

Appendix E2

Noise Study Addendum

Prepared by The Greenbusch Group, Inc

November 11, 2021



DATE: November 24, 2021

TO: Jean Stolzman AIA, LEED AP BC+C

FROM: Ellie Myers
Justin Morgan, INCE

RE: Issaquah High School #4 and Elementary School #17 –Noise Study Addendum

Transmitted by: ☐ Mail ☐ Delivery ☐ Fax ☒ E-mail

INTRODUCTION

This addendum evaluates sound levels associated with the new High School (HS) #4 and Elementary School (ES) #17 project (“Project”) located at 4221 228th Avenue Southeast in Issaquah, Washington and is an update to the Issaquah High School #4 and Elementary School #17 Noise Study issued in 2020.

REGULATORY CRITERIA

Permissible noise levels are governed by the Washington State Administrative Code (WAC) 173-60 and are defined by the environmental designation for noise abatement (EDNA). The Site is classified as a Class B EDNA and all the surrounding properties are classified as Class A EDNAs. The maximum permissible sound levels for the Site are 57 dBA from 7:00 AM to 10:00 PM and 47 dBA from 10:00 PM to 7:00 AM.

ACOUSTICAL MODEL

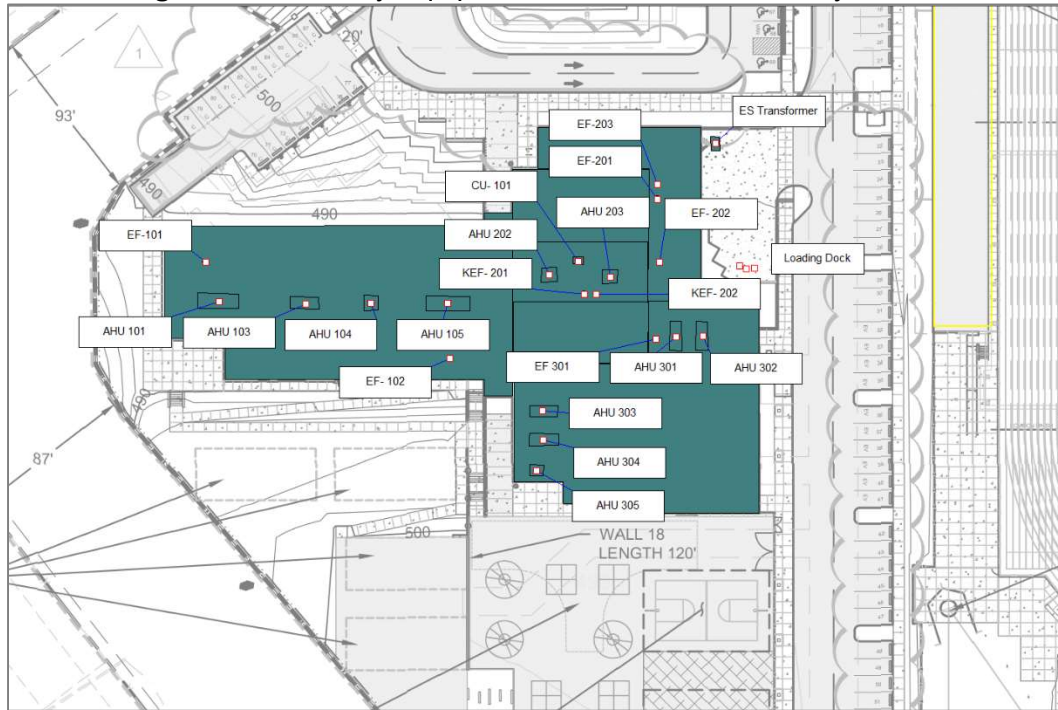
The primary tool used to predict sound levels at neighboring properties was a 3-D computer noise model using the acoustic modeling software environment Cadna/A. Cadna/A utilizes the CADNA (Control of Accuracy and Debugging for Numerical Applications) computation engine developed by the Pierre et Marie Curie University of Paris. The model used for this Project utilized the International Organization for Standardization 9613 Part II algorithms, implemented in the Cadna/A software, which accounted for the effects of distance, topography, and surface reflections on sound levels.

Locations of structures, topographic information, and traffic routes were provided by Bassetti Architects and AHBL. This addendum includes updates to the traffic routes, ES location, baseball field, and a redesign of the HS parking garage to include tennis courts on the second level. In addition to site-layout updates, mitigation measures previously recommended in the 2020 Noise Study were included in the updated analysis. Mitigation measures recommended in the 2020 Noise Study included rooftop acoustical barriers and prohibiting pre-trip inspections at the school bus lot between 10:00 PM and 7:00 AM.

Stationary Mechanical Equipment

After the 2020 Noise Study was issued the ES and corresponding stationary mechanical equipment and loading dock activities moved approximately 60 feet east, away from the neighboring property line. Stationary mechanical equipment and loading dock activity sound levels can be found in the 2020 Noise Study. Location of the ES, mechanical equipment, and loading dock activities are illustrated in the Figure below.

Figure 1. Stationary Equipment Modeled at Elementary School



On-Site Traffic

On-site vehicle and school bus traffic was modeled using predicted trip generation estimates provided by Heffron Transportation, Inc in the 2020 Transportation Technical Report. Traffic data used in the computer noise models represent peak daytime and nighttime hours. The peak nighttime hour at the HS and ES is 6:00 AM to 7:00 AM. Daily trips for the HS and ES do not coincide with each other because the schools have different start times. Because of this, peak hours for the HS and ES were modeled separately. The peak daytime hour at the HS is 7:00 AM to 8:00 AM, while the peak daytime hour at the ES is from 8:15 AM to 9:15 AM. Traffic data volumes can be found in the 2020 Noise Study.

Updates to the 2020 Noise Study include changes to the traffic routes and a new HS parking garage layout. Figure 2 and Figure 3 show the updated traffic routes and the HS parking garage layout.

Figure 2. Modeled Passenger and Parking Traffic Routes

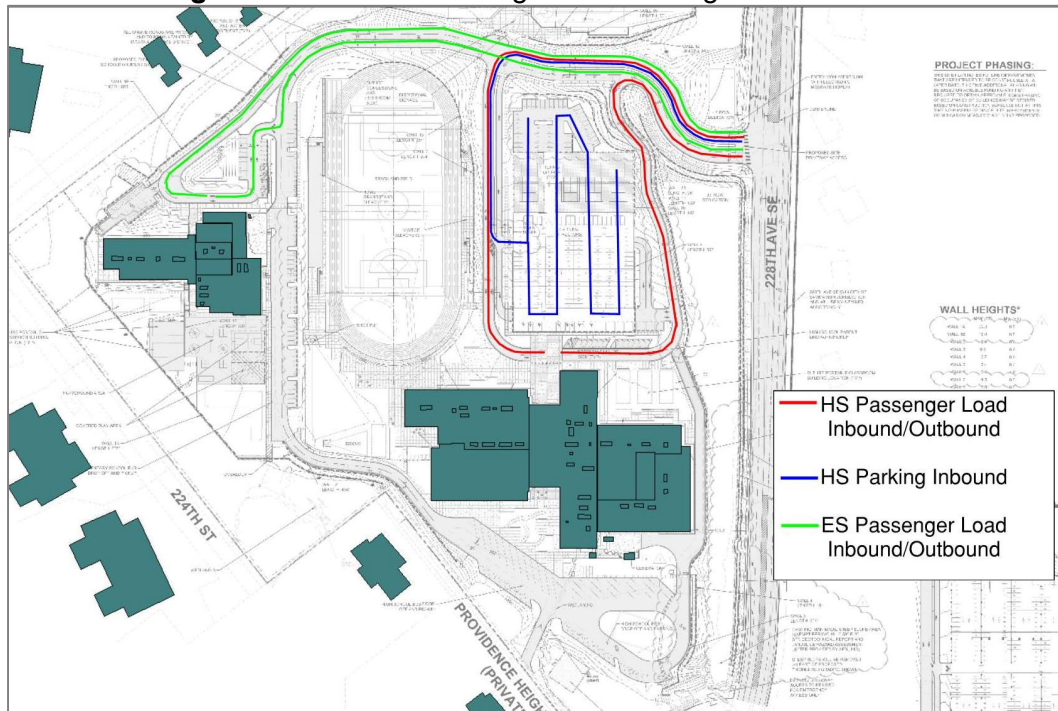
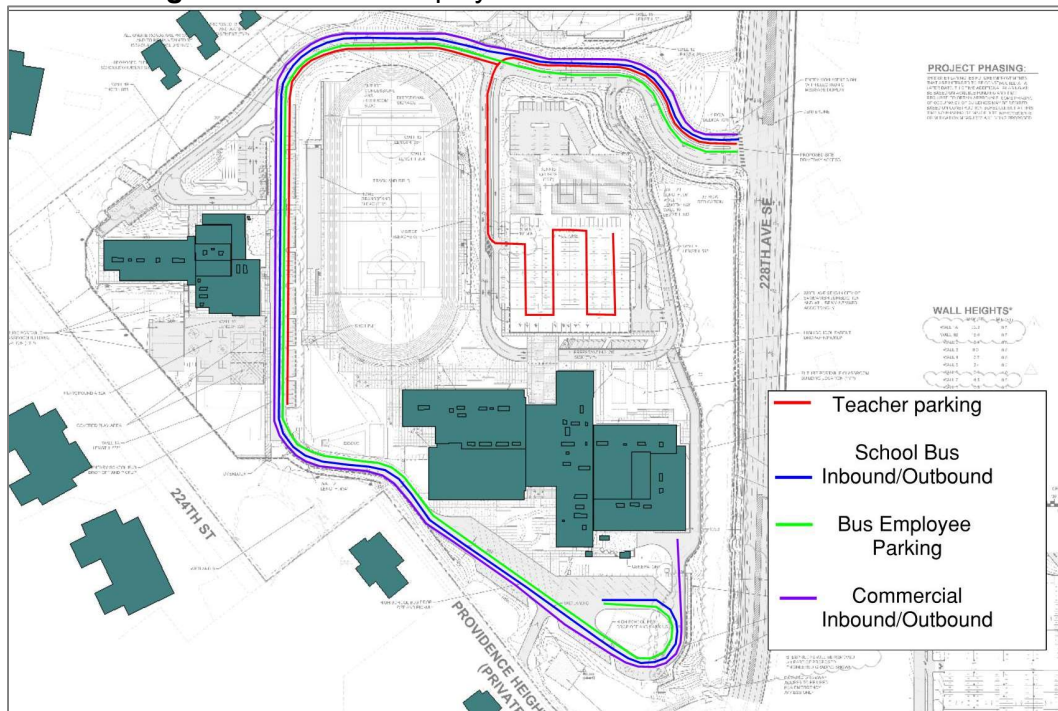


Figure 3. Modeled Employee and Commercial Traffic Routes



ANALYSIS AND RESULTS

Three models were generated to predict updated nighttime and daytime sound levels. The nighttime model predicted sound levels for the peak nighttime hour (6:00 AM to 7:00 AM). The daytime models were created to model peak traffic at the HS (7:00 AM to 8:00 AM) and peak traffic at the ES (8:15 AM to 9:15 AM). Because the schools start at different times, the Project will experience two different peak traffic hours that required separate models.

Nighttime

Sound levels from the Project were predicted 5 feet above grade at neighboring property lines. The model includes rooftop mechanical equipment, the two transformers, and on-site traffic. Sounds produced by the two loading docks, generator, compactor, Scene Shop, and pre-trip inspections at the school bus lot were not modeled during nighttime hours.

Several nearby multistory residences may have line-of-sight to the screened rooftop mechanical units. Because areas near the ground do not always have line-of-sight to these units, sound levels were also predicted at multiple elevations at nearby residential structures to determine if predicted sound levels comply with codified sound limits at different elevations.

Table 1 lists predicted sound levels at neighboring property lines and buildings during peak nighttime hours. Figure A1 in Appendix A illustrates predicted nighttime sound levels at neighboring properties.

Table 1. Predicted Nighttime Sound Levels, dBA

Property	Sound Level Limit	Predicted Sound Levels	Complies with Sound Limits?
North	47	27	Yes
Northeast		32	
East		39	
Southeast		37	
South		45	
Southwest		40	
West		40	
Northwest		41	

Daytime

Two models were used to predict daytime sound levels at neighboring property lines during peak hours for the HS and ES. Each model included sound levels from rooftop mechanical equipment, two transformers, one generator, the pre-trip checks at the school bus lot, two loading docks, the Scene Shop, and on-site traffic. The only difference between the two models were traffic routes and traffic volumes (see Table 6 in the 2020 Noise Study).

Table 2 and Table 3 below list updated predicted sound levels from each peak daytime hour. Predicted sound levels did not exceed code limits during either peak hours for the HS or ES. Figure A2 and Figure A3 in Appendix A illustrate predicted sound levels for peak daytime hours at the HS and ES.

Table 2. Predicted Peak Daytime HS Sound Levels, dBA

Property	Sound Level Limit	Predicted Sound Levels	Complies with Sound Limits?
North	57	32	Yes
Northeast		36	
East		39	
Southeast		39	
South		53	
Southwest		45	
West		40	
Northwest		51	

Table 3. Predicted Peak Daytime ES Sound Levels, dBA

Property	Sound Level Limit	Predicted Sound Levels	Complies with Sound Limits?
North	57	31	Yes
Northeast		35	
East		47	
Southeast		39	
South		52	
Southwest		45	
West		40	
Northwest		50	

CONCLUSION

Based on this analysis detailed above, sound produced by the updated traffic routes, Elementary School location adjustment, baseball field restructure, and a redesign of the High School parking garage to include tennis courts are expected to comply with local regulatory criteria. No additional mitigation measures are required.

APPENDIX A. PREDICTED SOUND LEVELS

Figure A1. Predicted Nighttime Sound Levels

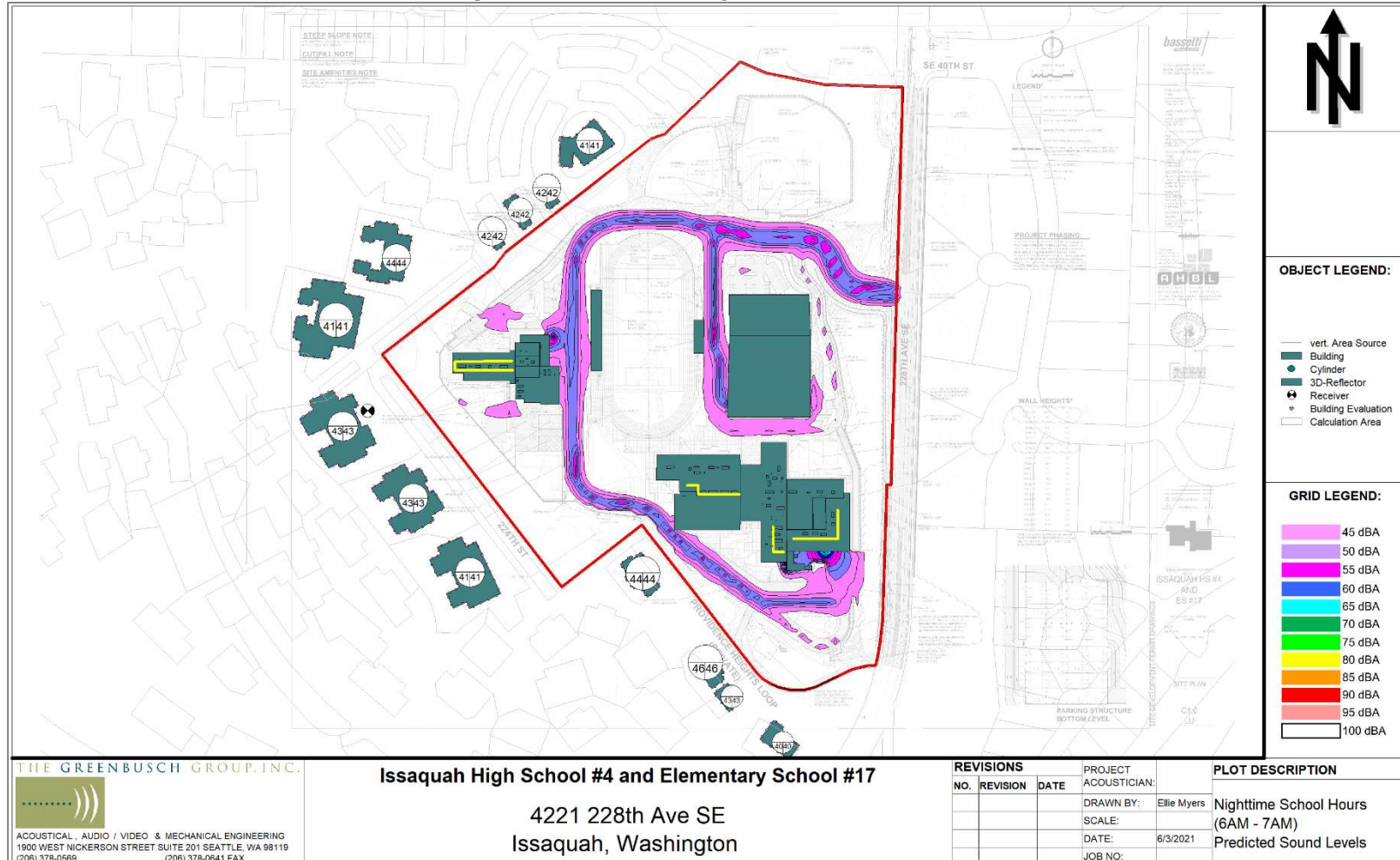


Figure A2. Predicted Peak Daytime HS Sound Levels

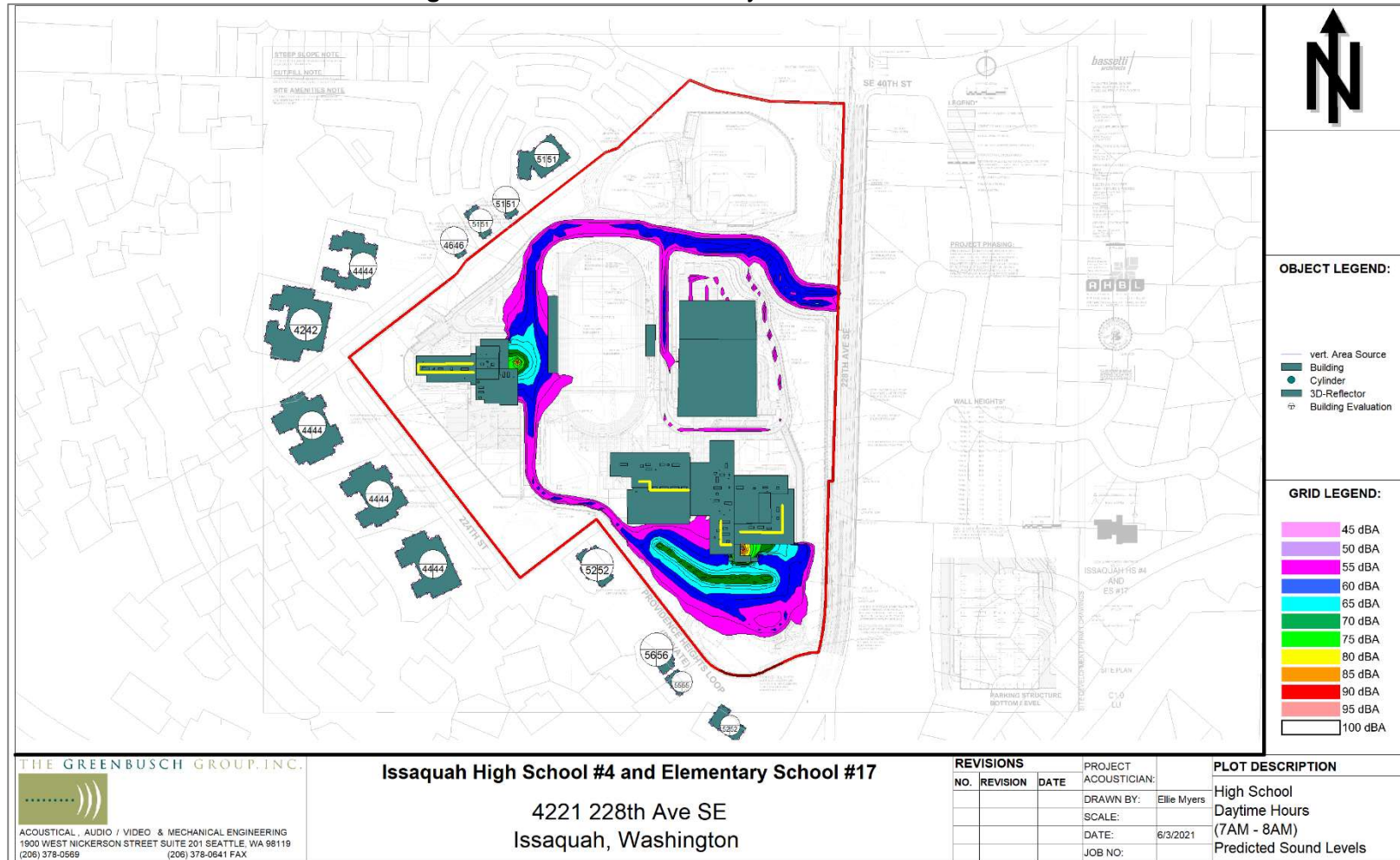


Figure A3. Predicted Peak Daytime ES Sound Levels

