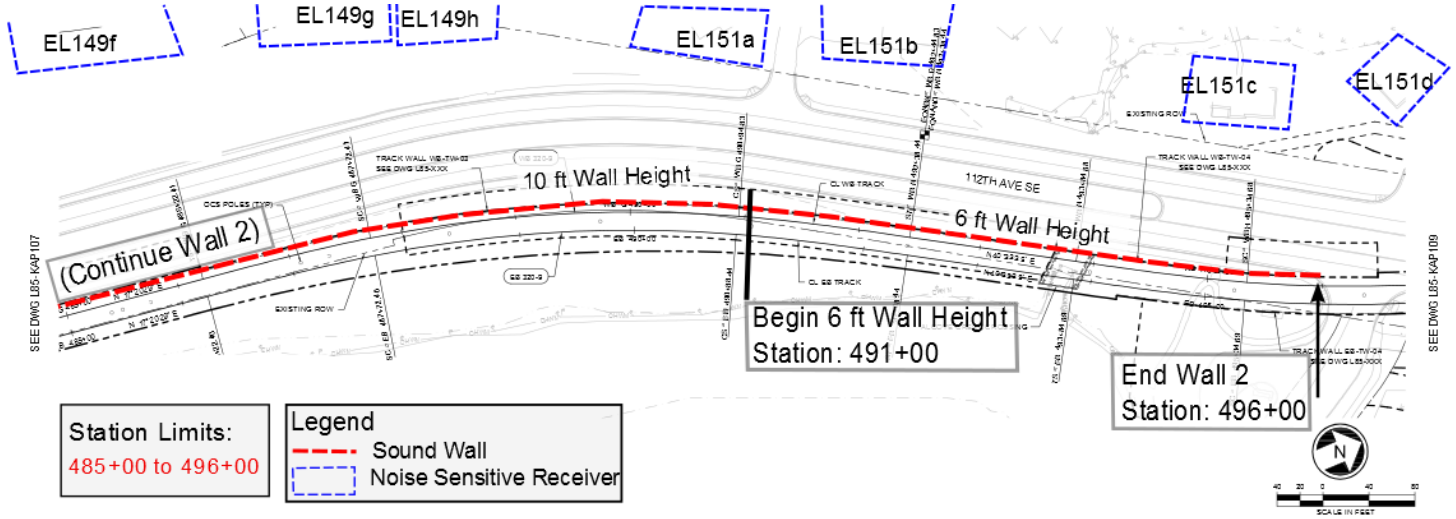


Figure A-10: Recommended Sound Walls for Parcels EL151e-EL163

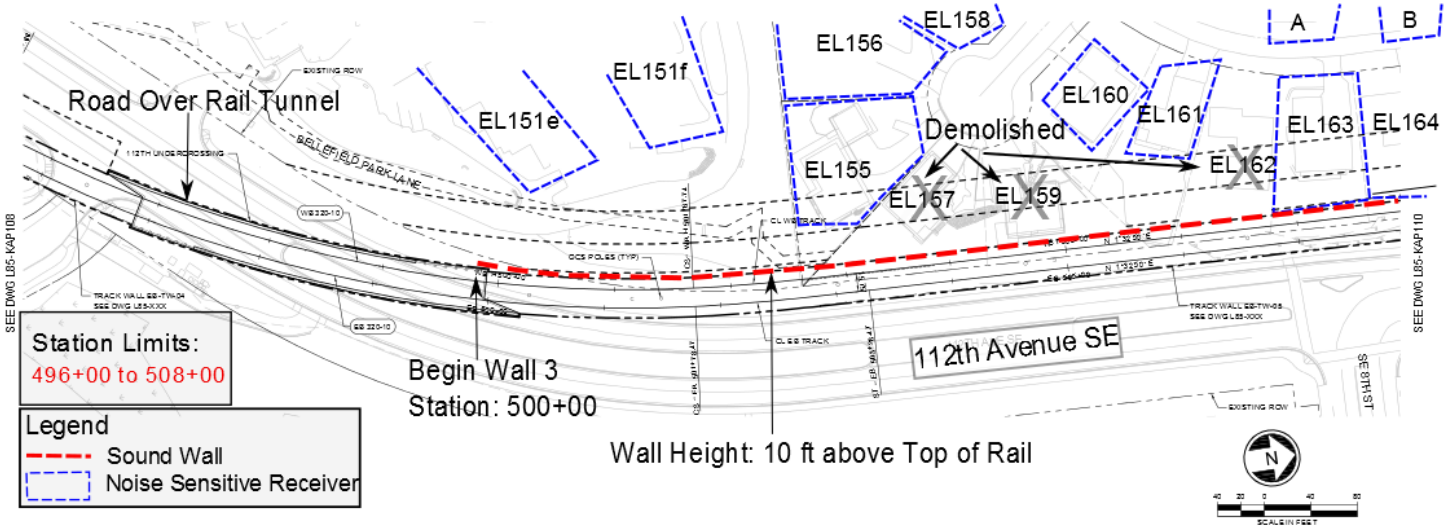


Figure A-11: Recommended Sound Walls for Parcels EL164-EL169

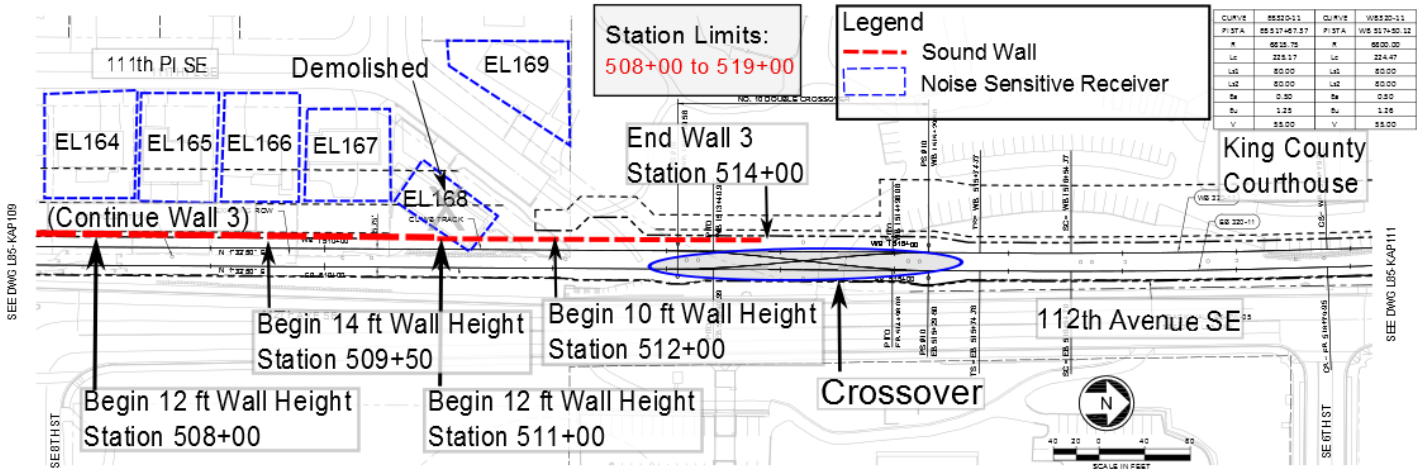


Figure A-12: Recommended Sound Walls for Parcels EL174-EL189

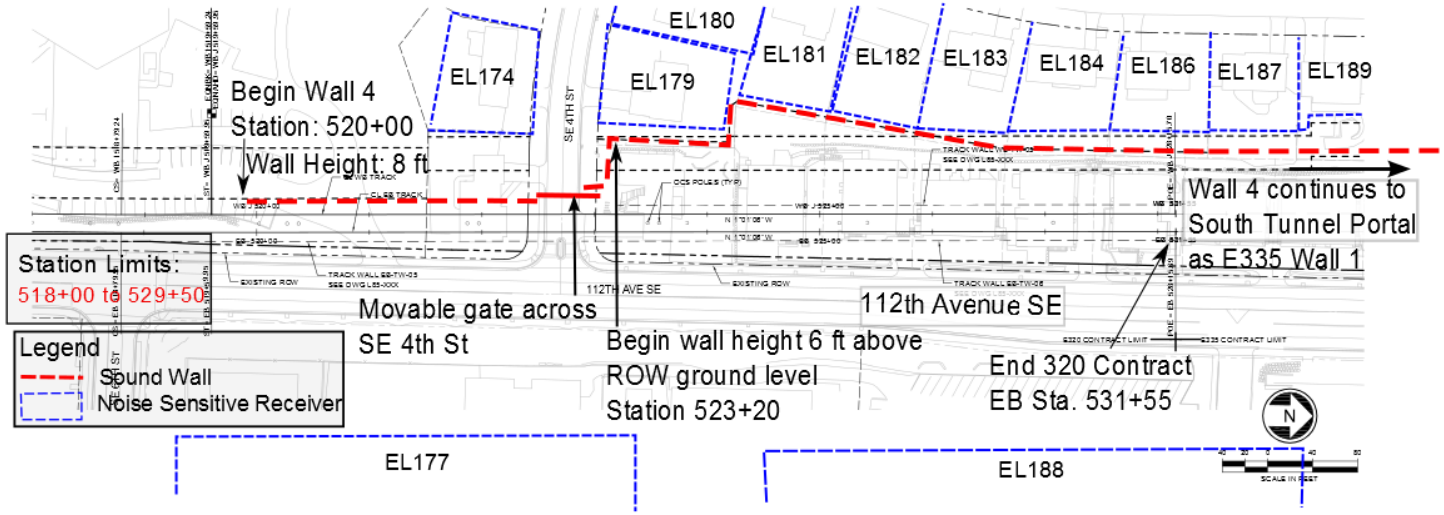


Figure A-13: Recommended Sound Wall for Parcels EL190-EL194

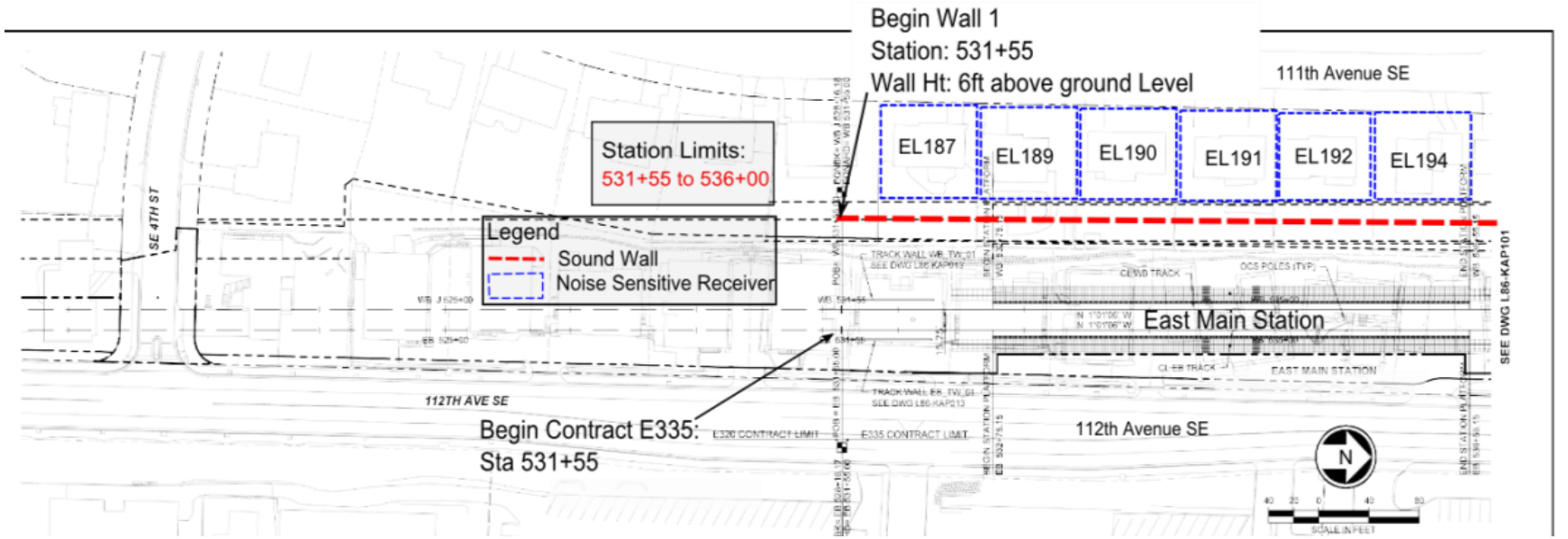


Figure A-14: Recommended Sound Wall for Parcels EL195, EL196, and EL206

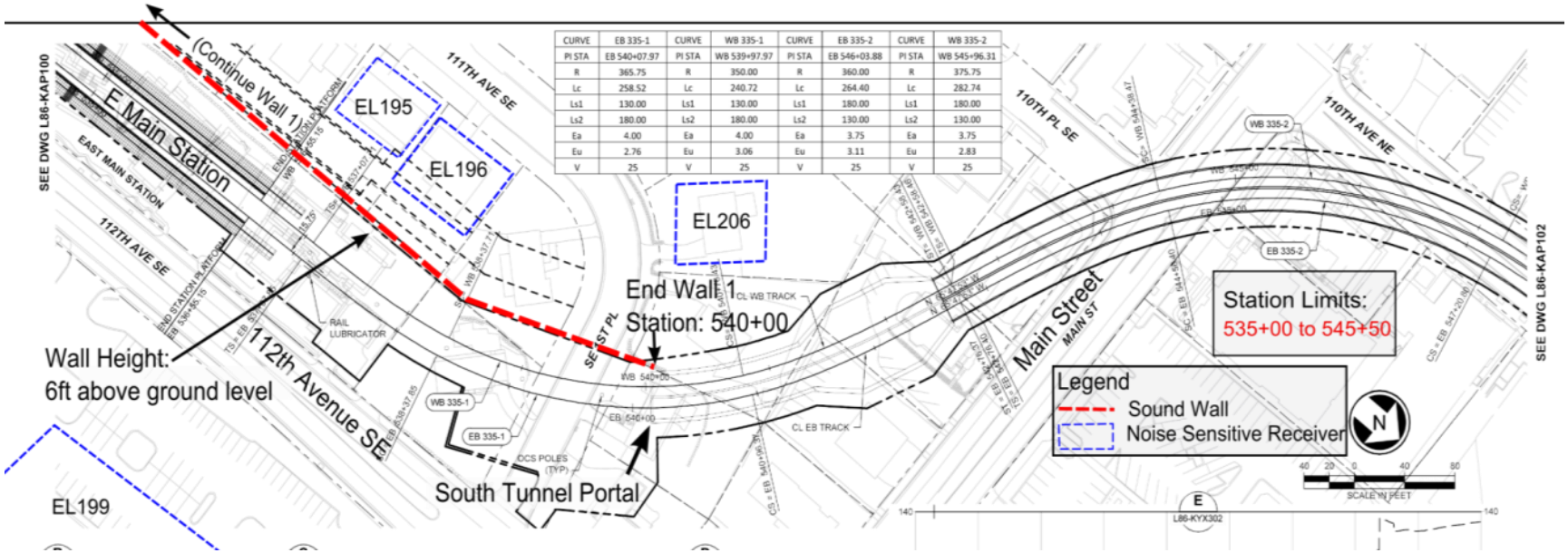


Figure A-15: Recommended Sound Wall for Coast Bellevue Hotel (Parcel EL242)

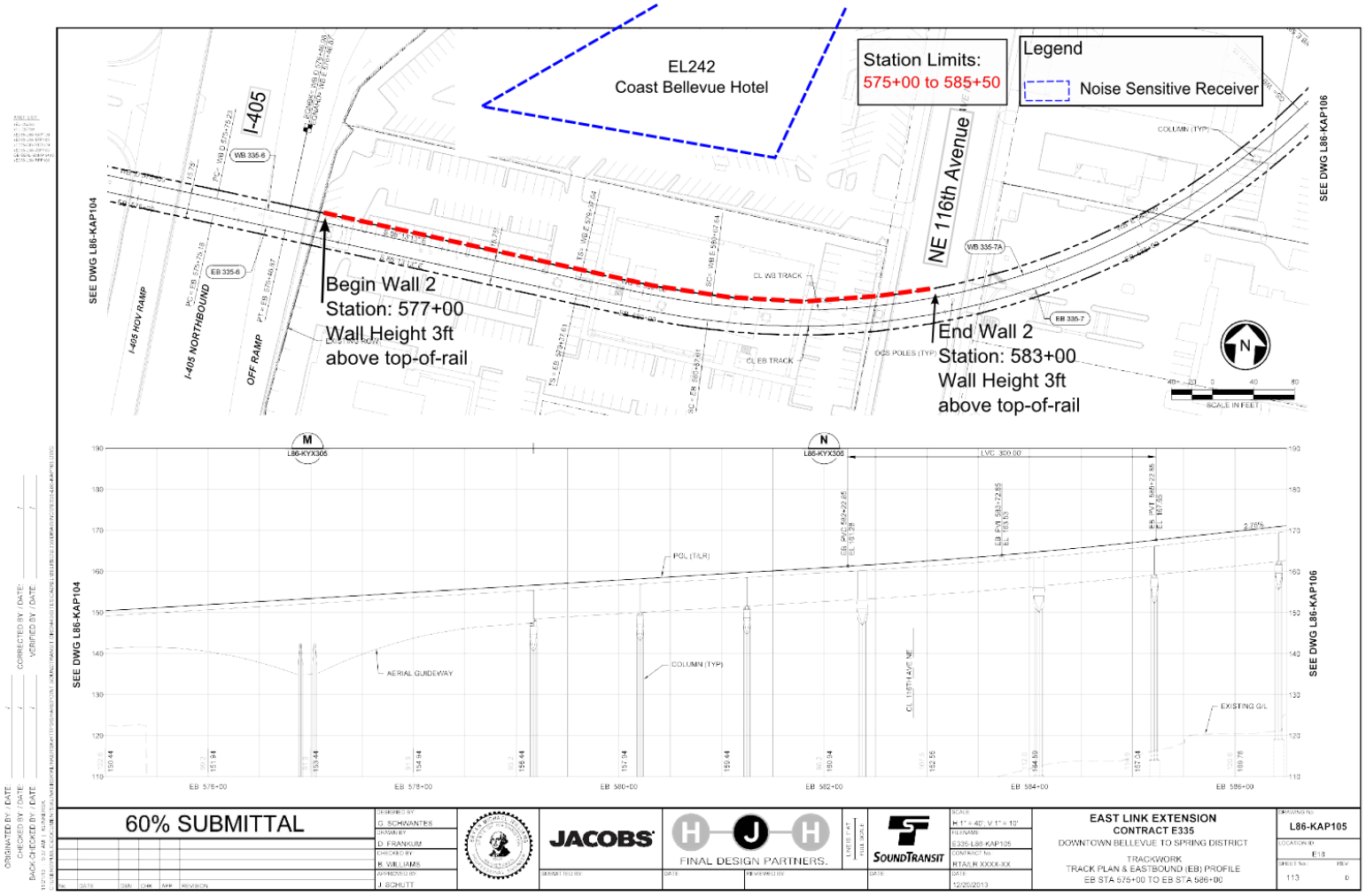


Figure A-16: Recommended Sound Wall for Lake Bellevue Condominiums (Parcel EL261)