Eilar Associates, Inc.
Acoustical and Environmental Consulting Services

Acoustical Analysis Report for Lotus Street Homes

City of San Diego Project No. 669302

Prepared for:
CT Homes LLC
Attention: JD Esajian
3033 Bunker Hill Street
San Diego, California 92109
Phone: 203-927-1419

Prepared by:
Eilar Associates, Inc.
210 South Juniper Street, Suite 100
Escondido, California 92025
Phone: 760-738-5570
info@eilarassociates.com

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1.0 Executive Summary

The proposed project, Lotus Street Homes, consists of the demolition of existing structures and construction of four two-story units. The project site is located at 5064 Lotus Street in the City of San Diego, California.

Current exterior noise at the site consists primarily of noise associated with aircraft overflight from the San Diego International Airport; the aircraft noise impact at the project site is estimated to be approximately 65 CNEL. The future noise environment in the vicinity of the project site will be primarily a result of the same ambient noise sources, as well as the noise generated by the proposed uses at the project site. Project-generated noise sources include permanent HVAC equipment and temporary construction equipment.

The City of San Diego Noise Element to the General Plan requires that residential outdoor use areas be protected from noise levels greater than 65 CNEL. As detailed herein, exterior noise levels on site are expected to be approximately 65 CNEL, primarily from aircraft noise. As the City of San Diego permits exterior noise levels of 65 CNEL at outdoor use areas, outdoor use areas are expected to comply with City of San Diego limits as designed. No project design features are required for the attenuation of transportation noise at outdoor use areas.

The City of San Diego and State of California require interior noise levels of 45 CNEL or less in residential units. Exterior noise levels on site are expected to exceed 60 CNEL at all facades, and therefore, interior noise levels may exceed 45 CNEL within units. Due to high noise levels on-site, an exterior-to-interior analysis was conducted. With the proposed exterior wall and roof assemblies and exterior glazing with a minimum STC rating of 28, interior noise levels are expected to remain below 45 CNEL in all habitable space with windows and exterior doors closed. Mechanical ventilation will be required for all units on site. With these project design features in place, all interior habitable rooms are expected to comply with California Building Code noise requirements.

Noise from the anticipated HVAC equipment on site was calculated to determine impacts at off-site receivers. Calculations show that noise levels from the mechanical equipment will be in compliance with the City of San Diego noise regulations found within the Municipal Code at all surrounding off-site receivers. No project design features are deemed necessary to control project-generated noise impacts from mechanical equipment.

While construction is taking place on site, an eight-foot high noise barrier is required along the eastern and western property lines in order to control noise impacts at properties to the east and west. With these construction noise barriers in place as shown in Figure 7, noise from temporary construction activities will not exceed the applicable construction noise limits of the City of San Diego Municipal Code at the ground level of surrounding residential property lines. Construction is prohibited between the hours of 7 p.m. and 7 a.m. and on Sundays or legal holidays. Standard construction noise control methods including adhering to permissible hours of operation, maintaining equipment in proper operating condition, and placing staging areas at furthest locations from noise sensitive receivers, shall also be employed as much as feasible to reduce noise impacts to surrounding receivers. With these project design features in place, temporary construction noise levels will comply with the noise limits of the City of San Diego Municipal Code.

Using the methodology given in the City of San Diego's California Environmental Quality Act (CEQA) Significance Determination Thresholds Document, it was determined that the proposed project will have a less than significant impact with regard to noise.

As detailed herein, noise impacts to and from the project site will comply with all applicable City of San Diego noise regulations with the recommended project design features in place.

2.0 Introduction

This acoustical analysis report is submitted to satisfy the acoustical requirements of the City of San Diego Noise Element to the General Plan, the City of San Diego Municipal Code, and the City of San Diego California Environmental Quality Act (CEQA) Significance Determination Thresholds. Its purpose is to assess noise impacts from aircraft overflight to identify project features or requirements necessary to achieve interior noise levels of 45 CNEL or less in habitable residential spaces, in compliance with the City of San Diego Noise Element to the General Plan and State of California Building Code noise regulations. In addition, this report assesses noise impacts from permanent and temporary project-related noise sources, such as mechanical equipment operation and construction noise. This analysis will determine if project design features are necessary and feasible to reduce these impacts to comply with the applicable noise regulations of the City of San Diego Noise Element to the General Plan and Municipal Code. Potential impacts will also be assessed for significance per the California Environmental Quality Act (CEQA).

All noise level or sound level values presented herein are expressed in terms of decibels, with A-weighting to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol L_{EQ} for a specified duration. Unless a different time period is specified, L_{EQ} is implied to mean a period of one hour.

The Community Noise Equivalent Level (CNEL) is a calculated 24-hour weighted average, where sound levels during evening hours of 7 p.m. to 10 p.m. have an added 5 dB weighting, and sound levels during nighttime hours of 10 p.m. to 7 a.m. have an added 10 dB weighting. This is similar to the Day-Night sound level, LDN, which is a 24-hour average with an added 10 dB weighting on the same nighttime hours but no added weighting on the evening hours. Sound levels expressed in CNEL are always based on A-weighted decibels. These metrics are used to express noise levels for both measurement and municipal regulations, for land use guidelines, and for enforcement of noise ordinances.

Sound pressure is the actual noise experienced by a human or registered by a sound level instrument. When sound pressure is used to describe a noise source, the distance from the noise source must be specified in order to provide complete information. Sound power, on the other hand, is a specialized analytical metric used to provide information without the distance requirement, but it may be used to calculate the sound pressure at any desired distance.

Some of the data may also be presented as octave-band-filtered and/or 1/3-octave-band-filtered data, which are a series of sound spectra centered about each stated frequency, with half of the bandwidth above and half of the bandwidth below each stated frequency. This data is typically used for machinery noise analysis and barrier calculations.

2.1 Project Description

The proposed project, Lotus Street Homes, consists of the demolition of existing structures and construction of four two-story units. Outdoor use areas for the project are provided as private patios and roof decks at each unit. The project site is surrounded by multifamily residential uses on all sides. Additional information is provided in the project plans, included as Appendix A.

2.2 Project Location

The project site is located at 5064 Lotus Street in the City of San Diego, California. The Assessor's Parcel Number (APN) for the property is 448-131-33-00. The project location is shown on the Vicinity Map, Figure

1, following this report. An Assessor's Parcel Map, Satellite Aerial Photograph, and Topographic Map of this area are also provided as Figures 2 through 4, respectively.

2.3 Applicable Noise Regulations

This acoustical analysis report is submitted to satisfy the acoustical requirements of the City of San Diego Noise Element to the General Plan, the City of San Diego Municipal Code, and the City of San Diego California Environmental Quality Act (CEQA) Significance Determination Thresholds.

The City of San Diego Noise Element to the General Plan states that exterior noise levels at outdoor use areas of residential properties should not exceed 65 CNEL. Additionally, the Noise Element and the State of California Building Code require interior noise levels not exceeding 45 CNEL in habitable space.

The City of San Diego Municipal Code, Section 59.5.0401 specifies noise limits based on the land use of the properties in question. The most restrictive nighttime noise limits at surrounding land uses are 50 dBA for mixed-use and high density (more than one dwelling unit per 2,000 square feet) residential. All properties immediately surrounding the project site are high-density, multi-family residential land uses, as is the proposed project site. Therefore, the most restrictive applicable noise limit will be 50 dBA at these properties.

In addition, Section 59.5.0404 of the City of San Diego Municipal Code states that construction activity is prohibited between the hours of 7 p.m. and 7 a.m. and on Sundays or legal holidays. During permissible hours of operation, noise levels from construction activity must be limited to a twelve-hour average of no greater than 75 dBA at any property line zoned for residential use.

Also, the City of San Diego Significance Determination Thresholds (Section K) should be used to determine whether or not a project will have a significant impact on surrounding properties. In order to determine the significance of project impacts, the following must be considered:

1. Would the project result or create a significant increase (3 dBA or more) in the existing ambient noise levels?

2. Would the project expose people to noise levels which exceed the City's adopted noise ordinance or are incompatible with Table K-4?

3. Would the project expose people to current or future transportation noise levels which exceed standards established in the Transportation Element of the General Plan or an adopted airport Comprehensive Land Use Plan?

4. Would the project result in land uses which are not compatible with aircraft noise levels as defined by an adopted airport Comprehensive Land Use Plan (CLUP)?

Please refer to Appendix B for pertinent sections of the San Diego Noise Element to the General Plan, the City of San Diego Municipal Code, California Building Code, and Significance Determination Thresholds.

3.0 Environmental Setting

3.1 Existing Noise Environment

Current exterior noise at the site consists primarily of noise associated with aircraft overflight from the San Diego International Airport. No other noise source is considered significant.

3.1.1 Aircraft Overflight Noise Sources

San Diego International Airport is located approximately 2.5 miles to the east of the proposed project site. According to the most current Airport Influence Area for San Diego International Airport, the project site lies within the 60-65 CNEL contour. Based on the site's location within the 60-65 CNEL contour, the aircraft noise impact at the project site is estimated to be approximately 65 CNEL. Please refer to Figure 5 for a graphical representation of these contours.

3.1.2 Measured Noise Levels

A long-term noise measurement was made beginning the afternoon of Thursday, September 24, 2020 and running through the afternoon of Friday, September 25, 2020. The purpose of this measurement was to obtain ambient noise information for the site. The noise measurement performed is considered representative of the typical noise exposure at the site and encompasses the primary source of noise, which is aircraft noise. The noise measurement was performed at approximately three feet above ground level, where the meter was placed in a bush near the south boundary of the project site for security purposes. Noise data obtained on site is shown in Table 1, and the measurement location is shown graphically in Figure 3.

Table 1. Long-Term Measured Noise Levels

Date	Time	Hourly Average Noise Level (dBA L_{EQ})
September 24, 2020	4 p.m. – 5 p.m.	65.9
	5 p.m. – 6 p.m.	75.0
	6 p.m. – 7 p.m.	59.8
	7 p.m. – 8 p.m.	63.1
	8 p.m. – 9 p.m.	67.0
	9 p.m. – 10 p.m.	59.5
	10 p.m. – 11 p.m.	54.3
	11 p.m. – 12 a.m.	44.4
September 25, 2020	12 a.m. – 1 a.m.	42.8
	1 a.m. – 2 a.m.	44.0
	2 a.m. – 3 a.m.	41.9

Table 1. Long-Term Measured Noise Levels		
Date	**Time**	**Hourly Average Noise Level (dBA L_{EQ})**
September 25, 2020	3 a.m. – 4 a.m.	42.6
	4 a.m. – 5 a.m.	53.4
	5 a.m. – 6 a.m.	45.3
	6 a.m. – 7 a.m.	63.3
	7 a.m. – 8 a.m.	63.3
	8 a.m. – 9 a.m.	64.5
	9 a.m. – 10 a.m.	62.3
	10 a.m. – 11 a.m.	62.0
	11 a.m. – 12 p.m.	66.0
	12 p.m. – 1 p.m.	63.8
	1 p.m. – 2 p.m.	63.2
	2 p.m. – 3 p.m.	63.4
	3 p.m. – 4 p.m.	60.1

Measured noise levels were observed to range from a minimum of 41.9 dBA between the hours of 2 a.m. and 3 a.m. on September 25, 2020 to a maximum of 75.0 dBA between 5 p.m. and 6 p.m. on September 24, 2020.

3.2 Future Noise Environment

The future noise environment in the vicinity of the project site will be primarily a result of the same ambient noise sources, as well as the noise generated by the proposed uses at the project site. Project-generated noise sources include permanent HVAC equipment and temporary construction equipment. Future aircraft noise is not expected to change significantly, and therefore, was modeled as described above.

3.2.1 HVAC Equipment

Though detailed project mechanical plans are not currently available, a rooftop heat pump is expected to service each unit. Each rooftop HVAC unit is expected to be equivalent to the 2.5-ton Carrier model 25HBC5 unit. Noise level data for this unit was provided by the manufacturer in the form of unweighted octave band sound power levels and an A-weighted overall sound power level. As the octave band levels did not add up to the overall A-weighted sound power level, they were adjusted to add up to the A-weighted overall level. The adjusted sound power level data for the proposed rooftop HVAC units is shown in Table 2. All rooftop HVAC units were modeled as being operational at all times for a worst-case analysis. Please refer to Appendix C for additional information.

Table 2. Sound Power Levels of Carrier 25HBC5								
Unit	Sound Power Levels (dB) at Octave Band Frequency (Hz)							Overall Sound Power Level (dBA)
	125	250	500	1,000	2,000	4,000	8,000	
Carrier 25HBC5030	52.9	60.4	63.4	67.4	64.4	61.9	55.4	71.0

Equipment noise levels shown above were incorporated into the permanent project-generated noise impact analysis as shown in Section 5.3.

3.2.2 Temporary Construction Equipment

According to the project proponent and professional experience, on-site construction activities are expected to consist of the following stages: grading and utilities, foundation, building construction, and paving. Please refer to Table 3 for anticipated on-site construction equipment during each stage of activity with noise levels and duty cycles for each piece of equipment. Construction equipment noise levels were provided by the UK Department for Environment, Food and Rural Affairs (DEFRA), and duty cycle information was taken from the Federal Highway Administration (FHWA) (see references). Although FHWA offers noise levels of construction equipment, professional experience and observations of construction activity by Eilar Associates, Inc. suggest that the noise levels given by DEFRA are more representative of equipment noise levels that would be generated at smaller scale construction sites such as the proposed project.

Table 3. Anticipated Construction Activity and Equipment Noise Levels			
Equipment	Duty Cycle (%)[1]	Noise Level at 50 feet (dBA)[2]	Activity Stage
Air Compressor	40	61	Building Construction
Concrete Mixer Truck	40	72	Foundation
Concrete Pump Truck	20	74	Foundation
Dozer	40	71	Grading/Utilities
Dump Truck	40	74	Grading/Utilities
Excavator	40	66	Grading/Utilities
Paver	50	73	Paving
Roller	20	74	Paving
Skid Steer	40	65	Grading/Utilities
Telescopic Forklift	40	67	Building Construction

[1]Duty cycle information was provided by the Federal Highway Administration.
[2]Noise level information was provided by UK Department for Environment, Food and Rural Affairs.

Equipment noise levels shown above were incorporated into the temporary construction noise impact analysis as shown in Section 5.4.

4.0 Methodology and Equipment

4.1 Methodology

4.1.1 CadnaA Noise Modeling Software

Modeling of the outdoor noise environment is accomplished using CadnaA Version 2020, which is a model-based computer program developed by DataKustik for predicting noise impacts in a wide variety of conditions. CadnaA (Computer Aided Noise Abatement) assists in the calculation, presentation, assessment, and alleviation of noise exposure. It allows for the input of project information such as noise source data, barriers, structures, and topography to create a detailed model and uses the most up-to-date calculation standards to predict outdoor noise impacts. Noise standards used by CadnaA that are particularly relevant to this analysis include ISO 9613 (Attenuation of sound during propagation outdoors). CadnaA provides results that are in line with basic acoustical calculations for distance attenuation and barrier insertion loss.

4.1.2 Exterior-to-Interior Noise Analysis

The State of California and the City of San Diego require buildings to be designed in order to attenuate, control, and maintain average interior noise levels not greater than 45 CNEL in residential space, as formulated in the California Building Code, Section 1206.4 and the City of San Diego Municipal Code. Contemporary exterior building construction is expected to achieve at least 15 decibels of exterior-to-interior noise attenuation with windows opened, according to the U.S. Environmental Protection Agency Office of Noise Abatement and Control (see reference). As a result, exterior noise levels of more than 60 CNEL often result in interior conditions that fail to meet the 45 CNEL requirements for habitable space.

Analysis for the interior noise levels requires consideration of:

- Number of unique assemblies in the wall (doors, window/wall mount air conditioners, sliding glass doors, and windows)
- Size, number of units, and sound transmission data for each assembly type
- Length of sound impacted wall(s)
- Depth of sound impacted room
- Height of exterior wall of sound impacted room
- Exterior noise level at wall assembly or assemblies of sound impacted room

The Composite Sound Transmission data is developed for the exterior wall(s) and the calculated noise exposure is converted to octave band sound pressure levels (SPL) for a typical aircraft type noise. The reduction in room noise due to absorption is calculated and subtracted from the interior octave noise levels, and the octave band noise levels are logarithmically summed to yield the overall interior room noise level. When interior noise levels exceed 45 CNEL, the noise reduction achieved by each element is reviewed to determine which changes will achieve the most cost-effective compliance. Windows are usually the first to be reviewed, followed by exterior doors, and then exterior walls.

Modeling of wall and floor/ceiling assemblies is accomplished using INSUL Version 9.0, which is a model-based computer program, developed by Marshall Day Acoustics for predicting the sound insulation of walls, floors, ceilings, and windows. It is acoustically based on theoretical models that require only minimal material information that can make reasonable estimates of the sound transmission loss (TL), STC and IIC for use in sound insulation calculations, such as the design of common party walls and multiple-family floor-ceiling assemblies, etc. INSUL can be used to quickly evaluate new materials or systems or investigate the effects of changes to existing designs. It models individual materials using the simple mass law and coincidence frequency

approach and can model more complex assembly partitions as well. It has evolved over several versions into an easy to use tool and has refined the theoretical models by continued comparison with laboratory tests to provide acceptable accuracy for a wide range of constructions. INSUL model performance comparisons with laboratory test data show that the model generally predicts the performance of a given assembly within 3 STC points.

4.1.3 Formulas and Calculations

To determine the combined logarithmic noise level of two known noise source levels, the values are converted to the base values, added together, and then converted back to the final logarithmic value, using the following formula:

$$L_C = 10\log(10^{L1/10} + 10^{L2/10} + 10^{LN/10})$$

where L_C = the combined noise level (dB), and
L_N = the individual noise sources (dB).

This procedure is also valid when used successively for each added noise source beyond the first two. The reverse procedure can be used to estimate the contribution of one source when the contribution of another concurrent source is known and the combined noise level is known. These methods can be used for L_{EQ} or other metrics (such as L_{DN} or CNEL), as long as the same metric is used for all components.

4.2 Measurement Equipment

Some or all of the following equipment was used at the site to measure existing noise levels:

- Soft dB Model Piccolo II Type 2 Sound Level Meter, Serial # 43006
- Larson Davis Model CAL150 Type 2 Calibrator, Serial # 5954

The sound level meter was field-calibrated immediately prior to the noise measurement and checked afterward to ensure accuracy. All sound level measurements conducted and presented in this report, in accordance with the regulations, were made with a sound level meter that conforms to the American National Standards Institute specifications for sound level meters (ANSI S1.4). All instruments are maintained with National Bureau of Standards traceable calibration, per the manufacturers' standards.

5.0 Noise Impacts

5.1 Exterior

As detailed in Section 3.1.1, exterior noise levels on site will be approximately 65 CNEL, primarily from aircraft noise. As aircraft noise cannot be modeled in detail to determine noise impacts at outdoor use areas and building facades, it was assumed that noise levels at outdoor use receivers and building facades would be 65 CNEL, for a worst-case analysis. As the City of San Diego permits exterior noise levels of 65 CNEL at outdoor use areas, outdoor use areas will comply with City of San Diego limits as designed. No project design features are required for the attenuation of transportation noise at outdoor use areas.

Additionally, the 65 CNEL aircraft noise level of 65 CNEL at building facades was considered for the interior noise analysis (see Section 5.2).

5.2 Interior

The State of California and the City of San Diego require buildings to be designed in order to attenuate, control, and maintain interior noise levels not greater than 45 CNEL in habitable space, as formulated in the City of San Diego General Plan and the California Building Code, Section 1206.4. According to the U.S. EPA (see reference), current exterior building construction is generally expected to achieve at least 15 decibels of exterior-to-interior noise attenuation with windows opened. Therefore, proposed project building structures exposed to exterior noise levels greater than 60 CNEL could be subject to interior noise levels exceeding the 45 CNEL noise limit for residential habitable space.

As exterior noise levels at building facades will be 65 CNEL, an exterior-to-interior analysis was performed for worst-case representative units to determine design considerations required to maintain compliant interior noise levels.

The exterior wall assembly is proposed to be constructed as a 2-inch by 6-inch wood-framed assembly with fiber cement siding over sheathing on the exterior, insulation in the cavity, and one layer of 5/8-inch thick Type X gypsum board on the interior. The exterior wall assembly was evaluated using INSUL and was shown to achieve an STC rating of 33. The roof assembly is proposed to be constructed as a 2-inch by 10-inch wood-framed assembly with standing seam metal roofing over sheathing on the exterior, insulation in the cavity, and one layer of 5/8-inch thick Type X gypsum board on the interior. The roof assembly was evaluated using INSUL and was shown to achieve an STC rating of 45. These assemblies were incorporated into interior noise calculations for the project. Please refer to Appendix D for additional information.

The results of the exterior-to-interior noise analysis for interior habitable spaces are shown in Table 4, with acoustical recommendations made therein. Worst-case representative units were evaluated. For more information, please refer to Appendix E: Exterior-to-Interior Noise Analysis.

Table 4. Interior Noise Levels of Worst-Case/Representative Units

Room Type	Maximum Exterior Facade Impact (CNEL)	STC Rating for Glazing	Interior Noise Level (CNEL)	
			Windows Open	Windows Closed
Living / Kitchen	65	28	**53.9**	42.7
Bedroom	65	28	**55.1**	42.3

As shown above, with the proposed exterior wall and roof assemblies and exterior glazing with a minimum STC rating of 28, interior noise levels will remain below 45 CNEL in all habitable space with windows and exterior doors closed. The sound rating of exterior glazing should be confirmed with the manufacturer prior to installation to confirm these STC rating requirements will be met.

In instances where interior habitable space is exposed to noise levels greater than 45 CNEL with windows in the open position, appropriate means of air circulation and provision of fresh air must be present to allow windows to remain closed for extended intervals of time so that acceptable levels of noise can be maintained on the interior. Mechanical ventilation will therefore be required for all units on site. It is the assumption of the undersigned that the proposed mechanical ventilation system will meet the criteria of the California Mechanical Code, including the capability to provide appropriate ventilation rates; however, this should be confirmed by the mechanical engineer. The ventilation system shall not compromise the sound insulation capability of the exterior wall or be dependent on ventilation through windows.

Exterior door installation should include all-around weather-tight door stop seals and an improved threshold closure system. The additional hardware will improve the doors' overall sound reduction properties. The transmission loss (TL) of an exterior door without weather-tight seals is largely a factor of sound leakage, particularly at the bottom of the door if excessive clearance is allowed for air transfer. By equipping exterior doors with all-around weather-tight seals and an airtight threshold closure at the bottom, a loss of up to 10 STC points can be prevented.

Additionally, it is imperative to seal and caulk between the rough opening and the finished door frame for all doors by applying an acoustically resilient, non-skinning, butyl caulking compound. Sealant application should be as generous as needed to ensure effective sound barrier isolation. The same recommendation applies to any other penetrations, cracks, or gaps through the assembly. The OSI SC175 and the Pecora AC-20 FTR acoustic sound sealants are products specifically designed for this purpose. For additional information on these products, please refer to Appendix F: Recommended Products.

The proposed habitable spaces were analyzed for interior noise impacts. With the proposed exterior wall and roof assemblies and exterior glazing with a minimum STC rating of 28, interior noise levels will remain below 45 CNEL in all habitable space with windows and exterior doors closed. Mechanical ventilation will be required for all units on site. With the project design features detailed herein in place, all interior habitable rooms will comply with California Building Code noise requirements.

5.3 Permanent Project-Related Noise Impacts

The City of San Diego Municipal Code states that permanent project-generated noise levels should not exceed 50 dBA at surrounding multi-family residential property lines. Noise impacts of roof-mounted HVAC equipment, as detailed in Section 3.2.1, were calculated at surrounding property lines to the east and west and are shown in Table 5. Any other surrounding receivers are located at a greater distance from proposed equipment and therefore will be exposed to lesser noise impacts due to additional distance attenuation and/or shielding provided by intervening structures. As there are second-story receivers at the residences to the east and the west, receivers were placed at heights of five feet and 15 feet to determine impacts at the nearest facades of surrounding residential buildings. Calculations considered noise shielding that will be provided by proposed on-site buildings. A graphical representation of noise source and receiver locations is provided as Figure 6. Please refer to Appendix G for additional information.

Table 5. Project-Generated Noise Levels at Surrounding Property Lines

Receiver	Location	Noise Limit (dBA L_{EQ})	Equipment Noise Level (dBA)	
			Floor 1	Floor 2
R1	West – South	50	25.7	33.8
R2	West – North	50	26.4	35.2
R3	East – North	50	26.3	33.5
R4	East – South	50	26.6	33.7

As shown above, as currently designed, noise levels from the mechanical equipment will be in compliance with the City of San Diego noise regulations found within the Municipal Code at all surrounding off-site receivers. No project design features are deemed necessary to control project-generated noise impacts from mechanical equipment.

5.4 Temporary Construction Noise Impacts

According to the City of San Diego Municipal Code, construction activity is prohibited between the hours of 7 p.m. and 7 a.m. and on Sundays or legal holidays. During permissible hours of operation, noise levels from construction activity must be limited to a twelve-hour average of no greater than 75 dBA at any property line zoned for residential use.

According to the project proponent and professional experience, on-site construction activities are expected to consist of the following stages: grading and utilities, foundation, building construction, and paving. Please refer to Table 3 for anticipated on-site construction equipment during each stage of activity, construction equipment noise levels and duty cycles for each piece of equipment. Construction noise levels were calculated at surrounding property lines to the north (across the alley), south (across Lotus Street), east, and west. Any other potentially noise-sensitive receivers are located at a greater distance from construction activity and therefore, would be exposed to lesser noise impacts due to distance attenuation and shielding provided by intervening structures. Second-floor receiver heights were also calculated for each receiver.

Construction noise sources were placed near the center of the work area to evaluate typical impacts to the surrounding receivers as equipment moves around the property. Noise calculations consider typical duty cycles of equipment, to account for periods of activity and inactivity on the site.

Noise levels for each stage of construction are shown in Table 6. Detailed calculations can be found in Appendix G, and a graphical representation of construction noise source and receiver locations is provided as Figure 7.

Table 6. Temporary Construction Noise Levels at Surrounding Property Lines – Current

Activity Stage	Equipment	Receiver	Noise Limit (dBA L_{EQ})	12-Hour Average Construction Noise Level (dBA L_{EQ})
Grading / Utilities	Dozer, Dump Truck, Excavator, Skid Steer	R1 (West)	75	**79.6**
		R2 (North)	75	69.4
		R3 (East)	75	**79.4**
		R4 (South)	75	65.7
Foundation	Concrete Mixer Truck, Concrete Pump Truck	R1 (West)	75	**77.5**
		R2 (North)	75	67.3
		R3 (East)	75	**77.4**
		R4 (South)	75	63.5
Building Construction	Air Compressor, Skid Steer, Telescopic Forklift	R1 (West)	75	73.0
		R2 (North)	75	62.8
		R3 (East)	75	72.8
		R4 (South)	75	59.1

Table 6. Temporary Construction Noise Levels at Surrounding Property Lines – Current				
Activity Stage	**Equipment**	**Receiver**	**Noise Limit (dBA L_{EQ})**	**12-Hour Average Construction Noise Level (dBA L_{EQ})**
Paving	Paver, Roller	R1 (West)	75	**79.4**
		R2 (North)	75	69.4
		R3 (East)	75	**79.3**
		R4 (South)	75	65.6

As shown above, construction noise levels are expected to exceed noise limits at the eastern and western property lines; therefore, an eight-foot construction noise barrier is required along the eastern and western property lines. Please refer to Table 7 for temporary construction noise levels with the barrier in place. Please refer to Figure 7 for a graphical representation of construction equipment sources, receivers, and required barriers.

Table 7. Temporary Construction Noise Levels at Surrounding Property Lines – with 8-foot Barrier				
Activity Stage	**Equipment**	**Receiver**	**Noise Limit (dBA L_{EQ})**	**12-Hour Average Construction Noise Level (dBA L_{EQ})**
Grading / Utilities	Dozer, Dump Truck, Excavator, Skid Steer	R1 (West)	75	63.5
		R3 (East)	75	63.9
Foundation	Concrete Mixer Truck, Concrete Pump Truck	R1 (West)	75	61.3
		R3 (East)	75	61.7
Paving	Paver, Roller	R1 (West)	75	62.8
		R3 (East)	75	63.2

As shown above, with the eight-foot construction noise barrier in place along the eastern and western property lines, construction noise levels are expected to meet the 75 dBA limit at all ground-level receivers. As the barrier height required to block line-of-sight between construction noise sources and upper level receivers would be infeasible, no additional project design features are deemed feasible. Please refer to Figure 7 for a graphical representation of construction equipment sources, receivers, and required barriers.

In order to be effective, the sound barrier should be solid and constructed of masonry, wood, plastic, fiberglass, steel, or a combination of those materials, with no cracks or gaps through or below the wall. Any seams or cracks must be filled or caulked. If wood is used, it can be tongue and groove and must be at least 7/8-inch thick or have a surface density of at least 3½ pounds per square foot. Sheet metal of 18-gauge (minimum) may be used if it meets the other criteria and is properly supported and stiffened so that it does not rattle or create noise itself from vibration or wind.

Calculations show that all construction stages will be in compliance with construction noise limits of The City of San Diego Municipal Code with the eight-foot barrier in place. The following "good practice" measures should still be practiced as a courtesy to residential neighbors and to more effectively control noise impacts to upper level receivers at adjacent properties.

1. Staging areas should be placed as far as possible from residential receivers. Ideally, staging areas would be located around the northeast corner of the site.

2. Place stationary equipment in locations that will have a lesser noise impact on nearby sensitive receivers.

3. Turn off equipment when not in use.

4. Limit the use of enunciators or public address systems, except for emergency notifications.

5. Equipment used in construction should be maintained in proper operating condition, and all loads should be properly secured, to prevent rattling and banging.

6. Schedule work to avoid simultaneous construction activities that both generate high noise levels.

7. Use equipment with effective mufflers.

8. Minimize the use of backup alarms.

With eight-foot high barriers in place at the east and west property lines during construction, operating hours limited to those permitted by the City of San Diego, and adherence to the general good practice construction noise control techniques, temporary construction noise impacts will be in compliance with the noise limits of the City of San Diego Municipal Code at surrounding properties.

5.4 CEQA Significance Determination

The project's impact on surrounding properties was taken into account using methodology given in the City of San Diego's Significance Determination Thresholds document. In order to determine whether or not the project will have a significant impact on surrounding properties, the City's Initial Study Checklist was used, and is addressed as follows:

1. Would the project result in a significant increase (3 dBA or more) in the existing ambient noise levels?

The minimum measured hourly ambient noise level measured on site (as detailed in Section 3.1.2) was combined with the proposed on-site mechanical equipment noise impacts at the closest surrounding properties to determine the cumulative noise impact and the increase in ambient noise levels at surrounding residential properties. Results are shown in Table 8.

Table 8. Calculated Cumulative Noise Impacts at Surrounding Property Lines						
Receiver Number	Receiver Location	Noise Level (dBA)				Impact
		Minimum Ambient	Mechanical	Cumulative	Ambient Increase	
R1-1	West (First Floor)	41.9	25.7	42.0	0.1	Less than Significant
R2-1	West (First Floor)	41.9	26.4	42.0	0.1	Less than Significant
R3-1	East (First Floor)	41.9	26.3	42.0	0.1	Less than Significant
R4-1	East (First Floor)	41.9	26.6	42.0	0.1	Less than Significant
R1-2	West (Second Floor)	41.9	33.8	42.5	0.6	Less than Significant
R2-2	West (Second Floor)	41.9	35.2	42.7	0.8	Less than Significant
R3-2	East (Second Floor)	41.9	33.5	42.5	0.6	Less than Significant
R4-2	East (Second Floor)	41.9	33.7	42.5	0.6	Less than Significant

As mechanical equipment operation creates less than a 3 dBA increase in the existing ambient noise levels, its impact will be less than significant at surrounding properties.

2. Would the project expose people to noise levels which exceed the City's adopted noise ordinance or are incompatible with Table K-4?

Noise levels generated by mechanical equipment at the proposed project site are shown to comply with the applicable noise level limits contained within the City of San Diego Municipal Code (the "adopted noise ordinance") at surrounding residential properties, as shown in Table 5.

Per City of San Diego staff, Table K-4 is no longer applicable, as the City of San Diego Noise Element to the General Plan was updated in 2015. For this reason, Table NE-3 shall be used to demonstrate compliance. The noise requirements of Table NE-3 show that multi-family residential land uses with noise levels up to 65 CNEL are considered compatible. As shown in Section 3.1.1, noise impacts to the project site are expected to be approximately 65 CNEL, which meets the compatibility limit.

3. Would the project expose people to current or future transportation noise levels which exceed standards established in the Transportation Element to the General Plan or an adopted airport Comprehensive Land Use Plan?

As shown in Sections 5.1 and 5.2, the proposed project will result in current and future transportation noise levels that are in compliance with the City of San Diego Noise Element to the General Plan at outdoor use and indoor spaces with the implementation of project design features for interior noise control detailed in Section 5.2.

4. Would the project result in land uses which are not compatible with aircraft noise levels as defined by an adopted airport Comprehensive Land Use Plan (CLUP)?

As the proposed project is exposed to aircraft noise levels of approximately 65 CNEL, the project will be compatible with the City of San Diego Noise Element to the General Plan and the Airport Land Use Compatibility Place for the San Diego International Airport.

Using the methodology given in the City of San Diego's Significance Determination Thresholds Document, it is expected that the proposed project will have a less than significant impact with regard to noise.

6.0 Conclusion

The City of San Diego Noise Element to the General Plan requires that residential outdoor use areas be protected from noise levels greater than 65 CNEL. As detailed herein, exterior noise levels on site are expected to be approximately 65 CNEL, primarily from aircraft noise. As aircraft noise cannot be modeled in detail to determine noise impacts at outdoor use areas and building facades, it was assumed that noise levels at outdoor use receivers and building facades would be 65 CNEL, for a worst-case analysis. As the City of San Diego permits exterior noise levels of 65 CNEL at outdoor use areas, outdoor use areas are expected to comply with City of San Diego limits as designed. No project design features are required for the attenuation of transportation noise at outdoor use areas.

The City of San Diego and State of California require interior noise levels of 45 CNEL or less in residential units. Exterior noise levels on site are expected to exceed 60 CNEL at all facades, and therefore, interior noise levels may exceed 45 CNEL within units. Due to high noise levels on-site, an exterior-to-interior analysis was conducted. With the proposed exterior wall and roof assemblies and exterior glazing with a minimum STC rating of 28, interior noise levels are expected to remain below 45 CNEL in all habitable space with windows and exterior doors closed. Mechanical ventilation will be required for all units on site. With these project design features in place, all interior habitable rooms are expected to comply with California Building Code noise requirements. Project design features for interior noise control are detailed in depth on pages 9 and 10 of this report.

Noise from the anticipated HVAC equipment on site was calculated to determine impacts at off-site receivers. Calculations show that noise levels from the mechanical equipment will be in compliance with the City of San Diego noise regulations found within the Municipal Code at all surrounding off-site receivers. No project design features are deemed necessary to control project-generated noise impacts from mechanical equipment.

While construction is taking place on site, an eight-foot high noise barrier is required along the eastern and western property lines in order to control noise impacts at properties to the east and west. With these construction noise barriers in place, noise from temporary construction activities will not exceed the applicable construction noise limits of the City of San Diego Municipal Code at the ground level of surrounding residential property lines. Construction is prohibited between the hours of 7 p.m. and 7 a.m. and on Sundays or legal holidays. Standard construction noise control methods including adhering to permissible hours of operation, maintaining equipment in proper operating condition, and placing staging areas at furthest locations from noise sensitive receivers, shall also be employed as much as feasible to reduce noise impacts to surrounding receivers. With these project design features in place, temporary construction noise levels will comply with the noise limits of the City of San Diego Municipal Code. Project design features for temporary construction noise control are detailed in depth on pages 11 through 13 of this report and shown graphically in Figure 7.

Using the methodology given in the City of San Diego's California Environmental Quality Act (CEQA) Significance Determination Thresholds Document, it was determined that the proposed project will have a less than significant impact with regard to noise.

As detailed herein, noise impacts to and from the project site will comply with all applicable City of San Diego noise regulations with the recommended project design features in place.

7.0 Certification

All recommendations for noise control are based on the best information available at the time our consulting services are provided. However, as there are many factors involved in sound and impact transmission, and Eilar Associates has no control over the construction, workmanship, or materials, Eilar Associates is specifically not liable for final results of any recommendations or implementation of the recommendations.

The findings and recommendations of this acoustical analysis report are based on the information available and are a true and factual analysis of the potential acoustical issues associated with the Lotus Street Homes project, to be located at 5064 Lotus Street in the City of San Diego, California. This report was prepared by Mo Ouwenga and Amy Hool.

Mo Ouwenga, INCE
Acoustical Consultant

Amy Hool, INCE
President/CEO

8.0 References

City of San Diego Noise Element to the General Plan, June 2015.

2019 California Building Code, Based on the International Building Code, Chapter 12, Section 1206 – Sound Transmission Control.

City of San Diego Municipal Code, Section 59.5.0401: Sound Level Limits, Effective February 9, 2006.

City of San Diego Significance Determination Thresholds, July 2016.

Department for Environment Food and Rural Affairs (DEFRA), Update of Noise Database for Prediction of Noise on Construction and Open Sites, 2005.

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U.S. Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety, March 1974.

Marshall Day Acoustics, INSUL Version 9.0, 2017.

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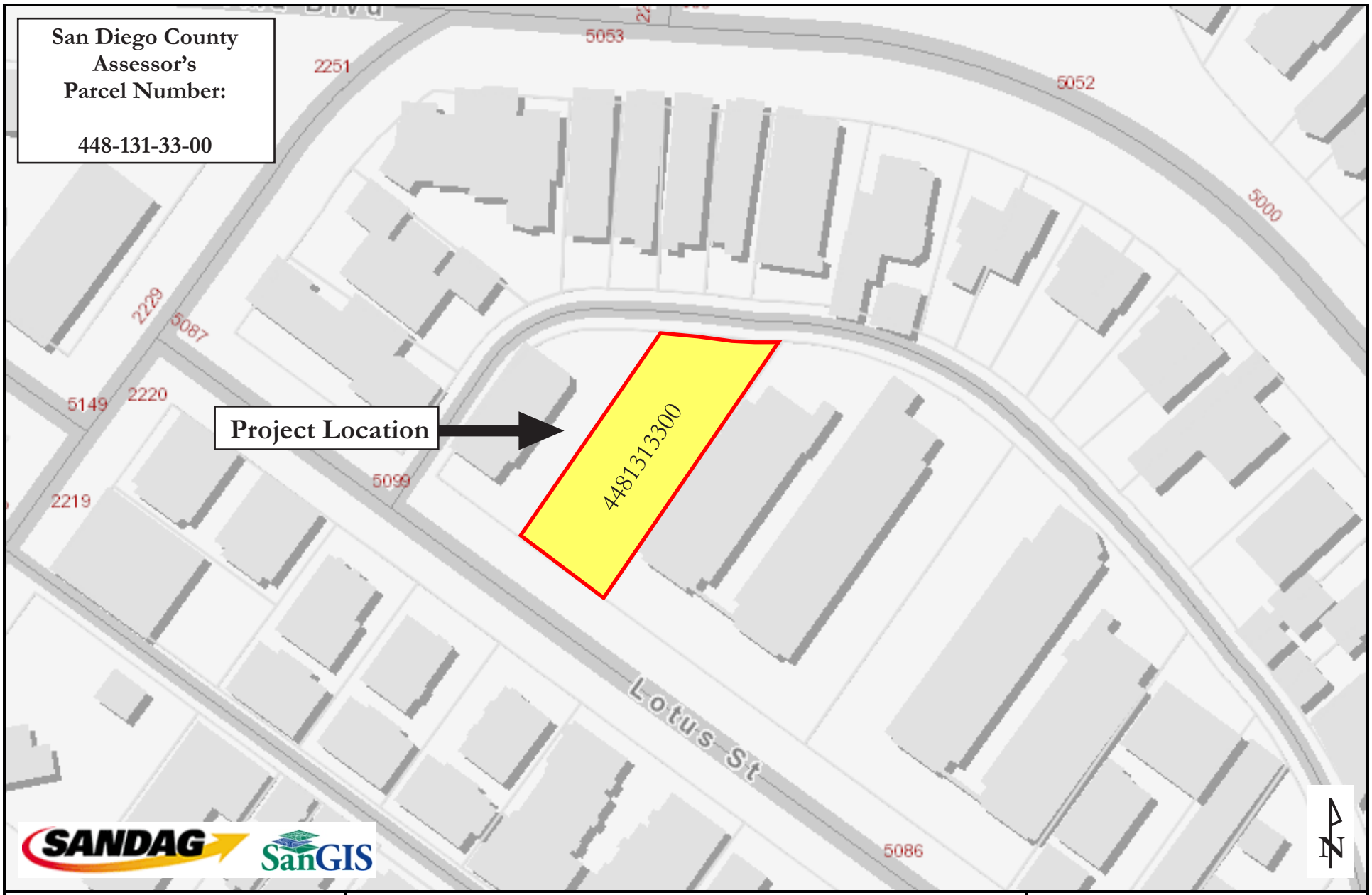
Acoustical and Environmental Consulting Services

Figures

Eilar Associates, Inc. 210 South Juniper Street, Suite 100 Escondido, California 92025 760-738-5570	**Vicinity Map** **Job # S200901**	**Figure 1**



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210 South Juniper Street, Suite 100
Escondido, California 92025
760-738-5570

Assessor's Parcel Map
Job # S200901

Figure 2

Eilar Associates, Inc.
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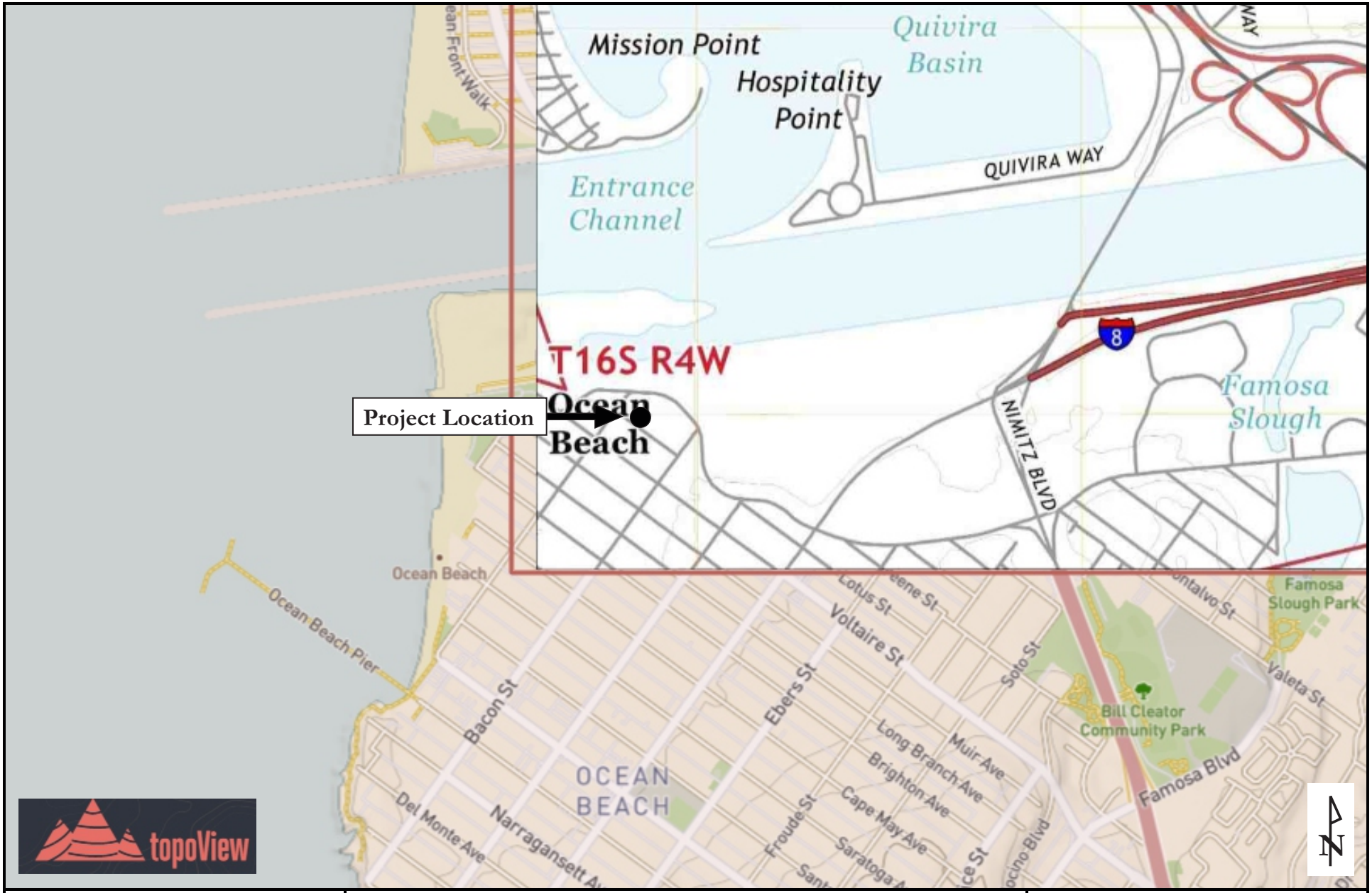
Escondido, California 92025
760-738-5570

Satellite Aerial Photograph Showing Noise Measurement Location
Job # S200901

Figure 3



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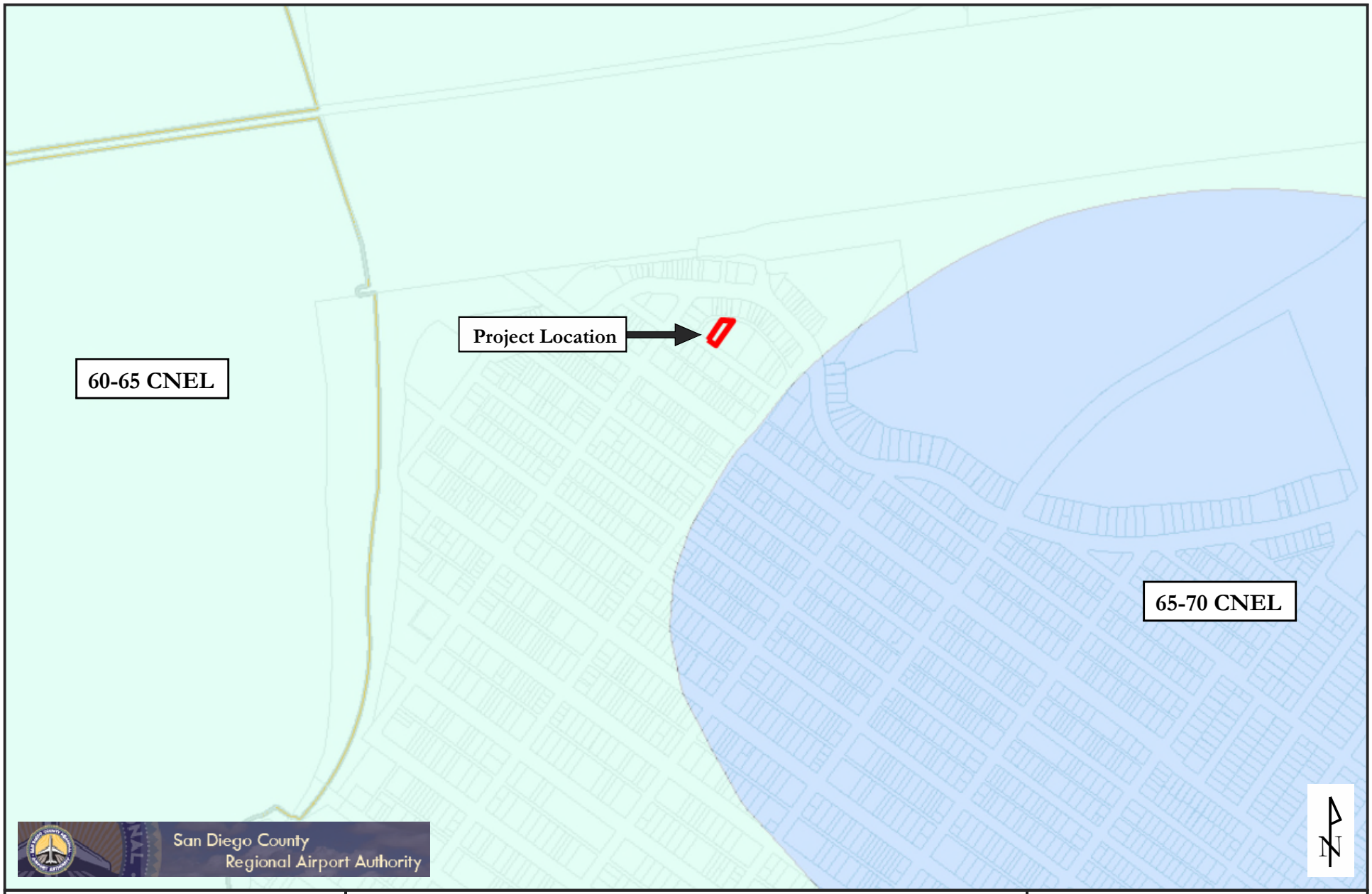
Escondido, California 92025
760-738-5570

Topographic Map
Job # S200901

Figure 4



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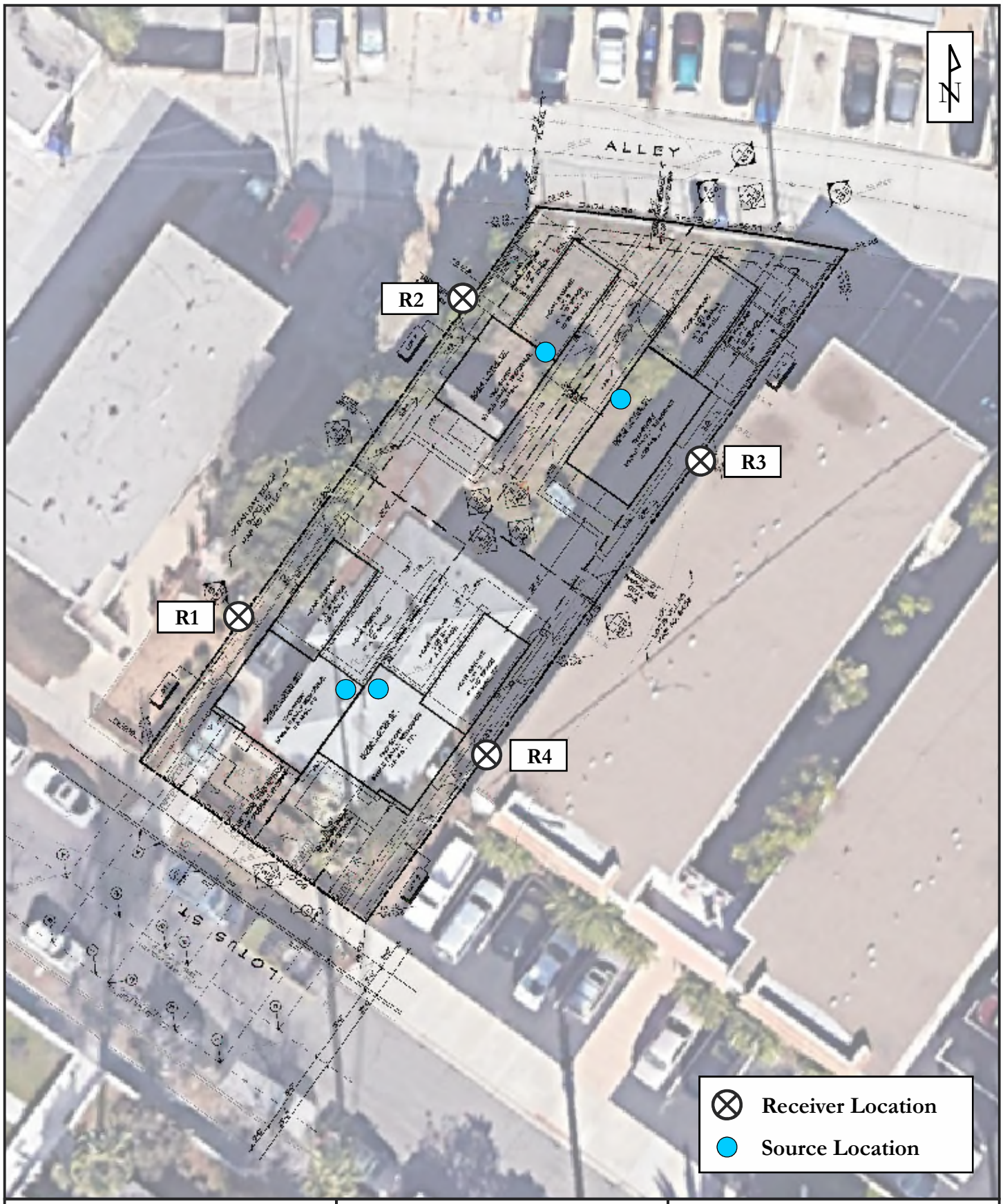
Escondido, California 92025
760-738-5570

San Diego International Airport Noise Contours Showing Project Location
Job # S200901

Figure 5



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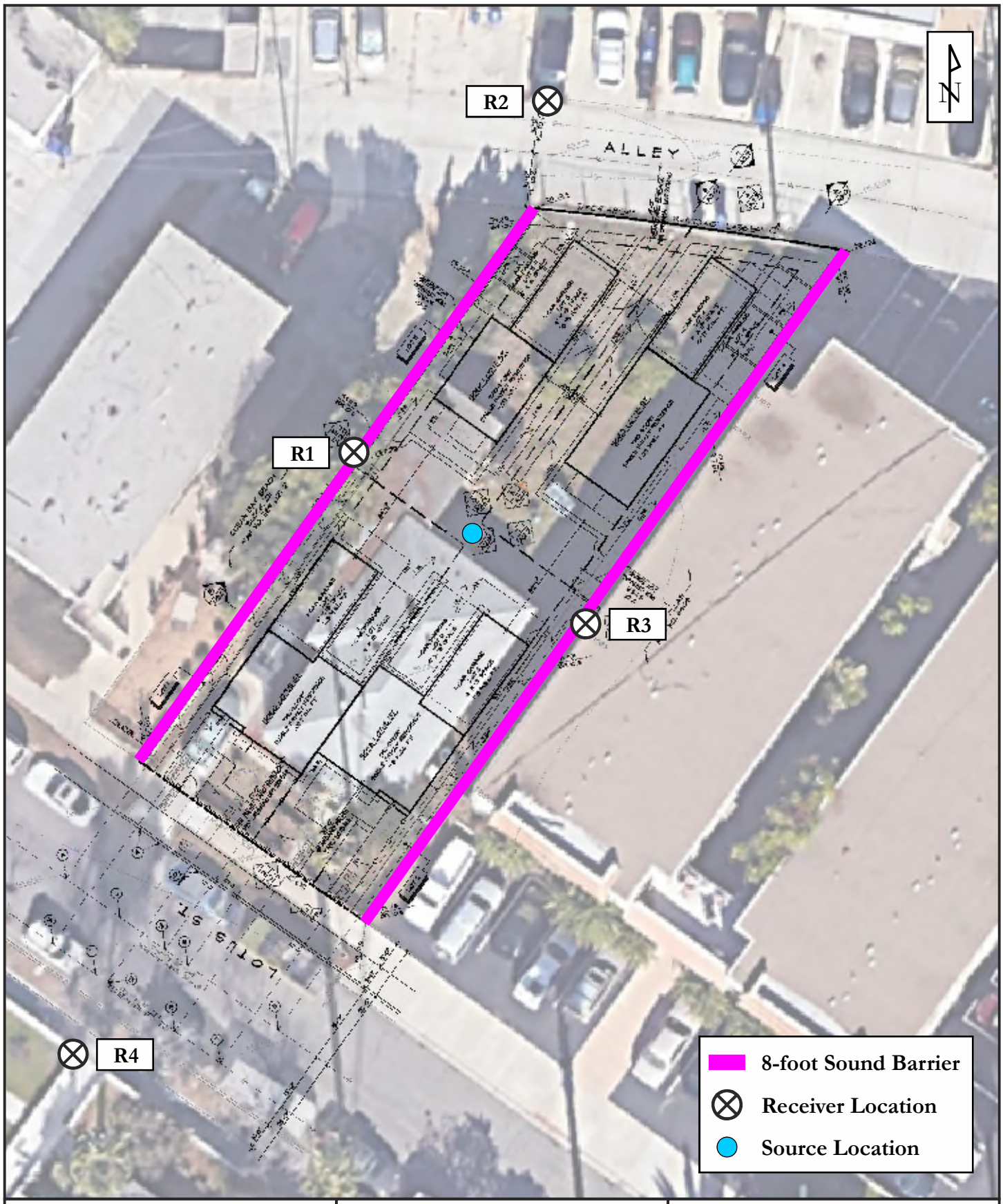
Satellite Aerial Photograph Showing Site Plan, Mechanical Equipment Locations, and Receiver Locations
Job # S200901

Figure 6



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Escondido, California 92025
760-738-5570

Satellite Aerial Photograph Showing Site Plan and Construction Equipment, Receiver, and Barrier Locations
Job # S200901

Figure 7

Eilar Associates, Inc.
Acoustical and Environmental Consulting Services

Appendix A
Project Plans

LOTUS STREET HOMES

COASTAL DEVELOPMENT PERMIT SUBMITTAL SET

SEPTEMBER 24, 2020

Prepared By:
Brian Britton
Golba Architecture
1940 Garnet Ave., Suite 100
San Diego, CA 92109
office: (619) 231-9905
fax: (858) 750-3471

Project Address:
5064 LOTUS ST.
SAN DIEGO, CA 92107

Project Name:
LOTUS STREET HOMES

Sheet Title:
COVER PAGE

PTS-669302

Revision 10:
Revision 9:
Revision 8:
Revision 7:
Revision 6:
Revision 5:
Revision 4:
Revision 3:
Revision 2: X
Revision 1: 09-24-20

Original Date: 07-09-20

Sheet 1 Of 16

GOLBA ARCHITECTURE Inc
Architecture ■ Space Planning ■ Interior Design
1940 Garnet Ave. #100 San Diego California 92109
Phone: (619) 231-9905 Fax: (858) 750-3471

LOTUS STREET HOMES
5064 LOTUS STREET
SAN DIEGO, CA

REGISTERED ARCHITECT BRIAN J. BRITTON No. C-14788 Exp. 7-31-21 STATE OF CALIFORNIA

T 1.0

DATE: 07-09-20 REV. DATE: △

GENERAL PLAN DEVELOPMENT GOALS

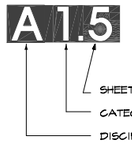
THE PROPOSED INFILL DEVELOPMENT PROJECT AT 5064 LOTUS ST. RECOGNIZES THE GOALS OF THE CONSERVATION ELEMENT OF THE CITY OF SAN DIEGO'S GENERAL PLAN.

IN EFFORT TO REACH THESE GOALS THE PROJECT WILL EMPLOY THE FOLLOWING;

- SOLAR PHOTO VOLTAIC SYSTEM FOR GENERATING POWER ON SITE.
- HIGH EFFICACY LIGHTING OR OCCUPANCY SENSORS WHERE APPLICABLE
- ENERGY STAR APPLIANCES
- DUAL PANE LOW-E GLAZING ON ALL WINDOWS
- USE OF LOW VOC PAINTS AND LOW EMITTING ADHESIVES, COATINGS, CARPETS AND OTHER FINISHES WHERE FEASIBLE.
- USE OF ENGINEERED WOOD PRODUCTS WHERE APPLICABLE
- NATURAL COOLING/VENTILATION WITH OPERABLE WINDOWS
- WATER CONSERVING NATIVE & PEST RESISTANT PLANTS IN LANDSCAPE DESIGN WHERE FEASIBLE
- USE OF PERMEABLE PAVING WHERE FEASIBLE.
- USE OF RAIN SENSOR SHUT OFF DEVICES
- HIGH EFFICIENCY IRRIGATION SYSTEM WITH STATE OF THE ART LOW PRECIPITATION RATE SPRINKLER EQUIPMENT.

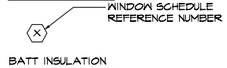
SYMBOLS

SHEET NUMBER

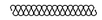


DOOR SYMBOL

WINDOW SYMBOL



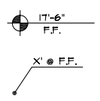
BATT INSULATION



NORTH ARROW

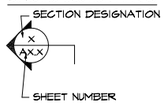
PLAN NOTE TARGET

ELEVATION MARKS



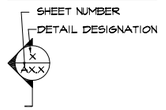
CENTER LINE

BUILDING SECTION MARKS

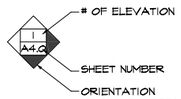


ELEVATION TARGETS

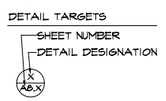
WALL SECTION MARKS



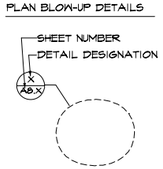
ELEVATION TARGETS



DETAIL TARGETS



PLAN BLOW-UP DETAILS



SQUARE FOOTAGE TOTALS

LOT 1

HABITABLE AREA:

GARAGE = 199 S.F.
GROUND FLOOR = 362 S.F.
SECOND FLOOR = 678 S.F.
TOTAL S.F. = 1,239 S.F.

ROOF DECK:

ROOF DECK = 245 S.F.

PARKING CALCULATIONS:

1.75 PARKING SPACES REQ'D, AND PROVIDED PER SDMC TABLE 142-05C (2 PROVIDED)

LOT 2

HABITABLE AREA:

GARAGE = 208 S.F.
GROUND FLOOR = 366 S.F.
SECOND FLOOR = 680 S.F.
TOTAL S.F. = 1,254 S.F.

ROOF DECK:

ROOF DECK = 245 S.F.

PARKING CALCULATIONS:

1.75 PARKING SPACES REQ'D, AND PROVIDED PER SDMC TABLE 142-05C (2 PROVIDED)

LOT 3

HABITABLE AREA:

GARAGE = 203 S.F.
GROUND FLOOR = 247 S.F.
SECOND FLOOR = 619 S.F.
TOTAL S.F. = 1,069 S.F.

ROOF DECK:

ROOF DECK = 240 S.F.

PARKING CALCULATIONS:

1.75 PARKING SPACES REQ'D, AND PROVIDED PER SDMC TABLE 142-05C (2 PROVIDED)

LOT 4

HABITABLE AREA:

GARAGE = 203 S.F.
GROUND FLOOR = 355 S.F.
SECOND FLOOR = 721 S.F.
TOTAL S.F. = 1,279 S.F.

ROOF DECK:

ROOF DECK = 252 S.F.

PARKING CALCULATIONS:

1.75 PARKING SPACES REQ'D, AND PROVIDED PER SDMC TABLE 142-05C (2 PROVIDED)

TOTAL AREA & DENSITY

ALL LOTS

HABITABLE AREA:

LOT 1 = 1,239 S.F.
LOT 2 = 1,254 S.F.
LOT 3 = 1,069 S.F.
LOT 4 = 1,279 S.F.

TOTAL S.F. = 4,841 S.F. < ALLOWABLE F.A.R. = 4,900 S.F.

ROOF DECK:

LOT 1 = 245 S.F.
LOT 2 = 245 S.F.
LOT 3 = 240 S.F.
LOT 4 = 252 S.F.

TOTAL S.F. = 1,000 S.F. (ROOF DECK)

DENSITY

MAX. DENSITY: 1 DWELLING UNIT PER 1,750 S.F. OF LOT AREA. (PER SDMC 131.0406(b)(2))

7,000 S.F. (LOT) / 1,750 S.F.

= 4 DWELLING UNITS TOTAL

PARKING

SMALL LOT SUBDIVISION FOR;
2 BEDROOM UNITS IN TRANSIT PRIORITY AREA = 1.75 SPACES PER UNIT (PER SDMC TABLE 142-05C)

1.75 (SPACES) X 4 DWELLING UNITS

= 7 SPACES REQUIRED (8 PROVIDED)

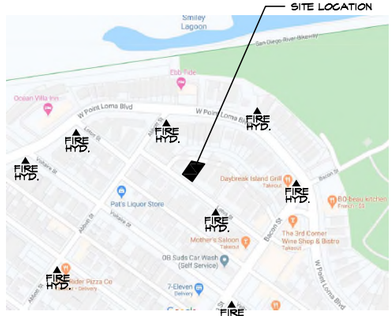
ABBREVIATIONS

ACOUS.	ACOUSTICAL
A.C.T.	ACOUSTICAL CEILING TILE
ADJ.	ADJUSTABLE.
A.F.F.	AT FINISHED FLOOR
AGG.	AGGREGATE
ALUM.	ALUMINUM
ALT.	ALTERNATE
A.P.	ACCESS PANEL
APPROX.	APPROXIMATE
ARCH.	ARCHITECTURAL
ASPH.	ASPHALT
ASST.	ASSISTANT
AUTO.	AUTOMATIC
BD.	BOARD
BLDG.	BUILDING
BOT.	BOTTOM
B.U.R.	BUILT UP ROOFING
CAB.	CABINET
CIRC.	CIRCULATION
C.L.	CENTER LINE
CLR.	CLEAR
CLG.	CEILING
CLO.	CLOSET
C.M.U.	CONCRETE MASONRY UNIT
COL.	COLUMN
CONC.	CONCRETE
CONF.	CONFERENCE
CONN.	CONNECTION
CONSTR.	CONSTRUCTION
CONT.	CONTINUOUS
CONTR.	CONTRACTOR
COORD.	COORDINATE
CORR.	CORRIDOR
CPT.	CARPET
C.J.	CONTROL JOINT
C.T.	CERAMIC TILE
CTR.	CENTER
C.W.	COLD WATER
DBL.	DOUBLE
DEMO.	DEMOLITION
DEPT.	DEPARTMENT
DIA.	DIAMETER
DIAG.	DIAGONAL
DIFF.	DIFFUSER
DIM.	DIMENSION
DIV.	DIVISION
DN.	DOWN
D.P.	DAMPPROOFING
DR.	DOOR
DTL.	DETAIL
E.	EAST
EA.	EACH
EL.	ELEVATION
ELAS.	ELASTOMERIC
ELEC.	ELECTRICAL
ELEV.	ELEVATOR
EMER.	EMERGENCY
ENCL.	ENCLOSURE
ENGR.	ENGINEER
ENT.	ENTRANCE
E.J.	EXPANSION JOINT
E. PNL.	ELECTRICAL PANEL
EQ.	EQUAL
EQUIP.	EQUIPMENT
E.W.C.	ELECTRIC WATER COOLER
EXH.	EXHAUST
EXST.	EXISTING
EXP.	EXPANSION
EXT.	EXTERIOR
F.D.	FLOOR DRAIN
FDN.	FOUNDATION
F.E.	FIRE EXTINGUISHER
F.F.	FINISH FLOOR
F.H.C.	FIRE HOSE CABINET
FIN.	FINISH
FL.	FLOOR
FLEX.	FLEXIBLE
FLUOR.	FLUORESCENT
FT.	FOOT
FRUN.	FURNITURE
FURR.	FURRING
FUT.	FUTURE
GA.	GAUGE
GALV.	GALVANIZED
GEN.	GENERAL
GL.	GLASS
GND.	GROUND
GR.	GRADE
GYP. BD.	GYPSUM BOARD
H.C.	HARD CORE
HDWD.	HARDWARE
H.M.	HOLLOW METAL
HORZ.	HORIZONTAL
HR.	HOUR
HT.	HEIGHT
HTG.	HEATING
H.V.A.C.	HEATING, VENTILATION
H.W.	HOT WATER
IN.	INCH(ES)
INCAND.	INCANDESCENT
INCL.	INCLUDED
INSUL.	INSULATED
INT.	INTERIOR
INTERM.	INTERMEDIATE
JAN.	JANITOR
JT.	JOINT
KIT.	KITCHEN
LAM.	LAMINATE
LAUN.	LAUNDRY
LAV.	LAVATORY
LB.(S)	POUNDS
L.F.	LINEAR FOOT
LT.	LIGHT
MACH.	MACHINE
MAINT.	MAINTENANCE
MAS.	MASONRY
MATL.	MATERIAL
MAX.	MAXIMUM
MECH.	MECHANICAL
MEMB.	MEMBRANE
MEZZ.	MEZZANINE
MFR.	MANUFACTURER
MIN.	MINIMUM
MISC.	MISCELLANEOUS
M.O.	MASONRY OPENING
MOV.	MOVABLE
MTD.	MOUNTED
MTL.	METAL
MUL.	MULLION
N.	NORTH
N.I.C.	NOT IN CONTRACT
NO.	NUMBER
NOM.	NOMINAL
N.T.S.	NOT TO SCALE
OA.	OVERALL
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
O.F.D.	OVERFLOW DRAIN
OFF.	OFFICE
OH.	OVERHEAD
OPNG.	OPENING
OPP.	OPPOSITE
PAV.	PAVING
P.C.	PRE-CAST
PL.	PLATE
P.LAM.	PLASTIC LAMINATE
PLAS.	PLASTER
PLBG.	PLUMBING
PLWD.	PLYWOOD
PNT.	PAINT
PNL.	PANEL
POL.	POLISHED
PROP.	PROPERTY
P.S.F.	POUNDS PER SQUARE FOOT
P.S.I.	POUNDS PER SQUARE INCH
PTD.	PAINTED
PTN.	PARTITION
PT.	POINT
QTY.	QUANTITY
R.	RUBBER
RECEP.	RECEPTION
REINF.	REINFORCING
R.O.M.	RIGHT OF WAY
RAD.	RADIUS
R.B.	RUBBER BASE
R.C.P.	REFLECTED CEILING PLAN
R.D.	ROOF DRAIN
REC.	RECESSED
REF.	REFERENCE
REFR.	REFRIGERATOR
REINF.	REINFORCED
REQD.	REQUIRED
RESL.	RESULTANT
REV.	REVISION
RFG.	ROOFING
RM.	ROOM
R.O.	ROUGH OPENING
S.	SOUTH
SAN.	SANITARY
SCHED.	SCHEDULE
SECT.	SECTION
SECUR.	SECURITY
S.F.	SQUARE FOOT
SHR.	SHOWER
SHT.	SHEET
SIM.	SIMILAR
SL.	SLOPE
S.P.	STANDPIPE
SPEC.	SPECIFICATION
SPKR.	SPEAKER
SQ.	SQUARE
S.ST.	STAINLESS STEEL
STA.	STATION
STD.	STANDARD
STL.	STEEL
STOR.	STORAGE
STRUC.	STRUCTURAL
SUSP.	SUSPENDED
SYM.	SYMMETRICAL
T.	TREAD
T.O.	TOP OF
T.&B.	TOP AND BOTTOM
T.&G.	TONGUE AND GROOVE
TEL.	TELEPHONE
TEMP.	TEMPERED
TER.	TERRAZZO
THK.	THICK
TLT.	TOILET
TOPO.	TOPOGRAPHY
T.V.	TELEVISION
TYP.	TYPICAL
UNEXC.	UNEXCAVATED
UNF.	UNFINISHED
U.N.O.	UNLESS OTHERWISE NOTED
UTL.	UTILITY
VAC.	VACUUM
V.C.T.	VINYL COMPOSITION TILE
VENT.	VENTILATION
VERT.	VERTICAL
VEST.	VESTIBULE
V.I.F.	VERIFY IN FIELD
VOL.	VOLUME
V.T.	VINYL TILE
W.	WEST
W.C.	WATER CLOSET
WD.	WOOD
W.F.	WIDE FLANGE
W.H.	WATER HEATER
WIN.	WINDOW
W.M.	WIRE MESH
WTPG.	WATERPROOFING
WT.	WATER
W.W.F.	WELDED WIRE MESH
YD.	YARD

5064 LOTUS ST.

SITE ADDRESS:	5064 LOTUS ST SAN DIEGO, CA 92107
ASSESSORS PARCEL NUMBER:	448-131-33-00
LEGAL DESCRIPTION:	LOTS 3 & 4 OF BLOCK 101, TR 1189
LOT USE	
EXISTING:	ONE SINGLE FAMILY RESIDENCE
PROPOSED:	ONE SINGLE FAMILY RESIDENCE PER LOT
LOT ZONING:	RM-2-4 (1 DWELLING PER 1,750 S.F. OF LOT)
LOT SIZE:	7,000 S.F.
ALLOWABLE F.A.R.:	4,900 S.F. (0.7 X 7,000 S.F.)
LOT COVERAGE:	2,143 S.F. / 7,000 S.F. = 30.6% LOT COVERAGE

VICINITY MAP NO SCALE



FIRE HYD. FIRE HYDRANT

COMPLETENESS REVIEW

I HEREBY ACKNOWLEDGE AND CERTIFY THAT:

1. I AM ACCOUNTABLE FOR KNOWING AND COMPLYING WITH THE GOVERNING POLICIES, REGULATIONS AND SUBMITTAL REQUIREMENTS APPLICABLE TO THIS PROPOSED DEVELOPMENT;

2. I HAVE PERFORMED REASONABLE RESEARCH TO DETERMINE THE REQUIRED APPROVALS AND DECISION PROCESS FOR THE PROPOSED PROJECT, AND THAT FAILURE TO ACCURATELY IDENTIFY AN APPROVAL OR DECISION PROCESS COULD SIGNIFICANTLY DELAY THE PERMITTING PROCESS;

3. I HAVE TAKEN THE PROFESSIONAL CERTIFICATION FOR DEVELOPMENT PERMIT COMPLETENESS REVIEW TRAINING AND AM ON THE APPROVED LIST FOR PROFESSIONAL CERTIFICATION;

4. MAINTAINING MY PROFESSIONAL CERTIFICATION FOR DEVELOPMENT PERMIT COMPLETENESS REVIEW PRIVILEGE REQUIRES ACCURATE SUBMITTALS ON A CONSISTENT BASIS;

5. SUBMITTING INCOMPLETE DOCUMENTS AND PLANS ON A CONSISTENT BASIS MAY RESULT IN THE REVOCATION OF MY PROFESSIONAL CERTIFICATION FOR DEVELOPMENT PERMIT COMPLETENESS REVIEW;

6. IF REQUIRED DOCUMENTS OR PLAN CONTENT IS MISSING, PROJECT REVIEW WILL BE DELAYED; AND

7. THIS SUBMITTAL PACKAGE MEETS ALL OF THE MINIMUM REQUIREMENTS CONTAINED IN LAND DEVELOPMENT MANUAL, VOLUME 1, CHAPTER 1, SECTION 4.

RESPONSIBLE CERTIFIED PROFESSIONAL NAME:

SIGNATURE: TIM GOLBA DATE: 06/19/20

PROJECT DIRECTORY

GENERAL

T1.0 COVER SHEET
T1.1 LEGEND AND PROJECT DATA

CIVIL

C-0 TOPOGRAPHICAL SURVEY
C-1 TENTATIVE MAP
C-2 PRELIMINARY GRADING PLAN

ARCHITECTURAL

A0.0 SITE PLAN
A1.0 FIRST FLOOR PLANS
A1.1 SECOND FLOOR PLANS
A1.2 ROOF DECK PLANS
A2.0 BUILDING ELEVATIONS
A2.1 BUILDING ELEVATIONS
A2.2 BUILDING ELEVATIONS
A2.3 BUILDING ELEVATIONS
A3.0 BUILDING SECTIONS

LANDSCAPING

L1.0 LANDSCAPE DEVELOPMENT PLAN
L1.1 LANDSCAPE DEVELOPMENT PLAN

GENERAL PROJECT DATA

PROJECT DESCRIPTION:	SCOPE OF WORK IS FOR A COASTAL DEVELOPMENT PERMIT AND SMALL LOT SUBDIVISION OF TWO LEGAL LOTS INTO 4 LEGAL LOTS AND FOR THE DEMOLITION OF EXISTING SINGLE FAMILY RESIDENCE AND CONSTRUCTION OF FOUR NEW 1,239 / 1,254 / 1,069 / AND 1,279 SQUARE FOOT TWO-STORY, SINGLE FAMILY RESIDENCES WITH ATTACHED 1-CAR GARAGES AND SURFACE SPACES FOR 2 CARS PER UNIT ON EACH PROPOSED SMALL LOT SUBDIVISION CREATED LOT.
OCCUPANCY:	R-3
BUILDING CODES:	2019 CALIFORNIA RESIDENTIAL CODE 2019 CALIFORNIA BUILDING CODE 2019 CALIFORNIA ELECTRICAL CODE 2019 CALIFORNIA PLUMBING CODE 2019 CALIFORNIA FIRE CODE 2019 CALIFORNIA MECHANICAL CODE 2019 CALIFORNIA GREEN BUILDING CODE
ZONING OVERLAYS:	CITY COASTAL, COASTAL HEIGHT LIMIT, SDUSD, OCEAN BEACH COMMUNITY PLAN, TRANSIT PRIORITY AREA, PARKING IMPACT OVERLAY ZONE (COASTAL IMPACT AREA), COUNCIL DISTRICT 2, NOISE CONTOURS - 60-65 dB CNEL, FLOOD PLAIN 500-YEAR, SD AIRPORT INFLUENCE AREA, FAA HEIGHT LIMIT, AIRPORT APPROACH, AIRPORT ENVIRONS
CONSTRUCTION TYPE:	TYPE VB, SPRINKLERED (NFPA 13D) *SPRINKLERS TO BE DEFERRED
NUMBER OF STORIES	
EXISTING:	1
PROPOSED:	2
BUILDING HEIGHT	
EXISTING:	13'-6"
PROPOSED:	24'-9.5"
YEAR EXISTING STRUCTURES BUILT:	1942
EXISTING SOIL CONDITIONS:	PREVIOUSLY DISTURBED
GEOLOGICAL HAZARD CATEGORY:	ZONE 52

DIRECTORY

OWNER:	CT HOMES C/O J D ESAJIAN 3033 BUNKER HILL ST. SAN DIEGO, CA 92109 TEL. (619) 231-9905
ARCHITECT:	GOLBA ARCHITECTURE, INC. 1940 GARNET AVE. #100 SAN DIEGO, CA 92109 TEL. (619) 231-9905 CONTACT: BRIAN BRITTON
CIVIL:	CHRISTENSEN ENGINEERING & SURVEYING 7888 SILVERTON AVE., SUITE J SAN DIEGO, CA 92126 TEL. (858) 271-9901 CONTACT: ANTONY CHRISTENSEN
LANDSCAPE:	NERI LANDSCAPE ARCHITECTURE (NLA) 928 HORNBLEND STREET, SUITE #3 SAN DIEGO, CA 92109 TEL. (858) 274-3222 CONTACT: JIM NERI

Prepared By:
Brian Britton
Golba Architecture
1940 Garnet Ave., Suite 100
San Diego, CA 92109
office: (619) 231-9905
fax: (858) 750-3471

Project Address:
5064 LOTUS ST.
SAN DIEGO, CA 92107

Project Name:
LOTUS ST. HOMES

Sheet Title:
LEGEND & PROJECT DATA

PTS-669302

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GOLBA ARCHITECTURE inc
Architecture ■ Space Planning ■ Interior Design
1940 Garnet Ave. #100 San Diego California 92109
Phone: (619) 231-9905 Fax: (858) 750-3471

LOTUS STREET HOMES
5064 LOTUS STREET
SAN DIEGO, CA

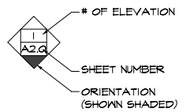
REGISTERED ARCHITECT BRIAN J. BRITTON No. C-14788 Exp. 7-31-21 STATE OF CALIFORNIA

DATE: 07-09-20 REV. DATE:

T 1.1

PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT THE OWNER/PERMITTEE SHALL SUBMIT A WATER POLLUTION CONTROL PLAN (WPCP). THE WPCP SHALL BE PREPARED IN ACCORDANCE WITH THE GUIDELINES IN PART 2 CONSTRUCTION BMP STANDARDS CHAPTER 4 OF THE CITY'S STORM WATER STANDARDS.

ELEVATION TARGETS



SITE NOTES:

PROVIDE BUILDING ADDRESS NUMBERS FOR ALL NEW AND EXISTING STRUCTURES VISIBLE AND LEGIBLE FROM THE STREET OR ROAD FRONTING THE PROPERTY. (UFC 901.4.4). MIN. SIZE OF NUMBERS SHALL BE 12".

METER LOCATIONS ARE SUBJECT TO APPROVAL BY SDG&E.

THIS PROJECT DRAINS ROOF DRAINS TO LANDSCAPED AREAS OR BRICK AND LANDSCAPED AREA ADJACENT TO THE HOUSING UNIT. ALL RUNOFF WILL BE DISCHARGED TO PAVED SURFACES IN THE PUBLIC RIGHT-OF-WAY.

SEE SHEET C-2 FOR MORE DETAILED GRADING INFORMATION.

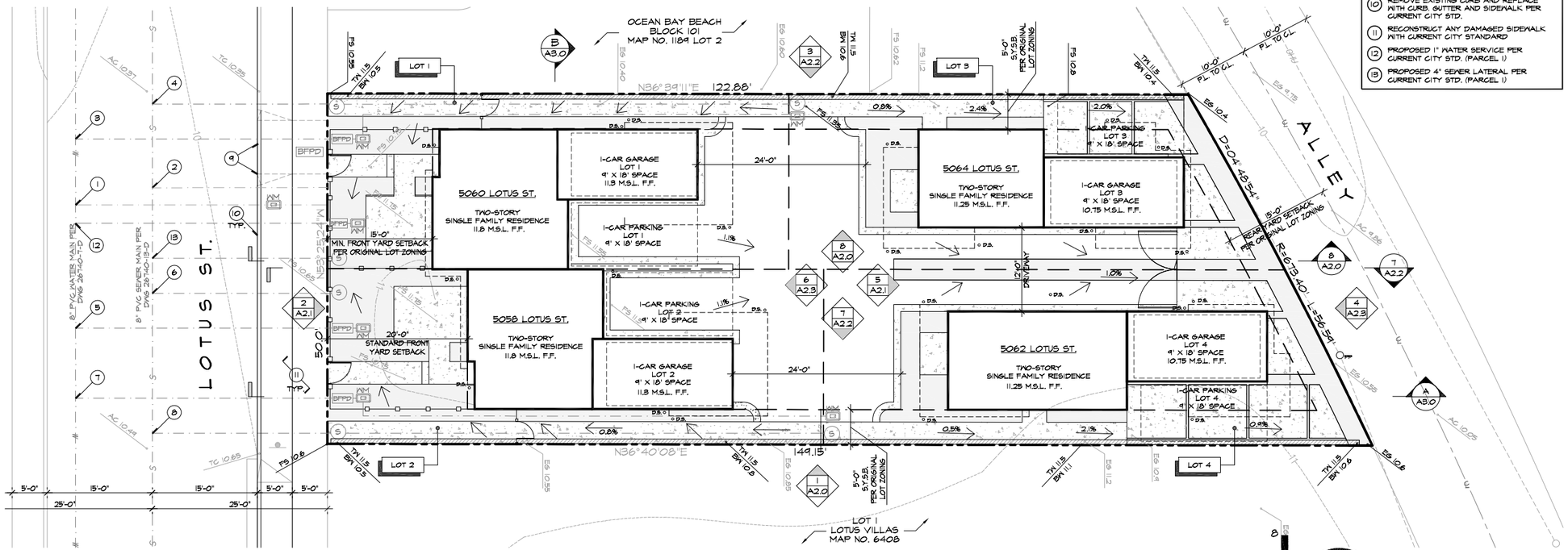
SEE CIVIL (C) AND LANDSCAPE (L) SHEETS FOR ADDITIONAL SITE INFORMATION

SITE KEY

- AREA OF PROPOSED RESIDENCE
- AREA OF PROPOSED CONCRETE
- AREA OF SOFTSCAPE
- AREA OF PERMEABLE PAVERS
- NEW SHORT CMU WALL
- INDICATES PROPERTY LINE
- INDICATES SETBACK LINE
- INDICATES LINE ABOVE
- D.S. DOWN SPOUT
- 0.0 SPOT ELEVATION
- DRAINAGE PATTERN (EXISTING TO REMAIN)

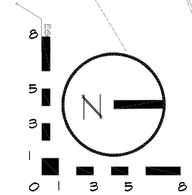
SITE NOTES:

1. EXISTING 1" WATER SERVICE TO BE KILLED
2. EXISTING 4" SEWER LATERAL TO BE ABANDONNED AT PROPERTY LINE
3. PROPOSED 1" WATER SERVICE PER CURRENT CITY STD. (PARCEL 3)
4. PROPOSED 4" SEWER LATERAL PER CURRENT CITY STD. (PARCEL 3)
5. PROPOSED 1" WATER SERVICE PER CURRENT CITY STD. (PARCEL 2)
6. PROPOSED 4" SEWER LATERAL PER CURRENT CITY STD. (PARCEL 2)
7. PROPOSED 1" WATER SERVICE PER CURRENT CITY STD. (PARCEL 4)
8. PROPOSED 4" SEWER LATERAL PER CURRENT CITY STD. (PARCEL 4)
9. REMOVE EXISTING DRIVEWAY AND REPLACE WITH CURB, GUTTER AND SIDEWALK PER CURRENT CITY STD.
10. REMOVE EXISTING CURB AND REPLACE WITH CURB, GUTTER AND SIDEWALK PER CURRENT CITY STD.
11. RECONSTRUCT ANY DAMAGED SIDEWALK WITH CURRENT CITY STANDARD
12. PROPOSED 1" WATER SERVICE PER CURRENT CITY STD. (PARCEL 1)
13. PROPOSED 4" SEWER LATERAL PER CURRENT CITY STD. (PARCEL 1)



SITE PLAN

SCALE: 1/8"=1'-0"



SCALE: 1/8"=1'-0"

Prepared By:
Brian Britton
Golba Architecture
1940 Garnet Ave., Suite 100
San Diego, CA 92109
office: (619) 231-9905
fax: (858) 750-3471

Project Address:
5064 LOTUS ST.
SAN DIEGO, CA 92107

Project Name:
LOTUS STREET HOMES

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Original Date: 07-09-20

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SITE PLAN

PTS-669302

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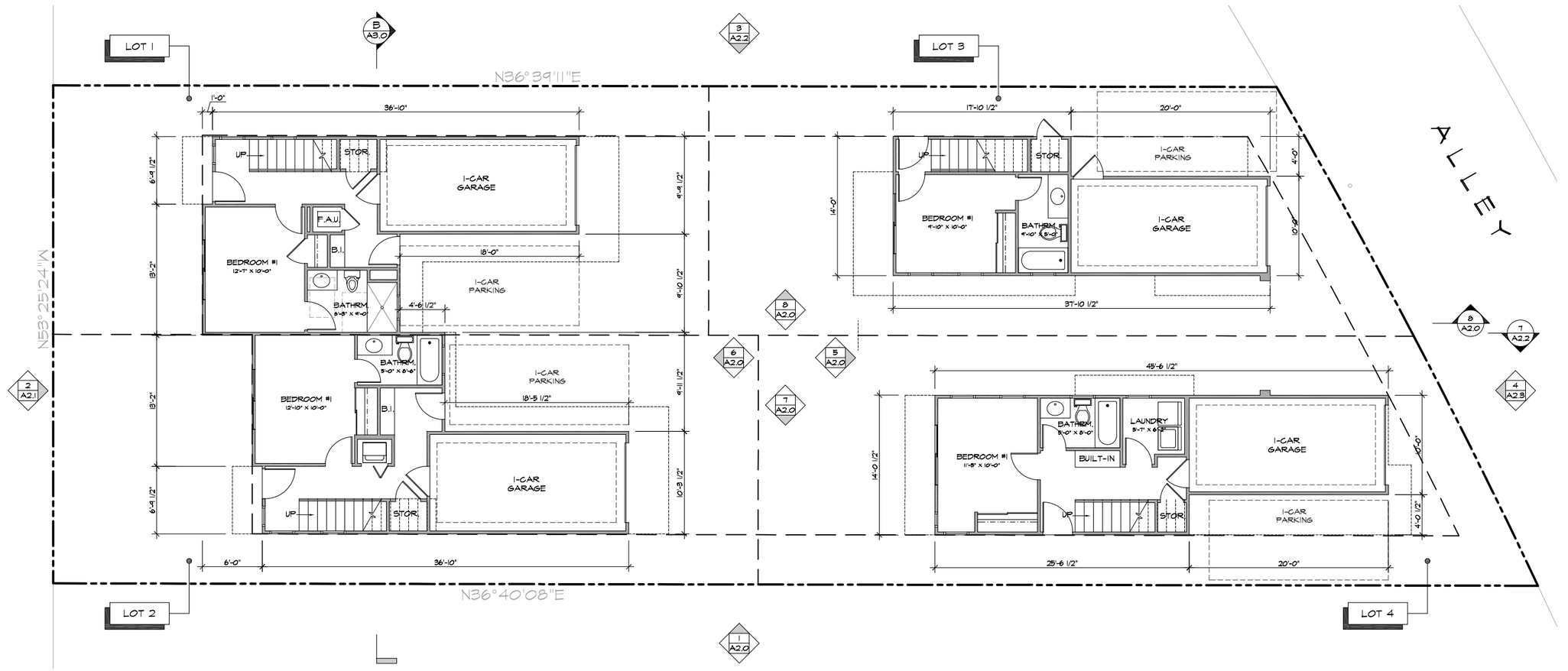
Architecture ■ Space Planning ■ Interior Design
1940 Garnet Ave, #100 San Diego California 92109
Phone: (619) 231-9905 Fax: (858) 750-3471

LOTUS STREET HOMES
5064 LOTUS STREET
SAN DIEGO, CA

REGISTERED ARCHITECT TIMOTHY J. GOLBA No. C-47338 Exp. 7-31-21 STATE OF CALIFORNIA

A 0.0

DATE: 07-09-20 REV. DATE:



FIRST FLOOR PLAN

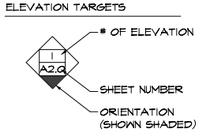
SCALE: 3/16"=1'-0"

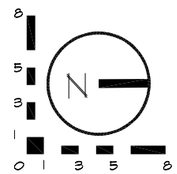
ADEQUATE NOISE ATTENUATION WILL BE PROVIDED TO ENSURE AN INTERIOR NOISE LEVEL OF 45 DB CNEL FOR ALL HABITABLE ROOMS

WALL LEGEND

- 2X4 STUD WALL
- 2X6 STUD WALL
- LOW WALL
- INDICATES LINE ABOVE
- (S)(C) SMOKE DETECTOR / CARBON MONOXIDE DETECTOR
- (X*)(X*) TEMPERED GLASS WINDOW/DOOR
- EXHAUST FAN TO PROVIDE A MIN. OF 5 AIR CHANGES/ HR. DISCHARGE TO THE OUTSIDE NO CLOSER THAN 3 FT. FROM ANY EXTERIOR OPENINGS. SEE T1.1 FOR VENTILATION NOTES.
- O D.S. DOWN SPOUT

ELEVATION TARGETS





SCALE: 3/16"=1'-0"

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Brian Britton
Golba Architecture
1940 Garnet Ave., Suite 100
San Diego, CA 92109
office: (619) 231-9905
fax: (858) 750-3471

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SAN DIEGO, CA 92107

Project Name:
LOTUS STREET HOMES

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FIRST FLOOR PLANS

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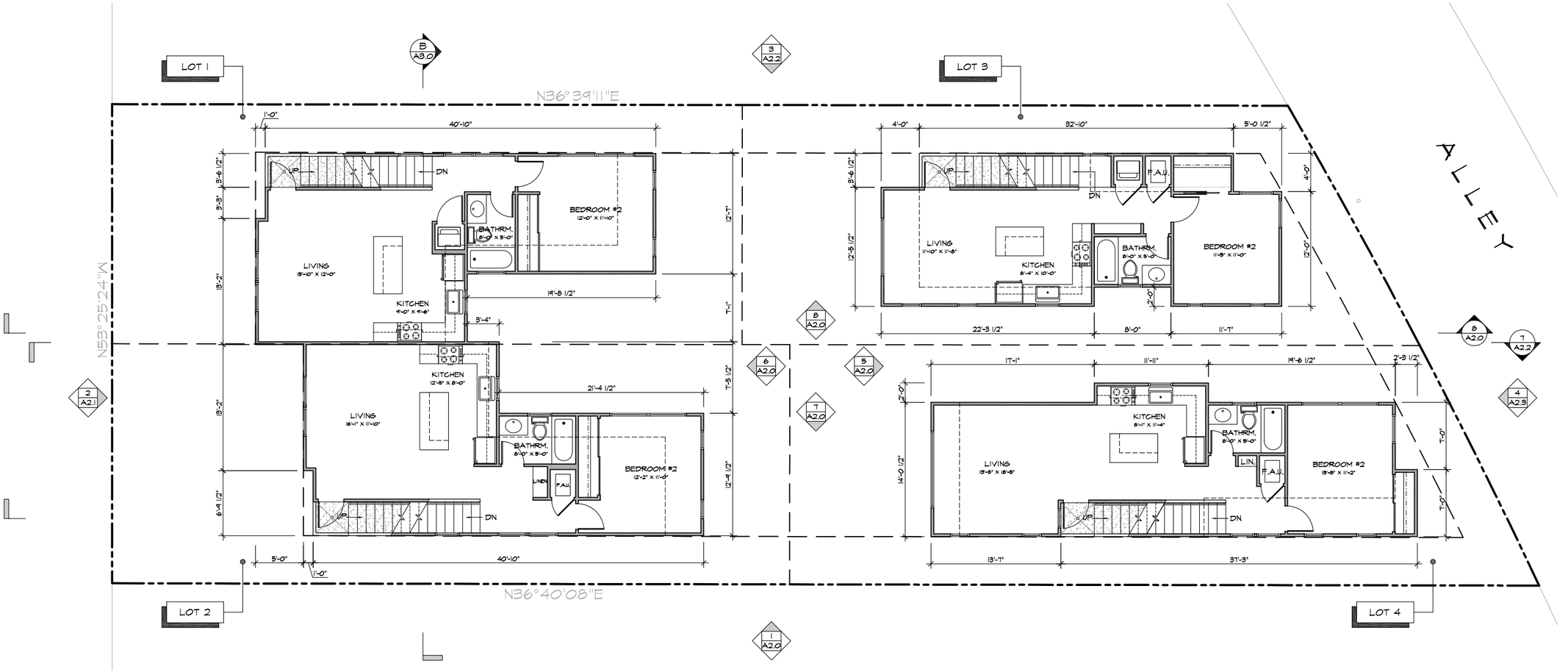
Architecture ■ Space Planning ■ Interior Design
1940 Garnet Ave, #100 San Diego California 92109
Phone: (619) 231-9905 Fax: (858) 750-3471

LOTUS STREET HOMES
5064 LOTUS STREET
SAN DIEGO, CA

REGISTERED ARCHITECT TIMOTHY J. GOLBA No. C-47138 Ren. 7-31-21 STATE OF CALIFORNIA

A 1.0

DATE: 07-09-20 REV. DATE:



SECOND FLOOR PLAN

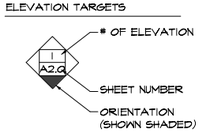
SCALE: 3/16"=1'-0"

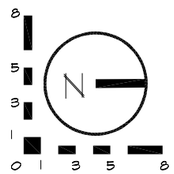
ADEQUATE NOISE ATTENUATION WILL BE PROVIDED TO ENSURE AN INTERIOR NOISE LEVEL OF 45 DB CNEL FOR ALL HABITABLE ROOMS

WALL LEGEND

- 2X4 STUD WALL
- 2X6 STUD WALL
- LOW WALL
- INDICATES LINE ABOVE
- SC — SMOKE DETECTOR / CARBON MONOXIDE DETECTOR
- X* X* — TEMPERED GLASS WINDOW/DOOR
- EXHAUST FAN TO PROVIDE A MIN. OF 5 AIR CHANGES/ HR. DISCHARGE TO THE OUTSIDE NO CLOSER THAN 3 FT. FROM ANY EXTERIOR OPENINGS. SEE T1.1 FOR VENTILATION NOTES.
- O D.S. — DOWN SPOUT

ELEVATION TARGETS





SCALE: 3/16"=1'-0"

Prepared By:
Brian Britton
Golba Architecture
1940 Garnet Ave., Suite 100
San Diego, CA 92109
office: (619) 231-9905
fax: (858) 750-3471

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Project Name:
LOTUS STREET HOMES

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SECOND FLOOR PLANS

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Architecture ■ Space Planning ■ Interior Design
1940 Garnet Ave, #100 San Diego California 92109
Phone: (619) 231-9905 Fax: (858) 750-3471

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A 1.1

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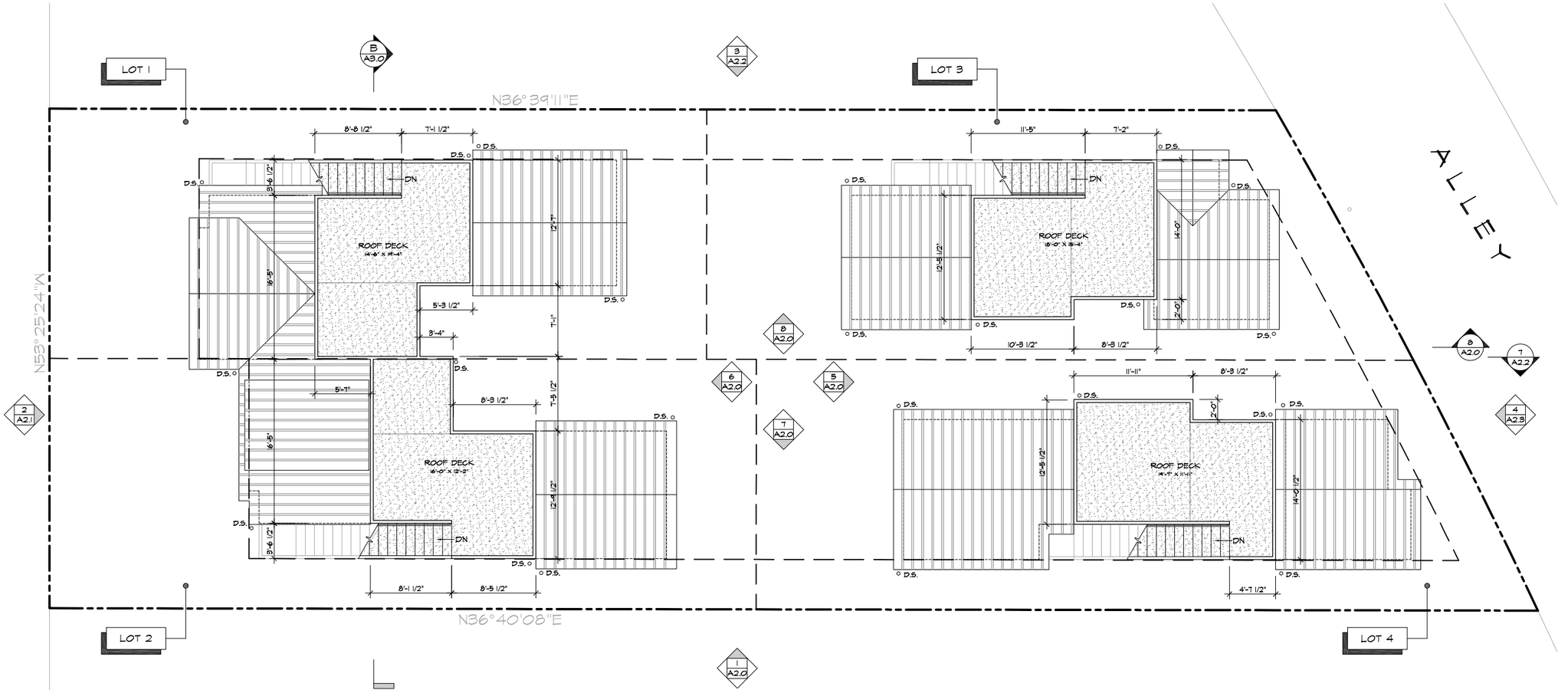


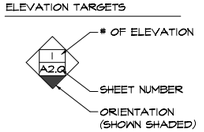
ROOF PLAN

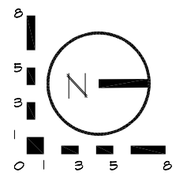
SCALE: 3/16"=1'-0"

WALL LEGEND

- 2X4 STUD WALL
- 2X6 STUD WALL
- LOW WALL
- INDICATES LINE ABOVE
- SMOKE DETECTOR / CARBON MONOXIDE DETECTOR
- TEMPERED GLASS WINDOW/DOOR
- EXHAUST FAN TO PROVIDE A MIN. OF 5 AIR CHANGES/ HR. DISCHARGE TO THE OUTSIDE NO CLOSER THAN 3 FT. FROM ANY EXTERIOR OPENING. SEE T1.1 FOR VENTILATION NOTES.
- D.S. DOWN SPOUT

ELEVATION TARGETS





SCALE: 3/16"=1'-0"

Prepared By:
Brian Britton
Golba Architecture
1940 Garnet Ave., Suite 100
San Diego, CA 92109
office: (619) 231-9905
fax: (858) 750-3471

Project Address:
5064 LOTUS ST.
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Project Name:
LOTUS STREET HOMES

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ROOF PLANS

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GOLBA ARCHITECTURE inc
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SAN DIEGO, CA

REGISTERED ARCHITECT TIMOTHY J. GOLBA No. C-47358 Ren. 7-31-21 STATE OF CALIFORNIA

A 1.2

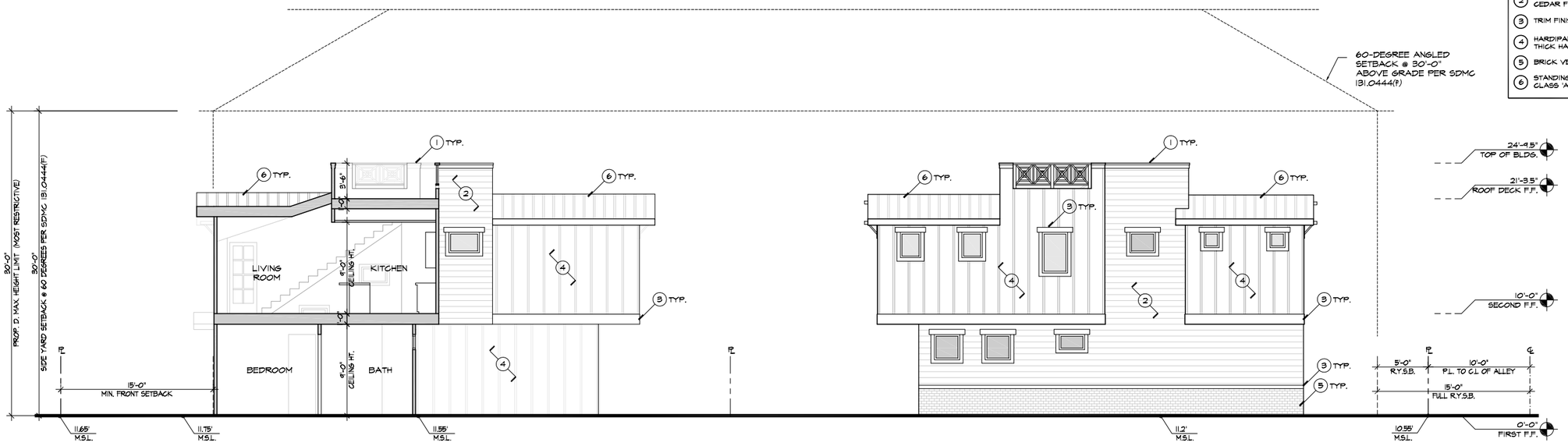
DATE: 07-09-20 REV. DATE:

ELEVATION LEGEND:

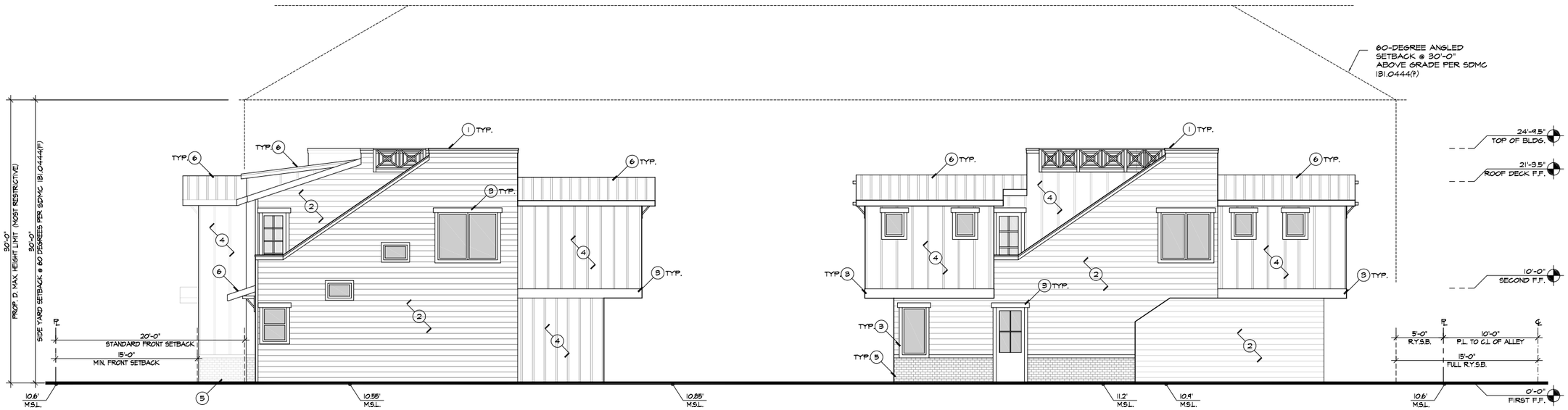
GLASS WINDOW

KEY NOTES:

1. DECK RAILING AT 42" ABOVE FINISHED FLOOR
2. 7 1/4" (6" EXPOSURE) LAP SIDING, RUSTIC CEDAR FINISH.
3. TRIM FINISH, TYP.
4. HARDIPANEL VERTICAL SIDING WITH 3/4" THICK HARDITRIM BATTEN STRIPS
5. BRICK VENEER FINISH
6. STANDING SEAM METAL ROOF PANELS. GLASS 'A' FIRE RATED ASSEMBLY, TYP.



#8 - EAST ELEVATION / SECTION



#1 - EAST ELEVATION

EAST - BUILDING ELEVATIONS

SCALE: 3/16"=1'-0"

GOLBA ARCHITECTURE inc
Architecture ■ Space Planning ■ Interior Design
1940 Garnet Ave, #100 San Diego California 92109
Phone: (619) 231-9905 Fax: (858) 750-3471

LOTUS STREET HOMES
5064 LOTUS STREET
SAN DIEGO, CA

REGISTERED ARCHITECT GEOFFRY J. GOLBA No. C41788 Ren. 11-31-21 STATE OF CALIFORNIA

DATE: 07-09-20
REV. DATE:

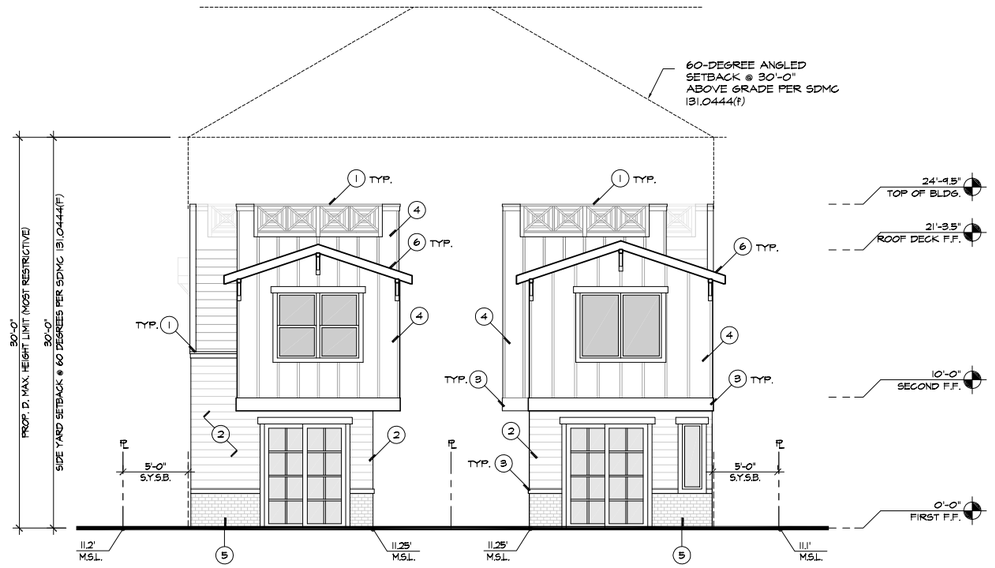
A 2.0

ELEVATION LEGEND:

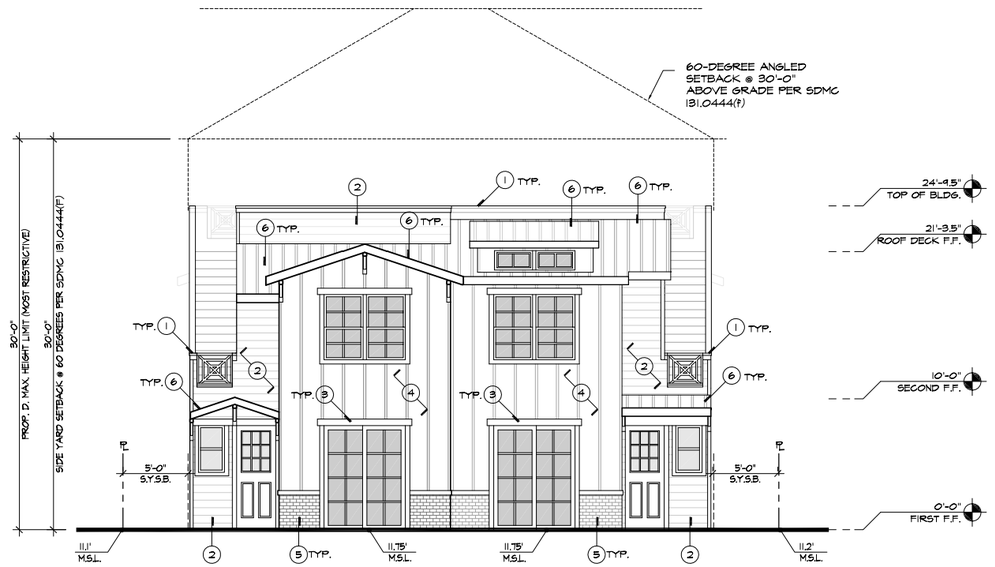
GLASS WINDOW

KEY NOTES:

1. DECK RAILING AT 42" ABOVE FINISHED FLOOR
2. 7 1/4" (6" EXPOSURE) LAP SIDING, RUSTIC CEDAR FINISH.
3. TRIM FINISH, TYP.
4. HARDIPANEL VERTICAL SIDING WITH 3/4" THICK HARDITRIM BATTEN STRIPS
5. BRICK VENEER FINISH
6. STANDING SEAM METAL ROOF PANELS. CLASS 'A' FIRE RATED ASSEMBLY, TYP.



#5 - SOUTH ELEVATION (REAR LOTS)



#2 - SOUTH ELEVATION (FRONT LOTS)

SOUTH - BUILDING ELEVATIONS

SCALE: 3/16"=1'-0"

Prepared By:
Brian Britton
Golba Architecture
1940 Garnet Ave., Suite 100
San Diego, CA 92109
office: (619) 231-9905
fax: (858) 750-3471

Project Address:
5064 LOTUS ST.
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Project Name:
LOTUS STREET HOMES

Sheet Title:
BUILDING ELEVATIONS

PTS-669302

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GOLBA ARCHITECTURE inc
Architecture ■ Space Planning ■ Interior Design
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Phone: (619) 231-9905 Fax: (858) 750-3471

LOTUS STREET HOMES
5064 LOTUS STREET
SAN DIEGO, CA

REGISTERED ARCHITECT GEOFFRY J. GOLBA No. C41786 Ren. 7-31-21 STATE OF CALIFORNIA

golba inc

A 2.1

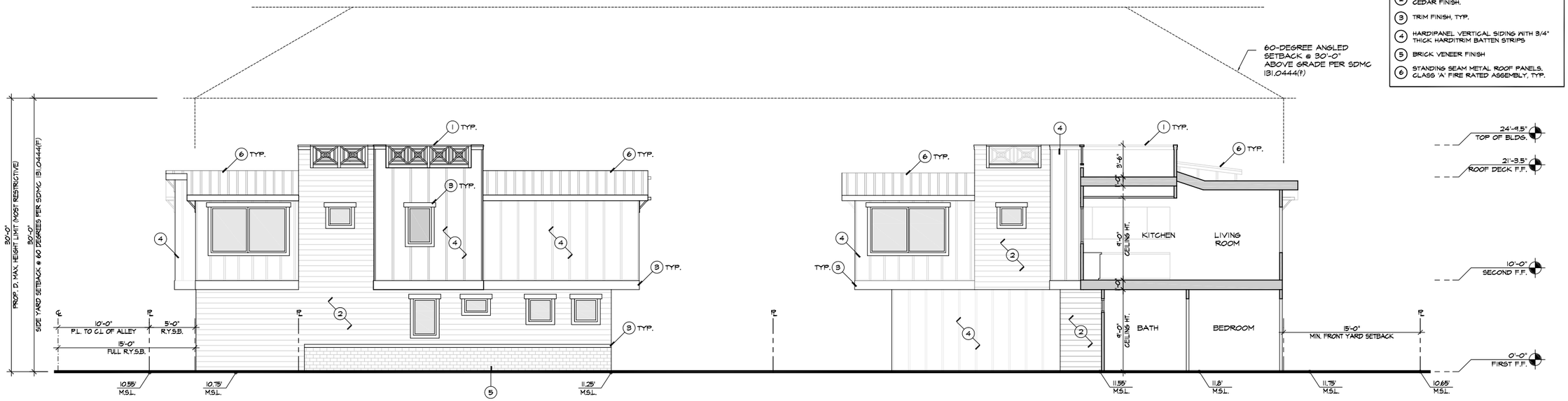
DATE: 07-09-20 REV. DATE:

ELEVATION LEGEND:

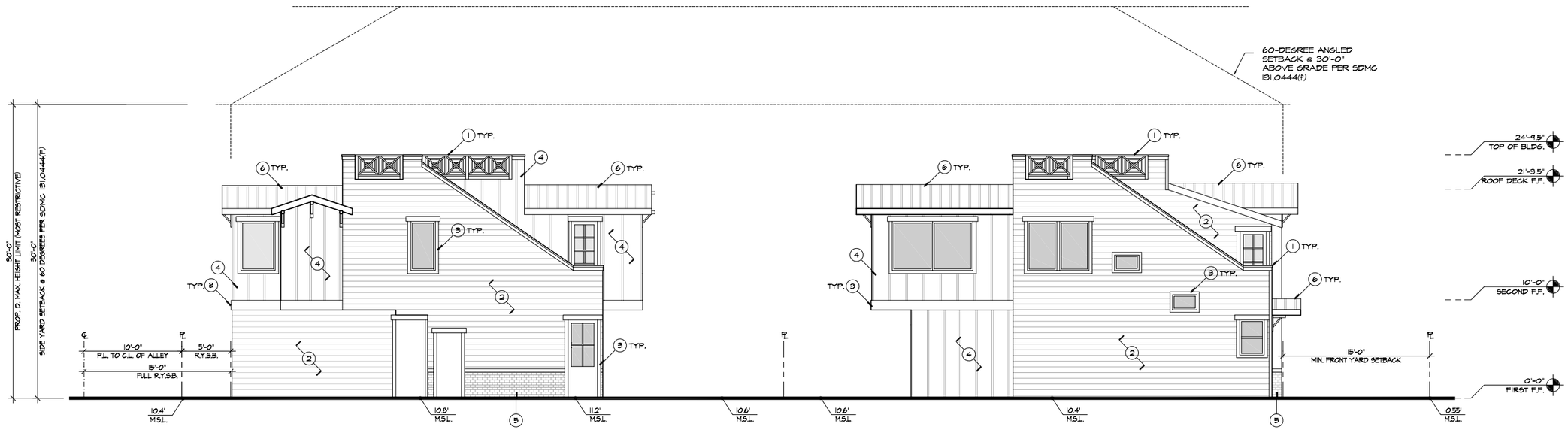
GLASS WINDOW

KEY NOTES:

1. DECK RAILING AT 42" ABOVE FINISHED FLOOR
2. 7 1/4" (6" EXPOSURE) LAP SIDING, RUSTIC CEDAR FINISH.
3. TRIM FINISH, TYP.
4. HARDIPANEL VERTICAL SIDING WITH 3/4" THICK HARDITRIM BATTEN STRIPS
5. BRICK VENEER FINISH
6. STANDING SEAM METAL ROOF PANELS, CLASS 'A' FIRE RATED ASSEMBLY, TYP.



#7 - WEST ELEVATION / SECTION



#3 - WEST ELEVATION

WEST - BUILDING ELEVATIONS

SCALE: 3/16"=1'-0"

GOLBA ARCHITECTURE inc
Architecture ■ Space Planning ■ Interior Design
1940 Garnet Ave, #100 San Diego California 92109
Phone: (619) 231-9905 Fax: (858) 750-3471

LOTUS STREET HOMES
5064 LOTUS STREET
SAN DIEGO, CA

A 2.2

DATE: 07-29-20

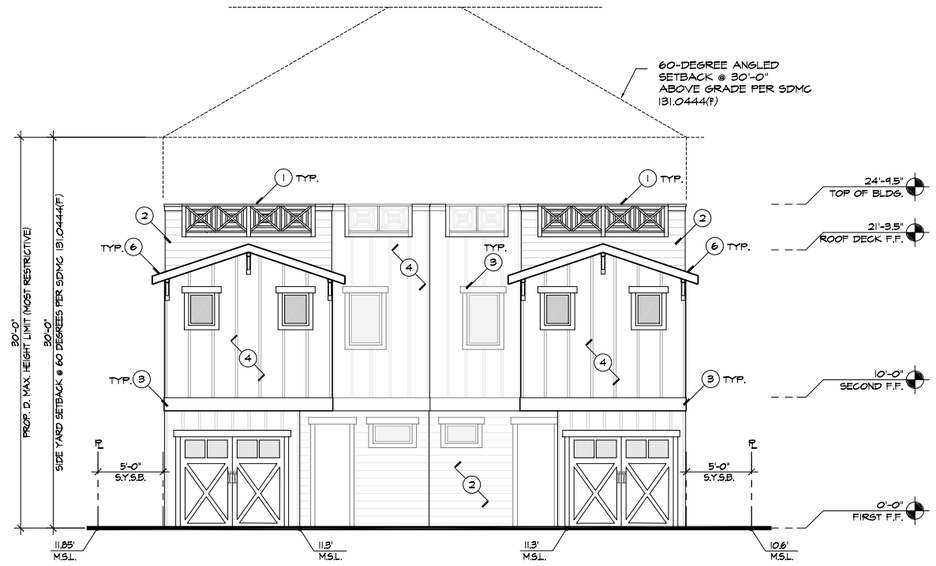
REV. DATE: △

ELEVATION LEGEND:

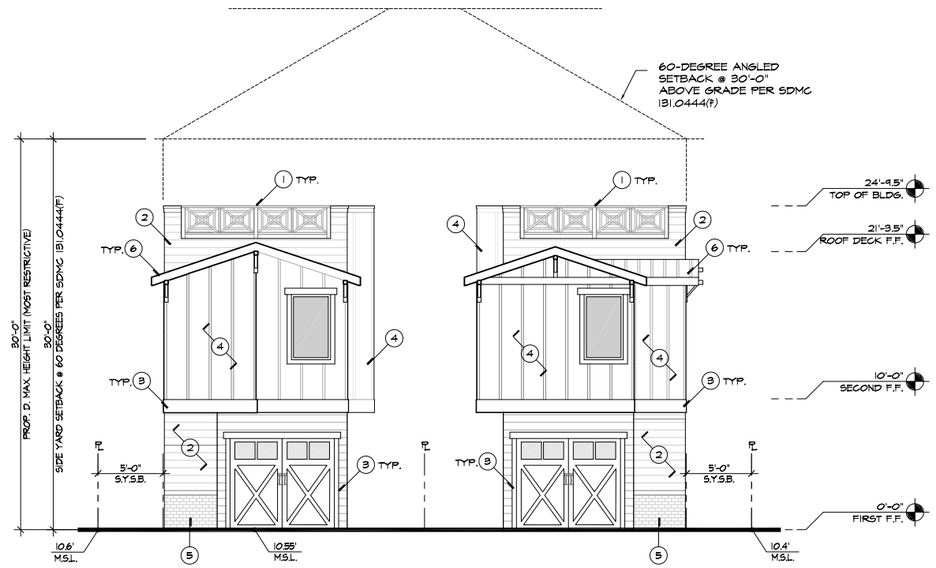
GLASS WINDOW

KEY NOTES:

1. DECK RAILING AT 42" ABOVE FINISHED FLOOR
2. 7 1/4" (6" EXPOSURE) LAP SIDING, RUSTIC CEDAR FINISH.
3. TRIM FINISH, TYP.
4. HARDIPANEL VERTICAL SIDING WITH 3/4" THICK HARDITRIM BATTEN STRIPS
5. BRICK VENEER FINISH
6. STANDING SEAM METAL ROOF PANELS. CLASS 'A' FIRE RATED ASSEMBLY, TYP.



#6 - NORTH ELEVATION (FRONT LOTS)



#4 - NORTH ELEVATION (REAR LOTS)

NORTH - BUILDING ELEVATIONS

SCALE: 3/16"=1'-0"

Prepared By:
Brian Britton
Golba Architecture
1940 Garnet Ave., Suite 100
San Diego, CA 92109
office: (619) 231-9905
fax: (858) 750-3471

Project Address:
5064 LOTUS ST.
SAN DIEGO, CA 92107

Project Name:
LOTUS STREET HOMES

Sheet Title:
BUILDING ELEVATIONS

PTS-669302

Revision 10:
Revision 9:
Revision 8:
Revision 7:
Revision 6:
Revision 5:
Revision 4:
Revision 3:
Revision 2: X
Revision 1: 09-24-20

Original Date: 07-09-20

Sheet 13 Of 16

GOLBA ARCHITECTURE inc
Architecture ■ Space Planning ■ Interior Design
1940 Garnet Ave, #100 San Diego California 92109
Phone: (619) 231-9905 Fax: (858) 750-3471

LOTUS STREET HOMES
5064 LOTUS STREET
SAN DIEGO, CA

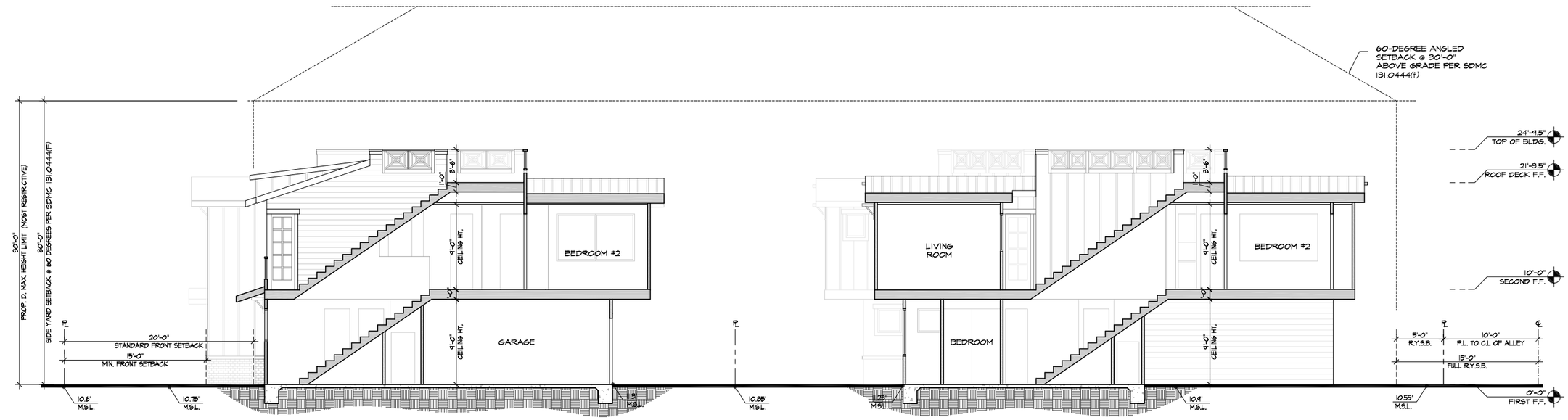
REGISTERED ARCHITECT GEOFFRY J. GOLBA No. C41786 Ren. 7-31-21 STATE OF CALIFORNIA

golba inc

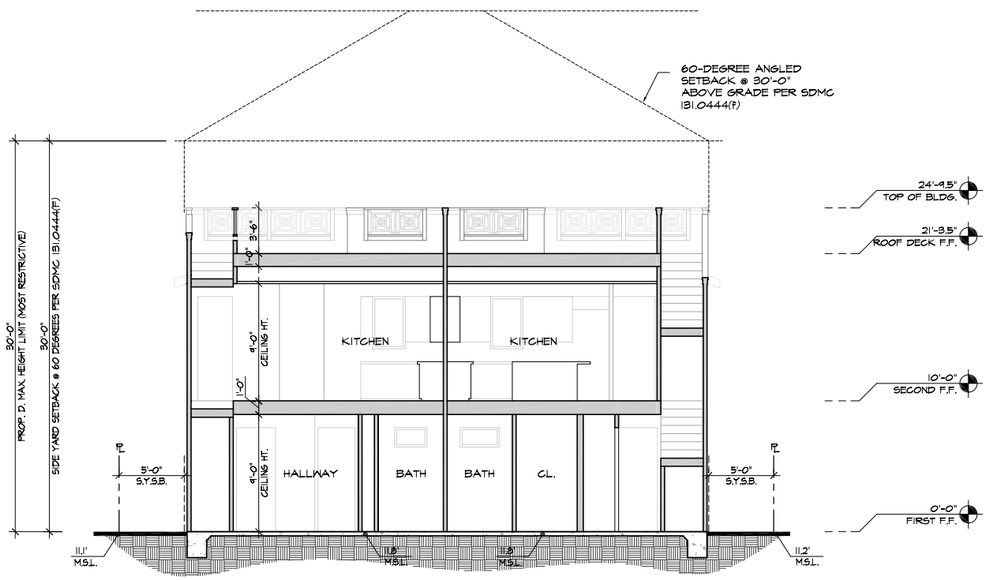
A 2.3

DATE: 07-09-20 REV. DATE: △

INSULATION
ROOF: R-30
WALL: R-15
FLOOR: R-19



SECTION - 'A'



SECTION - 'B'

BUILDING / SITE SECTIONS

SCALE: 3/16"=1'-0"

Prepared By:
Brian Britton
Golba Architecture
1940 Garnet Ave., Suite 100
San Diego, CA 92109
office: (619) 231-9905
fax: (858) 750-3471

Project Address:
5064 LOTUS ST.
SAN DIEGO, CA 92107

Project Name:
LOTUS STREET HOMES

Sheet Title:
BUILDING SECTIONS

PTS-669302

Revision 10:
Revision 9:
Revision 8:
Revision 7:
Revision 6:
Revision 5:
Revision 4:
Revision 3:
Revision 2: X
Revision 1: 09-24-20

Original Date: 07-09-20

Sheet 14 of 16

GOLBA ARCHITECTURE inc
Architecture ■ Space Planning ■ Interior Design
1940 Garnet Ave, #100 San Diego California 92109
Phone: (619) 231-9905 Fax: (858) 750-3471

LOTUS STREET HOMES
5064 LOTUS STREET
SAN DIEGO, CA

REGISTERED ARCHITECT JEFFREY J. GOLBA No. C47158 Ren. 7-31-21 STATE OF CALIFORNIA

A 3.0

DATE: 07-09-20 REV. DATE:

Eilar Associates, Inc.
Acoustical and Environmental Consulting Services

Appendix B

Applicable Noise Regulations

NE-A.2. Assure the appropriateness of proposed developments relative to existing and future noise levels by consulting the guidelines for noise-compatible land use (shown on Table NE-3) to minimize the effects on noise-sensitive land uses.

NE-A.3. Limit future residential and other noise-sensitive land uses in areas exposed to high levels of noise.

NE-A.4. Require an acoustical study consistent with Acoustical Study Guidelines (Table NE-4) for proposed developments in areas where the existing or future noise level exceeds or would exceed the "compatible" noise level thresholds as indicated on the Land Use - Noise Compatibility Guidelines (Table NE-3), so that noise mitigation measures can be included in the project design to meet the noise guidelines.

NE-A.5. Prepare noise studies to address existing and future noise levels from noise sources that are specific to a community when updating community plans.

TABLE NE-3 Land Use - Noise Compatibility Guidelines

Land Use Category	Exterior Noise Exposure (dBA CNEL)				
	60	65	70	75	
Parks and Recreational					
Parks, Active and Passive Recreation					
Outdoor Spectator Sports, Golf Courses; Water Recreational Facilities; Indoor Recreation Facilities					
Agricultural					
Crop Raising & Farming; Community Gardens, Aquaculture, Dairies; Horticulture Nurseries & Greenhouses; Animal Raising, Maintain & Keeping; Commercial Stables					
Residential					
Single Dwelling Units; Mobile Homes		45			
Multiple Dwelling Units **For uses affected by aircraft noise, refer to Policies NE-D.2. & NE-D.3.*		45	45*		
Institutional					
Hospitals; Nursing Facilities; Intermediate Care Facilities; Kindergarten through Grade 12Educational Facilities; Libraries; Museums; Child Care Facilities		45			
Other Educational Facilities including Vocational/Trade Schools and Colleges and Universities		45	45		
Cemeteries					
Retail Sales					
Building Supplies/Equipment; Food, Beverages & Groceries; Pets & Pet Supplies; Sundries, Pharmaceutical, & Convenience Sales; Wearing Apparel & Accessories			50	50	

Land Use Category	Exterior Noise Exposure (dBA CNEL)				
	60	65	70	75	
Commercial Services					
Building Services; Business Support; Eating & Drinking; Financial Institutions; Maintenance & Repair; Personal Services; Assembly & Entertainment (includes public and religious assembly); Radio & Television Studios; Golf Course Support			**50**	**50**	
Visitor Accommodations		**45**	**45**	**45**	
Offices					
Business & Professional; Government; Medical, Dental & Health Practitioner; Regional & Corporate Headquarters			**50**	**50**	
Vehicle and Vehicular Equipment Sales and Services Use					
Commercial or Personal Vehicle Repair & Maintenance; Commercial or Personal Vehicle Sales & Rentals; Vehicle Equipment & Supplies Sales & Rentals; Vehicle Parking					
Wholesale, Distribution, Storage Use Category					
Equipment & Materials Storage Yards; Moving & Storage Facilities; Warehouse; Wholesale Distribution					
Industrial					
Heavy Manufacturing; Light Manufacturing; Marine Industry; Trucking & Transportation Terminals; Mining & Extractive Industries					
Research & Development				**50**	

	Compatible	**Indoor Uses**	Standard construction methods should attenuate exterior noise to an acceptable indoor noise level. Refer to Section I.
		Outdoor Uses	Activities associated with the land use may be carried out.
45, 50	**Conditionally Compatible**	**Indoor Uses**	Building structure must attenuate exterior noise to the indoor noise level indicated by the number (45 or 50) for occupied areas. Refer to Section I.
		Outdoor Uses	Feasible noise mitigation techniques should be analyzed and incorporated t make the outdoor activities acceptable. Refer to Section I.
	Incompatible	**Indoor Uses**	New construction should not be undertaken.
		Outdoor Uses	Severe noise interference makes outdoor activities unacceptable.

Section 1206 Sound Transmission

1206.1 Scope

This section shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent *dwelling units* and *sleeping units* or between *dwelling units* and *sleeping units* and adjacent public areas such as halls, *corridors*, *stairways* or *service areas*.

1206.2 Airborne sound

Walls, partitions and floor-ceiling assemblies separating *dwelling units* and *sleeping units* from each other or from public or service areas shall have a sound transmission class of not less than 50, or not less than 45 if field tested, for airborne noise where tested in accordance with ASTM E90. Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. This requirement shall not apply to entrance doors; however, such doors shall be tight fitting to the frame and sill.

1206.2.1 Masonry

The sound transmission class of concrete masonry and clay masonry assemblies shall be calculated in accordance with TMS 0302 or determined through testing in accordance with ASTM E90.

1206.3 Structure-borne sound

Floor-ceiling assemblies between *dwelling units* and *sleeping units* or between a *dwelling unit* or *sleeping unit* and a public or service area within the structure shall have an impact insulation class rating of not less than 50, or not less than 45 if field tested, where tested in accordance with ASTM E492. Alternatively, the impact insulation class of floor-ceiling assemblies shall be established by engineering analysis based on a comparison of floor-ceiling assemblies having impact insulation class ratings as determined by the test procedures in ASTM E492.

Exception: Impact sound insulation is not required for floor-ceiling assemblies over nonhabitable rooms or spaces not designed to be occupied, such as garages, mechanical rooms or storage areas.

1206.4 Allowable interior noise levels

Interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room. The noise metric shall be either the day-night average sound level (Ldn) or the community noise equivalent level (CNEL), consistent with the noise element of the local general plan.

1206.5 Acoustical control

[BSC-CG] See *California Green Building Standards Code*, Chapter 5, Division 5.5 for additional sound transmission requirements.

Article 9.5: Noise Abatement and Control

Division 4: Limits

("Noise Level Limits, Standards and Control"
added 9–18–1973 by O–11122 N.S.)
(Retitled to "Limits" on 9–22–1976 by O–11916 N.S.)

§59.5.0401 Sound Level Limits

(a) It shall be unlawful for any person to cause noise by any means to the extent that the one–hour average sound level exceeds the applicable limit given in the following table, at any location in the City of San Diego on or beyond the boundaries of the property on which the noise is produced. The noise subject to these limits is that part of the total noise at the specified location that is due solely to the action of said person.

TABLE OF APPLICABLE LIMITS

Land Use	Time of Day	One-Hour Average Sound Level (decibels)
1. Single Family Residential	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	50 45 40
2. Multi-Family Residential (Up to a maximum density of 1/2000)	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	55 50 45
3. All other Residential	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	60 55 50
4. Commercial	7 a.m. to 7 p.m. 7 p.m. to 10 p.m. 10 p.m. to 7 a.m.	65 60 60
5. Industrial or Agricultural	any time	75

(b) The sound level limit at a location on a boundary between two zoning districts is the arithmetic mean of the respective limits for the two districts. Permissible construction noise level limits shall be governed by Sections 59.5.0404 of this article.

(c) Fixed–location public utility distribution or transmission facilities located on or adjacent to a property line shall be subject to the noise level limits of Part A. of this section, measured at or beyond six feet from the boundary of the easement upon which the equipment is located.

(d) This section does not apply to firework displays authorized by permit from the Fire Department.

(e) This section does not apply to noise generated by helicopters at heliports or helistops authorized by a conditional use permit, nor to any roller coaster operated on City–owned parkland.

(Amended 9–11–1989 by O–17337 N.S.)
(Amended 11-28-2005 by O-19446 N.S.; effective 2-9-2006.)

§59.5.0402 Motor Vehicles

(a) Off–Highway

(1) Except as otherwise provided for in this article, it shall be unlawful to operate any motor vehicle of any type on any site, other than on a public street or highway as defined in the California Vehicle Code, in any manner so as to cause noise in excess of those noise levels permitted for on– highway motor vehicles as specified in the table for "45 mile– per–hour or less speed limits" contained in Section 23130 of the California Vehicle Code, and as corrected for distances set forth in subsection A.2. below.

(2) Corrections

The maximum noise level as the off–highway vehicle passes may be measured at a distance of other than fifty (50) feet from the center line of travel, provided the measurement is further adjusted by adding algebraically the applicable correction as follows:

California Environmental Quality Act

Significance Determination Thresholds

Development Services Department

City of San Diego
Development Services

Land Development
Review Division
(619) 446-5460

JANUARY 2011*

***Note:** Development Services Department staff periodically revises sections of the thresholds in response to CEQA case law, and changes in federal, state, and local regulations. Staff also periodically provides updated information and clarification and direction for environmental analysts.

Table K-1
RELATIVE LOUDNESS

Sound Level Change	Acoustic Energy Change	Relative Loudness
0 dB	0	Reference Point
3 dB	50 %	Perceptible Change
10 dB	90 %	Twice as Loud
20 dB	99 %	Four Times as Loud
30 dB	99.9 %	Eight Times as Loud
40 dB	99.99 %	Sixteen Times as Loud

Source: Miller 1989 pg. 1-6

Noise Level
The same as sound level. The terms may be used interchangeably.

Sound Level
In decibels, that quantity measured with a sound level meter as defined herein, by use of the "A" frequency weighting and "fast" time averaging unless some other time averaging is specified.

Sound Level Meter
An instrument for the measurement of sound, including a microphone, an amplifier, an attenuator, networks at least for standardized frequency weighting A, and an indicating instrument having at least the standardized dynamic characteristic "fast," as specified in American National Standard Specification for Sound Level Meters S1. 4-1971 or its successor.

INITIAL STUDY CHECKLIST QUESTIONS

The following questions are from the City's Initial Study Checklist and are used to provide guidance to determine potential significant impacts related to Noise:

Would the project:

1. Result or create a significant increase in the existing ambient noise levels?

2. Exposure of people to noise levels which exceed the City's adopted noise ordinance or are incompatible with Table K-4?

3. Exposure of people to current or future transportation noise levels which exceed standards established in the Transportation Element of the General Plan or an adopted airport Comprehensive Land Use Plan?

4. Result in land uses which are not compatible with aircraft noise levels as defined by an adopted airport Comprehensive Land Use Plan (CLUP)?

SIGNIFICANCE THRESHOLDS

1. Interior and Exterior Noise Impacts from Traffic Generated Noise (Table K-2 below provides the general thresholds of significance for uses affected by traffic noise.)

Table K-2
TRAFFIC NOISE SIGNIFICANCE THRESHOLDS
(db(A) CNEL)

Structure or Proposed Use that would be impacted by Traffic Noise	Interior Space	Exterior Useable Space [22]	General Indication of Potential Significance
Single-family detached	45 dB	65 Db	Structure or outdoor useable area[23] is < 50 feet from the center of the closest (outside) lane on a street with existing or future ADTs > 7500 [24]
Multi-family, schools, libraries, hospitals, day care, hotels, motels, parks, convalescent homes.	- Development Services Department (DSD) ensures 45 dB pursuant to Title 24	65 dB	
Offices, Churches, Business, Professional Uses	n/a	70 dB	Structure or outdoor usable area is < 50 feet from the center of the closest lane on a street with existing or future ADTs > 20,000
Commercial, Retail, Industrial, Outdoor Spectator Sports Uses	n/a	75 dB	Structure or outdoor usable area is < 50 feet from the center of the closest lane on a street with existing or future ADTs > 40,000

Source: 1) City of San Diego Acoustical Report Guidelines (December 2003) and 2) City of San Diego Progress Guide and General Plan (Transportation Element)

2. HUD-Funded projects and Noise

   If a project is receiving U.S. Department of Housing and Urban Development (HUD) funding, noise analysis and mitigation must be in accordance with the HUD Noise Guidebook[25] Minimum attenuation requirements are prescribed in Title 24 of the Code of

[22] If a project is currently at or exceeds the significance thresholds for traffic noise described above and noise levels would result in less than a 3 dB increase, then the impact is not considered significant.

[23] Exterior usable areas do not include residential front yards or balconies, unless the areas such as balconies are part of the required usable open space calculation for multi-family units.

[24] Traffic counts are available from:

- San Diego Regional Association of Governments (SANDAG) Regional Economic Development Information
- System (**REDI**): http://cart.sandag.cog.ca.us/REDI/
- **SANDAG Traffic Forecast Information Center**: http://pele.sandag.org/trfic.html

[25] http://www.hud.gov/offices/cpd/energyenviron/environment/resources/guidebooks/noise/index.cfm

Federal Regulations[26] (24 CFR 51.104(a)) which are the HUD Environmental Criteria and Standards.

3. Airport Noise Impacts

If the project is proposed within the Airport Environs Overlay Zone (AEOZ) as defined in Chapter 13, Article 2, Division 3 of the San Diego Municipal Code, the potential exterior noise impacts from aircraft noise would not constitute a significant environmental impact.

However, interior noise impacts will be regulated by the requirement for residential development within the AEOZ to reduce interior noise levels attributable to airport noise to 45 dB Community Noise Equivalent Level (CNEL). Interior noise levels for new construction of multi-family units are addressed by the Building Development Review Division (BDR) of the City's Development Services Department (DSD) and do not need to be mitigated through conditions in the environment report, but the BDR requirements should be noted. BDR requires additional insulation and upgraded building materials so that interior noise levels do \not exceed 45 dB(A) CNEL. The requirements for an acoustical testing are defined in the City of San Diego Municipal Code, Chapter 13, Article 2, Division 3, §132.0308, "Acoustical Testing of Interior Noise Levels."

Requirements for noise studies are found in the Municipal Code at Chapter 13, Article 2, Division 3, §132.0308. This section of the municipal code applies to "development" as defined at, § 113.0103 to include "constructing, reconstructing, converting, establishing, altering, maintaining, relocating, demolishing, using, or enlarging any building, structure, improvement, lot, or premises."

Remodels and additions to single-family and multi-family residences subject to airport noise levels above 65 dB (A) CNEL ordinarily would not be considered a significant issue and a noise study would not be required for the purposes of CEQA analysis. However, new construction of hospitals, schools, day care centers, or other sensitive uses subject to airport noise levels in excess of 65 dB(A) CNEL would be considered a significant issue and a noise study would be required that could recommend measures to mitigate potential noise impacts to a level below significance. Table K-3 below addresses the general impacts from airport noise thresholds.

[26] http://www.access.gpo.gov/nara/cfr/cfr-table-search.html#page1

Table K-3
IMPACTS FROM AIRPORT NOISE

Structure or Proposed Use that would be impacted by Airport Noise	Regulation
Structure within an AEOZ	Exterior noise is one factor in determining land use compatibility. See Table K-4 and the applicable Comprehensive Land Use Plan (CLUP).
New Single Family and Multi-family	Building Development Review Division (BDR) of Development Services Department (DSD) ensures 45 dB interior noise levels. Discuss Airport noise impact & BDR requirements (insulation and upgraded building materials to ensure 45 dB(A) CNEL) in environmental document See also **§ 132.0309 Requirement for Avigation Easement**
Remodels and additions to existing single and multi-family	Noise study & mitigation **not required** for airport noise > 65 dB(A) CNEL. See also **§ 132.0309 Requirement for Avigation Easement**. For development within the 60 dB CNEL contour of Lindbergh Field the applicant must demonstrate that indoor noise levels that are attributable to airport operations shall not exceed 45 dB. Refer to § 132.0306 of the Municipal Code.
New construction of hospitals, schools, day care centers or other sensitive uses	Noise study and mitigation **required** for airport noise > 65 dB(A) CNEL. See also § **132.0309 Requirement for Avigation Easement.**

4. Noise from Adjacent Stationary Uses (Noise Generators)

   A project which would generate noise levels at the property line which exceed the City's Noise Ordinance Standards is considered potentially significant (such as potentially a carwash or projects operating generators or noisy equipment).

   If a non-residential use, such as a commercial, industrial or school use, is proposed to abut an existing residential use, the decibel level at the property line should be the arithmetic mean of the decibel levels allowed for each use as set forth in Section 59.5.0401 of the Municipal Code. Although the noise level above could be consistent with the City's Noise Ordinance Standards, a noise level above 65 dB (A) CNEL at the residential property line could be considered a significant environmental impact.

1. Impacts to Sensitive Wildlife

   Noise mitigation may be required for significant noise impacts to certain avian species during their breeding season, depending upon the location of the project such as in or adjacent to an MHPA, whether or not the project is occupied by the California gnatcatcher, least Bell's vireo, southern willow flycatcher, least tern, cactus wren, tricolored blackbird or western snowy plover, and whether or not noise levels from the project, including construction during the breeding season of these species would exceed 60dB(A) or existing ambient noise level if above 60dB(A). In addition, please note that significant noise impacts to the California gnatcatcher are only analyzed if the project is within an MHPA; there are no restrictions for the gnatcatcher outside the MHPA any time of year. Please see Biological Resources Section, Step 2, Note (f).

6. Temporary Construction Noise

   Temporary construction noise which exceeds 75 dB (A) L_{eq} at a sensitive receptor would be considered significant. Construction noise levels measured at or beyond the property lines of any property zoned residential shall not exceed an average sound level greater than 75-decibles (dB) during the 12-hour period from 7:00 a.m. to 7:00 p.m. In addition, construction activity is prohibited between the hours of 7:00 p.m. of any day and 7:00 a.m. of the following day, or on legal holidays as specified in Section 21.04 of the San Diego Municipal Code, with exception of Columbus Day and Washington's Birthday, or on Sundays, that would create disturbing, excessive, or offensive noise unless a permit has been applied for and granted beforehand by the Noise Abatement and Control Administrator, in conformance with San Diego Municipal Code Section 59.5.0404.

   Additionally, where temporary construction noise would substantially interfere with normal business communication, or affect sensitive receptors, such as day care facilities, a significant noise impact may be identified.

7. Noise/Land Use Compatibility

   Noise is one factor to be considered in determining whether a land use is compatible. Land use compatibility noise factors are presented in Table K-4. Compatible land uses are shaded. Incompatible land uses are unshaded. The transition zone between compatible and incompatible should be evaluated by the environmental planner to determine whether the use would be acceptable based on all available information and the extent to which the noise from the proposed project would affect the surrounding uses.

Eilar Associates, Inc.
Acoustical and Environmental Consulting Services

Appendix C

Manufacturer Data Sheets

25HBC5
Comfort™15 Heat Pump with Puron®Refrigerant 1-1/2 to 5 Nominal Tons

turn to the experts

Product Data

Carrier heat pumps with Puron® refrigerant provide a collection of features unmatched by any other family of equipment. The 25HBC has been designed utilizing Carrier's non-ozone depleting Puron refrigerant.

This product has been designed and manufactured to meet Energy Star® criteria for energy efficiency when matched with appropriate coil components. Refer to the AHRI directory for system combinations that meet Energy Star® guidelines.

NOTE: Ratings contained in this document are subject to change at any time. Always refer to the AHRI directory (www.ahridirectory.org) for the most up-to-date ratings information.

Industry leading Features / Benefits

Efficiency

- 14.0 - 16.0 SEER/ 11.0-13.0 EER / 8.2 - 9.0 HSPF
- Microtube Technologyt refrigeration system
- Indoor air quality accessories available

Sound

- Sound level as low as 69 dBA
- Sound levels as low as 68 dBA with accessory sound blanket

Comfort

- System supports Thermidistat or standard thermostat controls

Reliability

- Non-ozone depleting Puron® refrigerant
- Scroll compressor
- Internal pressure relief valve
- Internal thermal overload
- Loss of charge switch
- Filter drier
- Balanced refrigeration system for maximum reliability

Durability

WeatherArmor Ultra™ protection package:

- Solid, durable sheet metal construction
- Dense wire coil guard standard
- Baked-on powder paint

Applications

- Long-line - up to 250 feet (76.20 m) total equivalent length, up to 200 feet (60.96 m) condenser above evaporator, or up to 80 ft. (24.38 m) evaporator above condenser (See Longline Guide for more information.)
- Low ambient cooling (down to -10_F/-23_C) with accessory kit

Electrical Data

UNIT SIZE	V/PH	OPER VOLTS*		COMPR		FAN	MCA	MAX FUSE† or BRK AMPS
		MAX	MIN	LRA	RLA	FLA		
18-30	208/230/1	253	197	48.0	9.0	0.50	11.8	20
24-30				58.3	12.8	0.50	16.5	25
30-30				73.0	14.1	0.50	18.1	30
37-30				75.0	16.8	0.60	21.6	35
42-30				109.0	21.1	1.20	27.6	40
48-31				130.0	24.4	1.30	31.8	45
60-30				134.0	26.4	1.20	34.2	50
61-30				152.5	24.9	2.80	33.9	50

*. Permissible limits of the voltage range at which the unit will operate satisfactorily
†. Time-Delay fuse.
FLA-Full Load Amps
LRA-Locked Rotor Amps
MCA- Minimum Circuit Amps
RLA-Rated Load Amps
NOTE: Control circuit is 24-V on all units and requires external power source. Copper wire must be used from service disconnect to unit.
All motors/compressors contain internal overload protection.
Complies with 2007 requirements of ASHRAE Standards 90.1

A-Weighted Sound Power (dBA)

UNIT SIZE	STANDARD RATING dBA	TYPICAL OCTAVE BAND SPECTRUM (dB, without tone adjustment)						
		125	250	500	1000	2000	4000	8000
18	73	49.5	60.0	65.0	69.0	65.5	62.0	55.0
24	69	48.5	59.5	61.5	62.5	61.0	59.0	53.5
30	71	51.0	58.5	61.5	65.5	62.5	60.0	53.5
37	72	67.7	66.8	68.1	69.9	62.8	60.3	55.2
42	74	56.5	64.0	67.0	68.5	65.0	62.0	57.5
48	73	67.5	67.8	70.1	70.6	63.1	58.5	53.3
60	74	59.0	62.0	65.0	68.0	65.0	62.5	62.0
61	70	61.7	65.6	68.1	65.8	59.8	58.4	56.1

NOTE: 37 size tested in accordance with AHRI Standard 270-2008 (not listed in AHRI). All other sizes tested in accordance with AHRI Standard 270-1995 (not listed in AHRI).

A-Weighted Sound Power (dBA) with Accessory Sound Shield

UNIT SIZE	STANDARD RATING dBA	TYPICAL OCTAVE BAND SPECTRUM (dB, without tone adjustment)						
		125	250	500	1000	2000	4000	8000
18	72	50.5	60.0	65.0	67.5	64.5	61.5	53.5
24	68	49.5	58.5	61.5	62.0	61.0	58.5	51.5
30	69	50.5	58.5	61.5	64.0	61.5	58.5	51.5
37	71	68.2	66.4	67.5	68.4	59.6	58.2	52.4
42	72	56.5	64.5	66.5	66.5	64.5	61.0	54.5
48	71	68.4	67.7	69.7	67.6	59.4	56.4	50.0
60	73	58.5	62.5	65.0	67.0	64.0	61.0	56.5
61	69	63.7	65.4	67.3	64.9	58.3	56.2	51.9

NOTE: 37 size tested in accordance with AHRI Standard 270-2008 (not listed in AHRI). All other sizes tested in accordance with AHRI Standard 270-1995 (not listed in AHRI).

Charging Subcooling (TXV-Type Expansion Device)

UNIT SIZE-SERIES	REQUIRED SUBCOOLING °F (°C)
18	12 (6.7)
24	13 (7.2)
30	10 (5.6)
37	10 (5.6)
42	12 (6.7)
48	9 (5.0)
60	13 (7.2)
61	7 (3.9)

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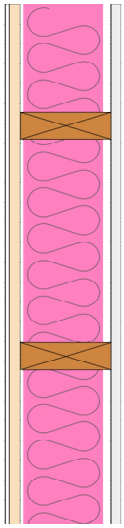
Appendix D

Sound Insulation Prediction Results

Sound Insulation Prediction (v9.0.20)

Margin of error is generally within STC ±3 dB
- Key No. 1866
Job Name: Lotus Street Homes
Job No.: S200901 Initials: mouwenga
Date:9/23/2020
File Name:exterior wall.ixl

Notes: Exterior Wall



STC 33
OITC 25

Mass-air-mass resonant frequency = =52 Hz

Panel Size = 8.9 ft x 13.1 ft

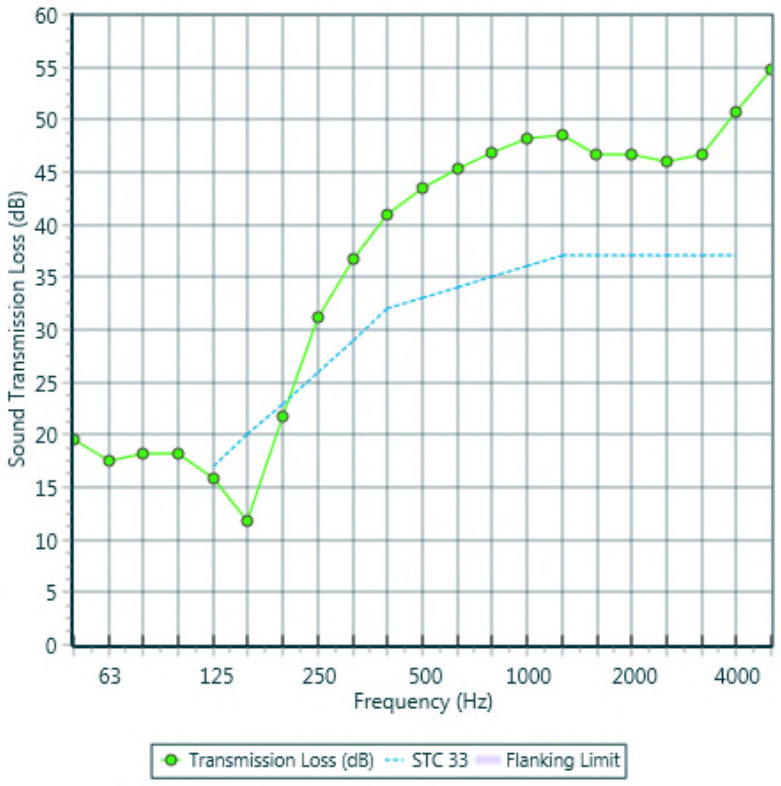
Partition surface mass = 6.53 lb/ft2

System description

Panel 1 : 1 x 0.248 in Fibre Cement + 1 x 0.689 in Plywood

Frame: Timber stud (5.7 in x 1.8 in), Stud spacing 16 in ; Cavity Width 5.67 in , 1 x fiberglass (0.6 lb/ft3) Thickness 5.0 in
Panel 2 : 1 x 0.626 in Type X Gypsum Board

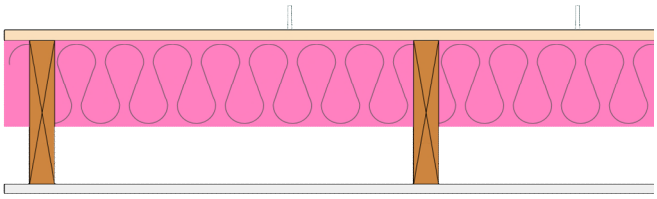
freq.(Hz)	TL(dB)	TL(dB)
50	20	
63	18	18
80	18	
100	18	
125	16	14
160	12	
200	22	
250	31	26
315	37	
400	41	
500	43	43
630	45	
800	47	
1000	48	48
1250	49	
1600	47	
2000	47	46
2500	46	
3150	47	
4000	51	50
5000	55	



Sound Insulation Prediction (v9.0.20)

Margin of error is generally within STC ±3 dB
- Key No. 1866
Job Name: Lotus Street Homes
Job No.: S200901 Initials: mouwenga
Date:9/23/2020
File Name:roof.ixl

Notes: Roof



STC 45
OITC 26

Mass-air-mass resonant frequency = =41 Hz

Panel Size = 8.9 ft x 13.1 ft

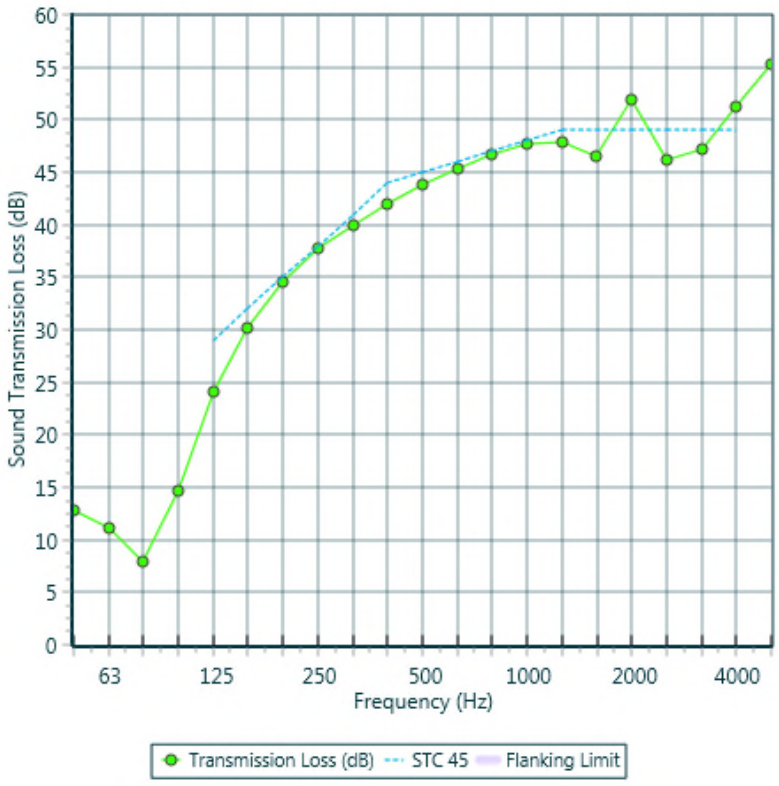
Partition surface mass = 5.73 lb/ft2

System description

Panel 1 : 1 x 0.024 in Steel Roofing (LokSeam) + 1 x 0.689 in Plywood

Frame: Timber stud (10 in x 1.6 in), Stud spacing 24 in ; Cavity Width 10 in , 1 x fiberglass (0.6 lb/ft3) Thickness 6.0 in
Panel 2 : 1 x 0.626 in Type X Gypsum Board

freq.(Hz)	TL(dB)	TL(dB)
50	13	
63	11	10
80	8	
100	15	
125	24	19
160	30	
200	34	
250	38	37
315	40	
400	42	
500	44	43
630	45	
800	47	
1000	48	47
1250	48	
1600	46	
2000	52	48
2500	46	
3150	47	
4000	51	50
5000	55	



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Appendix E

Exterior-to-Interior Noise Analysis

EXTERIOR TO INTERIOR NOISE REDUCTION ANALYSIS

Project Name: Lotus Street Homes
Project #: S200901
Room Name: Living - Kitchen

Wall 1 of 4

Room Type : **Medium Soft**

	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Reverberation Time (sec) :	0.6	0.6	0.6	0.6	0.5	0.5	: Moderately Absorptive Room
Room Absorption (Sabins) :	259	259	259	259	310	310	

		Noise Level		125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Source 1:	**Aircraft**	**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Aircraft Spectrum
Source 2:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 3:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 4:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Overall:		**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Effective Noise Spectrum

Assembly Type	Open	Width	Height	Qty	Total Area	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
STC 33 Exterior Fiber Cement Wall	N	32	9	1	281.0	14	26	43	48	46	50
STC 28 1/2-inch Dual Insulating Window	Y	2	3.5	1	7.0	23	23	22	32	43	37
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0

Room Depth: **11** ft **Overall Area:** **288** ft²
Volume: **3168** ft³

Number of Impacted Walls: **4**

Windows Open Interior Noise Level:	**53.9**	**dBA**
Windows Closed Interior Noise Level:	**42.7**	**dBA**

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
12.9	18.3	19.1	19.1	19.1	19.1	: Transmission Loss
24.6	24.6	24.6	24.6	24.6	24.6	: Wall Surface Area Factor
24.1	24.1	24.1	24.1	24.9	24.9	: Absorption
37.3	40.4	42.1	40.1	36.3	30.3	: Noise Level
46.8	**dBA**	WINDOWS OPEN				

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
14.1	25.9	37.0	45.3	45.9	48.5	: Transmission Loss
24.6	24.6	24.6	24.6	24.6	24.6	: Wall Surface Area Factor
24.1	24.1	24.1	24.1	24.9	24.9	: Absorption
36.1	32.8	24.2	13.9	9.5	1.0	: Noise Level
38.0	**dBA**	WINDOWS CLOSED				

EXTERIOR TO INTERIOR NOISE REDUCTION ANALYSIS

Project Name: Lotus Street Homes **Wall 2 of 4**
Project #: S200901
Room Name: Living - Kitchen

		Noise Level		125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Source 1:	**Aircraft**	**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Aircraft Spectrum
Source 2:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 3:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 4:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Overall:		**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Effective Noise Spectrum

Assembly Type	Open	Width	Height	Qty	Total Area	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
STC 33 Exterior Fiber Cement Wall	N	31	9	1	240.0	14	26	43	48	46	50
STC 28 1/2-inch Dual Insulating Window	Y	2	2.5	3	15.0	23	23	22	32	43	37
STC 28 French Door with seals	N	3	8	1	24.0	23	23	22	32	43	37
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0

Overall Area: **279** ft²

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
12.1	15.3	15.6	15.7	15.7	15.7	: Transmission Loss
24.5	24.5	24.5	24.5	24.5	24.5	: Wall Surface Area Factor
24.1	24.1	24.1	24.1	24.9	24.9	: Absorption
38.0	43.3	45.5	43.4	39.6	33.6	: Noise Level
49.8	**dBA**	WINDOWS OPEN				

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
14.6	25.4	30.4	40.2	45.3	44.6	: Transmission Loss
24.5	24.5	24.5	24.5	24.5	24.5	: Wall Surface Area Factor
24.1	24.1	24.1	24.1	24.9	24.9	: Absorption
35.5	33.2	30.6	18.9	9.9	4.6	: Noise Level
38.4	**dBA**	WINDOWS CLOSED				

EXTERIOR TO INTERIOR NOISE REDUCTION ANALYSIS

Project Name: Lotus Street Homes **Wall 3 of 4**
Project #: S200901
Room Name: Living - Kitchen

		Noise Level		125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Source 1:	**Aircraft**	**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Aircraft Spectrum
Source 2:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 3:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 4:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Overall:		**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Effective Noise Spectrum

Assembly Type	Open	Width	Height	Qty	Total Area	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
STC 33 Exterior Fiber Cement Wall	N	14	9	1	93.5	14	26	43	48	46	50
STC 28 1/2-inch Dual Insulating Window	Y	6.5	5	0.5	16.3	23	23	22	32	43	37
STC 28 1/2-inch Dual Insulating Window	N	6.5	5	0.5	16.3	23	23	22	32	43	37
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0

Overall Area: **126** ft²

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
10.2	11.7	11.8	11.9	11.9	11.9	: Transmission Loss
21.0	21.0	21.0	21.0	21.0	21.0	: Wall Surface Area Factor
24.1	24.1	24.1	24.1	24.9	24.9	: Absorption
36.4	43.4	45.8	43.7	39.9	33.9	: Noise Level
50.0	**dBA**	WINDOWS OPEN				

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
15.1	25.0	27.9	37.9	44.8	42.6	: Transmission Loss
21.0	21.0	21.0	21.0	21.0	21.0	: Wall Surface Area Factor
24.1	24.1	24.1	24.1	24.9	24.9	: Absorption
31.5	30.2	29.7	17.7	7.0	3.2	: Noise Level
35.4	**dBA**	WINDOWS CLOSED				

EXTERIOR TO INTERIOR NOISE REDUCTION ANALYSIS

Project Name: Lotus Street Homes
Project #: S200901
Room Name: Living - Kitchen

Wall 4 of 4

		Noise Level		125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Source 1:	**Aircraft**	**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Aircraft Spectrum
Source 2:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 3:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 4:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Overall:		**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Effective Noise Spectrum

Assembly Type	Open	Width	Height	Qty	Total Area	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
STC 45 Metal Lock Seam Roof	N	32	11	1	352.0	19	37	43	47	48	50
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0

Overall Area: **352** ft²

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
19.0	37.0	43.0	47.0	48.0	50.0	: Transmission Loss
25.5	25.5	25.5	25.5	25.5	25.5	: Wall Surface Area Factor
24.1	24.1	24.1	24.1	24.9	24.9	: Absorption
32.1	22.6	19.1	13.1	8.3	0.3	: Noise Level
32.8	**dBA**	WINDOWS OPEN				

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
19.0	37.0	43.0	47.0	48.0	50.0	: Transmission Loss
25.5	25.5	25.5	25.5	25.5	25.5	: Wall Surface Area Factor
24.1	24.1	24.1	24.1	24.9	24.9	: Absorption
32.1	22.6	19.1	13.1	8.3	0.3	: Noise Level
32.8	**dBA**	WINDOWS CLOSED				

EXTERIOR TO INTERIOR NOISE REDUCTION ANALYSIS

Project Name: Lotus Street Homes
Project #: S200901
Room Name: Bedroom

Wall 1 of 4

Room Type : **Soft**

	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Reverberation Time (sec) :	0.5	0.5	0.5	0.5	0.4	0.4	: Highly Absorptive Room
Room Absorption (Sabins) :	148	148	148	148	185	185	

		Noise Level		125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Source 1:	**Aircraft**	**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Aircraft Spectrum
Source 2:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 3:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 4:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Overall:		**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Effective Noise Spectrum

Assembly Type	Open	Width	Height	Qty	Total Area	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
STC 33 Exterior Fiber Cement Wall	N	14	9	1	86.0	14	26	43	48	46	50
STC 28 1/2-inch Dual Insulating Window	Y	4	5	1	20.0	23	23	22	32	43	37
STC 28 1/2-inch Dual Insulating Window	N	4	5	1	20.0	23	23	22	32	43	37
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0

Room Depth: **12** ft

Overall Area: **126** ft²

Volume: **1512** ft³

Number of Impacted Walls: **4**

Windows Open
Interior Noise Level: **55.1** **dBA**

Windows Closed
Interior Noise Level: **42.3** **dBA**

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
9.7	10.8	10.9	11.0	11.0	11.0	: Transmission Loss
21.0	21.0	21.0	21.0	21.0	21.0	: Wall Surface Area Factor
21.7	21.7	21.7	21.7	22.7	22.7	: Absorption
39.4	46.7	49.1	47.0	43.1	37.1	: Noise Level

53.3 **dBA** WINDOWS OPEN

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
15.4	24.7	27.0	37.1	44.6	41.8	: Transmission Loss
21.0	21.0	21.0	21.0	21.0	21.0	: Wall Surface Area Factor
21.7	21.7	21.7	21.7	22.7	22.7	: Absorption
33.6	32.8	33.0	21.0	9.5	6.2	: Noise Level

38.0 **dBA** WINDOWS CLOSED

EXTERIOR TO INTERIOR NOISE REDUCTION ANALYSIS

Project Name: Lotus Street Homes
Project #: S200901
Room Name: Bedroom

		Noise Level		125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Source 1:	**Aircraft**	**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Aircraft Spectrum
Source 2:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 3:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 4:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Overall:		**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Effective Noise Spectrum

Assembly Type	Open	Width	Height	Qty	Total Area	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
STC 33 Exterior Fiber Cement Wall	N	14	9	1	126.0	14	26	43	48	46	50
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0

Overall Area: 126 ft²

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
14.0	26.0	43.0	48.0	46.0	50.0	: Transmission Loss
21.0	21.0	21.0	21.0	21.0	21.0	: Wall Surface Area Factor
21.7	21.7	21.7	21.7	22.7	22.7	: Absorption
35.0	31.5	17.0	10.0	8.1	-1.9	: Noise Level
36.7	**dBA**	WINDOWS OPEN				

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
14.0	26.0	43.0	48.0	46.0	50.0	: Transmission Loss
21.0	21.0	21.0	21.0	21.0	21.0	: Wall Surface Area Factor
21.7	21.7	21.7	21.7	22.7	22.7	: Absorption
35.0	31.5	17.0	10.0	8.1	-1.9	: Noise Level
36.7	**dBA**	WINDOWS CLOSED				

EXTERIOR TO INTERIOR NOISE REDUCTION ANALYSIS

Project Name: Lotus Street Homes **Wall 3 of 4**
Project #: S200901
Room Name: Bedroom

		Noise Level		125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Source 1:	**Aircraft**	**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Aircraft Spectrum
Source 2:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 3:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 4:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Overall:		**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Effective Noise Spectrum

Assembly Type	Open	Width	Height	Qty	Total Area	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
STC 33 Exterior Fiber Cement Wall	N	12	9	1	98.0	14	26	43	48	46	50
STC 28 1/2-inch Dual Insulating Window	Y	2	2.5	2	10.0	23	23	22	32	43	37
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0

Overall Area: **108** ft²

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
10.8	13.1	13.3	13.3	13.3	13.3	: Transmission Loss
20.3	20.3	20.3	20.3	20.3	20.3	: Wall Surface Area Factor
21.7	21.7	21.7	21.7	22.7	22.7	: Absorption
37.5	43.7	46.0	44.0	40.1	34.1	: Noise Level
50.3	**dBA**	WINDOWS OPEN				

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
14.4	25.6	32.1	41.6	45.5	45.8	: Transmission Loss
20.3	20.3	20.3	20.3	20.3	20.3	: Wall Surface Area Factor
21.7	21.7	21.7	21.7	22.7	22.7	: Absorption
34.0	31.3	27.3	15.7	7.8	1.6	: Noise Level
36.5	**dBA**	WINDOWS CLOSED				

EXTERIOR TO INTERIOR NOISE REDUCTION ANALYSIS

Project Name: Lotus Street Homes
Project #: S200901
Room Name: Bedroom

Wall 4 of 4

		Noise Level		125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
Source 1:	**Aircraft**	**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Aircraft Spectrum
Source 2:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 3:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Source 4:	**<N/A>**	**0.0**	**dBA**	0.0	0.0	0.0	0.0	0.0	0.0	
Overall:		**65.0**	**dBA**	49.7	58.2	60.7	58.7	55.7	49.7	: Effective Noise Spectrum

Assembly Type	Open	Width	Height	Qty	Total Area	125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz
STC 45 Metal Lock Seam Roof	N	14	12	1	168.0	19	37	43	47	48	50
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0
<N/A>	N	0	0	0	0.0	0	0	0	0	0	0

Overall Area: **168** ft²

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
19.0	37.0	43.0	47.0	48.0	50.0	: Transmission Loss
22.3	22.3	22.3	22.3	22.3	22.3	: Wall Surface Area Factor
21.7	21.7	21.7	21.7	22.7	22.7	: Absorption
31.3	21.8	18.3	12.3	7.3	-0.7	: Noise Level
32.0	**dBA**	WINDOWS OPEN				

125 Hz	250 Hz	500 Hz	1KHz	2KHz	4KHz	
49.7	58.2	60.7	58.7	55.7	49.7	: Exterior Wall Noise Exposure
19.0	37.0	43.0	47.0	48.0	50.0	: Transmission Loss
22.3	22.3	22.3	22.3	22.3	22.3	: Wall Surface Area Factor
21.7	21.7	21.7	21.7	22.7	22.7	: Absorption
31.3	21.8	18.3	12.3	7.3	-0.7	: Noise Level
32.0	**dBA**	WINDOWS CLOSED				

Eilar Associates, Inc.
Acoustical and Environmental Consulting Services

Appendix F
Recommended Products

TECHNICAL DATA SHEET

Revision: August 7, 2018
Supersedes: November 13, 2015
Ref. #: 518327

DRAFT & ACOUSTICAL SOUND SEALANT

SC175

DESIGNED FOR USE ON SOUND-RATED WALL SYSTEMS

OSI SC175 Draft & Acoustical Sound Sealant is a non-flammable, latex-based sealant specially designed to reduce sound transmissions and drafts in all types of wall systems where a sound-rated assembly is required. Its primary function is to achieve and maintain the specific STC (Sound Transmission Class) value of the system designed. This paintable sealant remains flexible and adheres firmly to wood, metal studs, concrete, gypsum board and most other building materials. It is easy-to-use and cleans up easily with soap and water.

Available As:

Item #	Size	Color
1496542	28 fl oz (828 ml) cartridge	White

FEATURES & BENEFITS

- Designed for Use on Sound-Rated Wall Systems
- Reduces Draft & Sound Transmission
- Tested to UL 1479 and UL 2079 *****
- Tested to ASTM E84
- Stays Permanently Flexible
- VOC Compliant

RECOMMENDED FOR

- Developed primarily for commercial construction utilizing light weight cavity walls and floor systems
- Used for exposed and unexposed applications at perimeter joints, floor and ceiling runners, cutouts in gypsum board, veneer plaster systems and other areas where a sound rated assembly is required
- Sealant can also be applied or buttered around all electrical boxes and outlets, cold air returns, heating and air conditioning ducts and other utility equipment penetrating wall surfaces for increased acoustical performance
- Works well for sealing sill and base plates in residential construction and non-fire rated systems

LIMITATIONS

- SC175 must be applied in accordance with ASTM C919 (Standard Practice for Use of Sealants in Acoustical Applications
- Non-fire rated and fire rated systems. Refer to UL Fire Resistance Directory for testing details *****
- Not for use in underwater applications or permanent water immersion
- Do not use in applications requiring temperature resistance greater than 170°F
- Do not use on metals that will corrode
- Consult with manufacturer of adjoining materials for compatibility, including CPVC materials
- Not recommended for bonding two non-porous surfaces
- Not recommended for use with polyethylene, polypropylene, polytetrafluoroethylene (PTFE)/Teflon® or nylon

COVERAGE

For a 28 fl. oz. (825 ml) cartridge:	
▪ A 1/4” (6 mm) bead extrudes approximately 86 ft. (26 m)	▪ A 3/8” (9.5 mm) bead extrudes approximately 38 ft. (12 m)

TECHNICAL DATA

Typical Uncured Physical Properties:

Color:	White	**VOC Content:**	<1.0% by weight CARB 45 g/l SCAQMD rule 1168
Appearance:	Non-slumping paste		
Base:	Synthetic latex rubber	**Shelf Life:**	24 months from date of manufacture (unopened)
Odor:	Mild acrylic odor	**Lot Code Explanation**	**YYDDD** **YY=** Last two digits of year of manufacture **DDD=** Day of manufacture based on 365 days in a year
Specific Gravity:	1.59		
Flashpoint:	800.6° F (427°C)		
Freeze/Thaw Stability	3 Freeze/Thaw Cycles Unaffected by freezing once cured	**Example:**	18061 = 61st day of 2018 = March 2, 2018

Typical Application Properties:

Application Temperature:	Above 40°F (4°C)	
Open/Tooling Time	15 minutes*	
Tack-free Time:	30 minutes	
Cure Time:	2-7 days or longer*	* Cure time is dependent on temperature, humidity and depth of sealant applied
Sag or Slump:	0.10 inches	ASTM D2202

Typical Cured Performance Properties:

Color:	White	
Service Temperature:	-5°F (-21°C) to 170°F (77°C)	
Water Resistant:	Yes	
Paintable:	Yes, after 24 hours	
Surface Burning Characteristics:	Flame Spread Index: 0 Smoke Development: 0	ASTM E 84 Inorganic reinforced cement board
Sound Transmission Class:	Unsealed partition: STC = 15 Single bead of sealant used at top and bottom runners only – both sides of partition system: STC = 24 Single bead of sealant used at top, bottom and perimeter joints – both sides of system: STC = 45 Double Bead of Sealant used at top, bottom, and all perimeter edges - both sides of partition system: STC = 55	ASTM E 90
Low Temperature Flexibility After Artificial Weathering:	Pass with no cracking or adhesion loss	ASTM C734
Consistency Test:	300	ASTM D217
180° Peel Adhesion:		ASTM C794
Aluminum:	10.0 pli	7day cure @ 73°F & day cure @ 122°F
Wood:	8.0 pli	

TECHNICAL DATA SHEET

Revision: August 7, 2018
Supersedes: November 13, 2015
Ref. #: 518327

TECHNICAL DATA

Specifications:

UL File Number R39256

FILL, VOID OR CAVITY MATERIAL
FOR USE IN THROUGH-PENETRATION FIRESTOP
SYSTEMS & JOINT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
Control No. # R39256

Tested to or conforms to:

- **ASTM C834** – Standard Specification for Latex Sealants
- **ASTM E84, Class A** – Standard Test Method for Surface Burning Characteristics of Building Materials (Tested at UL under research project)
- **ASTM E90** – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- **ASTM C919** – Standard Practice for Use of Sealants in Acoustical Applications
- **ASTM D217** – Standard Test Methods for Cone Penetration of Lubricating Grease
- *** UL 1479** (ASTM E814) – Standard for Fire Tests of Penetration Firestops
- *** UL 2079** (ASTM E1966) – Standard for Tests for Fire Resistance of Building Joint Systems
- GreenGuard® Certified

*** Refer to UL Fire Resistance Directory for design systems**

DIRECTIONS

Tools Typically Required:
Utility knife, caulking gun and tool to puncture inside seal of cartridge.

Safety Precautions:
Wear gloves.

Preparation:
The temperature of the product, the surfaces and the working area must be above 40°F (4°C). For best performance, apply sealant at 70°F (21°C). Ensure surfaces to be sealed are clean, dry, structurally sound and free of dust, grease, oil, and other foreign contaminants. Cut off tip of cartridge at a 45° angle to desired bead size (3/8" recommended). Puncture inside seal of cartridge.

Application:
Sealant should be applied as specified in the sound-rated system being installed (either wood or metal studs). Sealant must be applied in accordance with ASTM C 919. Maximum joint size should not exceed 5/8" (15.9 mm) width x ½" (12.7 mm) depth. If necessary, sealant can be painted as applicable to meet project requirements after 24 hours.

Bottom and Top Runners:
Apply a continuous 3/8" (9.5 mm) round bead of sealant on runners before setting gypsum board. Press gypsum board firmly into sealant, ensuring complete contact with adjacent materials. Fill joint on top runners to complete the seal. Repeat procedure for double-layer applications.

Cut-Outs and Perimeter Joints:
Backs of electrical boxes, pipes, duct systems and other types of utility equipment penetrating wall surfaces shall be buttered with sealant. Seal all joints at perimeter edges including abutting surfaces and corner joints.

For further application information, refer to ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.

Clean-up:
Clean tools and uncured adhesive residue immediately with warm water and soap. Cured sealant may be carefully cut away with a sharp-edged tool.

STORAGE & DISPOSAL

DAMAGED BY FREEZING. Store in a cool, dry location at room temperature. For maximum shelf life store at 75°F (24°C). Take unwanted product to an approved household hazardous waste transfer facility. Hardened material may be disposed of with

LABEL PRECAUTIONS

CAUTION! Contains ethylene glycol, mineral spirits, and crystalline silica. May cause skin, eye and respiratory irritation. Avoid contact with eyes and skin. Avoid breathing vapors. Use with adequate ventilation. Do not swallow. FIRST AID: If swallowed do not induce vomiting, call a physician or Poison Control center immediately. For eye contact, flush with water for 15 minutes, call a physician. For skin contact, wash thoroughly with soap and water. **KEEP OUT OF REACH OF CHILDREN.**

WARNING: Cancer and Reproductive Harm – www.P65Warnings.ca.gov.

Refer to the Safety Data Sheet (SDS) for further information.

LIMITED WARRANTY

This product is warranted to be free from defects in materials when used as directed. Henkel's sole obligation shall be, at its option, to replace or refund the purchase price of product proven to be defective. Henkel makes no other warranty, express or implied, including warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE and will not be liable for consequential or incidental damages. This limited warranty gives you specific legal rights, which vary from state to state

DISCLAIMER

The information and recommendations contained herein are based on our research and are believed to be accurate, but no warranty, express or implied, is made or should be inferred. Henkel recommends purchasers/users should test the products to determine acceptable quality and suitability for the intended use. All adhesive/sealant applications should be tested under simulated or actual end use conditions to ensure the adhesive/sealant meets or exceeds all required project specifications. Since assembly conditions may be critical to adhesive/sealant performance, it is also recommended that testing be performed on specimens assembled under simulated or actual production conditions. Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute a permission, inducement or recommendation to practice any invention covered by any patent, without authority from the owner of the patent.

OSI Tougher than the Elements. For Professional Use Only. The Battle will be Fierce.
OSI works side by side with residential builders, contractors and remodeling professionals who use our products every day on their jobsites. OSI combines this deep understanding with the sophisticated global innovation and manufacturing excellence of Henkel to make the world's best professional-grade caulks, sealants and adhesives.

For Technical Assistance call: 1-800-624-7767 – Mon-Fri - 9:00a – 4:00p ET
www.ositough.com

OSI Brand is part of the Henkel family of brands. Founded in 1876, Henkel is a global leader in the consumer and industrial businesses. Henkel operates worldwide with leading brands and technologies in three business areas: Laundry & Home Care, Beauty Care and Adhesive Technologies.

Henkel Corporation - Professional & Consumer Adhesives Headquarters - Rocky Hill, CT 06067
www.henkelna.com

AC-20 FTR®

(Fire & Temperature Rated) Acoustical & Insulation Sealant

Specification Data Sheet

PECORA CORPORATION

BASIC USES

• AC-20 FTR® fire-rated systems are suitable for applications in schools, hospitals, churches, high-rise office buildings and hotels, prisons, sports arenas, and other public-use buildings to ensure a safe and orderly evacuation in the event of a fire.

2. MANUFACTURER

Pecora Corporation
165 Wambold Road
Harleysville, PA 19438

Phone: 215-723-6051
800-523-6688
Fax: 215-721-0286
Website: www.pecora.com

3. PRODUCT DESCRIPTION

AC-20 FTR® is a unique acrylic latex sealant that is UL® Classified in firestopping systems for expansion joints and through penetrations. When properly installed, these systems effectively contain fire, smoke, toxic fumes, and water within a given area surrounded by firewalls for a two, three, or four hour period, depending on the design specifications.

Other Uses: Excellent adhesive, flexibility and durability qualities make AC-20 FTR® ideal for insulating and weatherproofing around windows, doors, panels, siding, duct work, base plates, etc. It is compatible with all common building materials including specialties such as polystyrene, polyurethane, cork, vinyl, foamed and fibrous glass.

Used as an acoustical sealant, AC-20 FTR® reduces sound transmission in partition systems to achieve specific STC values by sealing spaces around cut-outs and at perimeters of partitions. The sealant cures to a tough rubber to form a long-lasting acoustical seal.

PACKAGING

• 30 fl. oz. (.887 liter) fiber cartridges
• 5-gallon (18.9 liter) pails

COLOR

• White, Beige-Gray
Special colors available in 250-gallon (946 liter) batches.

4. TECHNICAL DATA

Applicable Standards: ASTM C-834-86 specification for latex sealing compounds.

Fire Rated System: Two-hour Fire and Temperature Rated wall and floor joint systems up to 7" (178mm) wide and four-hour systems up to 4" wide can be designed with AC-20 FTR® in conjunction with Ultra Block fire blocking material in fire-rated walls and floors. Reference: ANSI/UL 263, ASTM E-119, NFPA No. 251.

UL CLASSIFIED

UNDERWRITERS LABORATORIES INC.® CLASSIFIED JOINT TREATMENT MATERIALS FIRE RESISTANCE CLASSIFICATION

DESIGNS J900H (FFS 0006) &U900 "O" (WWS 0010), J900Z (FFS 2002), U900Z-009 (WWS 2008), J900Z-007 (FFS 1010), U900Z-015 (WWS 1012)

AC-20 FTR® in conjunction with Ultra Block® achieves a 2-hour fire rating when sealing around steel or copper pipe and electrical metallic tubing or steel conduit in through penetration systems. Reference: ANSI/UL 1479, ASTM E-814.

FILL, VOID OR CAVITY MATERIALS CLASSIFIED BY UNDERWRITERS LABORATORIES INC. FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEM NO. CAJ 1093

In addition to its fire-blocking value, Ultra Block® is very efficient acoustically, having a noise reduction coefficient of .75 and sound transmission coefficient of .5 (Ultra Block® is a registered trademark of Backer Rod Mfg. and Supply Co., Denver, CO, USA.)

5. INSTALLATION

Surface Preparation: Surfaces must be free of all contamination. Sealant may be applied to damp, porous surfaces. No priming is required.

Application: Refer to Pecora Firestopping Manual 07270 and UL Fire Resistance Directory for installation details on fire-rated joint and through penetration systems. For insulating and weatherproofing purposes, fill all window, door, and panel perimeter joints using a resilient backer rod to control sealant depth to 1/2" (13mm) maximum. For best results, protect sealant from excessive low temperatures and apply above 40°F (4°C). For acoustical purposes, apply continuous

TYPICAL PHYSICAL PROPERTIES

Test Property	Value	Procedure
Modulus @ 100% (psi)	15-20	ASTM D412
Ultimate Tensile (psi)	30-40	ASTM D412
Ultimate Elongation (%)	400-500	ASTM D412
Movement Capability (%)	±7 1/2	ASTM D412
VOC Content	31 g/L	

beads of sealant to seal perimeters of all sound-rated partitions. Apply sealant in the angles formed by metal components or base-layer panels and abutting surfaces. Apply sealant around all openings formed for outlets; electrical, telephone, light fixtures, etc.

Tooling: Tool material flush with surfaces to allow for expected shrinkage and insure good contact and adhesion to the substrate.

Cleaning: Remove excess material with water or a damp cloth before it cures. Sealant may be painted within 30 minutes after application with a good grade of latex paint.

Shelf Life: AC-20 FTR® has a shelf life well in excess of one year when stored in unopened containers below 80° F (27°C).

Precautions: AC-20 FTR® is non-flammable, non-toxic, non-irritating and environmentally safe. However, do not take internally. Refer to Material Safety Data Sheet for additional information.

Ultra Block® is a non-carcinogenic processed continuous filament textile glass fiber that may cause skin, eye and respiratory irritation. When applying, wear long sleeves, gloves, cap, goggles or safety glasses and NIOSH/MSHA-approved dust respirator. After use bathe with soap and warm water. Wash clothes separately and rinse after use. Refer to Material Safety Data Sheet for additional information.

FOR PROFESSIONAL USE ONLY.
KEEP OUT OF THE REACH OF CHILDREN.

6. AVAILABILITY AND COST

Pecora products are available from our stocking distributors in all major cities. For the name and telephone number of your nearest representative call one of our locations listed below or visit our website at www.pecora.com.

7. WARRANTY

Pecora Corporation warrants its products to be free of defects. Under this warranty, we will provide, at no charge, replacement materials for, or refund the purchase price of, any product proven to be defective when installed in accordance with our published recommendations and in applications considered by us as suitable from this product. This warranty in lieu of any and all other warranties expressed or implied, and in no case will Pecora be liable for incidental or consequential damages.

8. MAINTENANCE

If the sealant is damaged and the bond is intact, cut out the damaged area and recaulk. No primer is required. If the bond has been affected, remove the sealant, clean and prepare the joint in accordance with instructions under "Installation".

9. TECHNICAL SERVICES

Pecora representatives are available to assist you in selecting an appropriate product and to provide on-site application instructions or to conduct jobsite inspections. For further assistance call our Technical Service Department at 800-523-6688.

ISO 9001:2000
KEMA CERTIFICATE
Accredited by ANSI-RAB NAP

PECORA CORPORATION
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HARLEYSVILLE, PA
165 Wambold Road, Harleysville, PA 19438
Phone: 800-523-6688 • 215-723-6051 • FAX: 215-721-0286

DALLAS, TX
11501 Hillguard Road, Dallas, TX 75243
Phone: 800-233-9754 • 214-348-5313 • FAX: 214-348-5421

Eilar Associates, Inc.
Acoustical and Environmental Consulting Services

Appendix G

CadnaA Analysis Data and Results

Eilar Associates, Inc.
210 South Juniper Street, Suite 100
Escondido, California 92025-4230
Phone: (760) 738-5570

Date: 29 Sep 2020

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receivers

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
1-R1			25.7	25.7	50.0	0.0				5.00	r	190.38	139.28	5.00
1-R2			26.4	26.4	50.0	0.0				5.00	r	231.53	197.10	5.00
1-R3			26.3	26.3	50.0	0.0				5.00	r	273.56	168.21	5.00
1-R4			26.6	26.6	50.0	0.0				5.00	r	234.99	114.75	5.00
2-R1			33.8	33.8	50.0	0.0				15.00	r	190.38	139.28	15.00
2-R2			35.2	35.2	50.0	0.0				15.00	r	231.53	197.10	15.00
2-R3			33.5	33.5	50.0	0.0				15.00	r	273.54	168.19	15.00
2-R4			33.7	33.7	50.0	0.0				15.00	r	235.01	114.77	15.00

Point Sources

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(ft²)		(min)	(min)	(min)	(dB)	(Hz)		(ft)		(ft)	(ft)	(ft)
AC1			71.0	71.0	71.0	Lw	AC1		0.0	0.0	0.0							0.0		(none)	23.00	r	209.74	126.38	23.00
AC2			71.0	71.0	71.0	Lw	AC1		0.0	0.0	0.0							0.0		(none)	23.00	r	245.81	187.26	23.00
AC3			71.0	71.0	71.0	Lw	AC1		0.0	0.0	0.0							0.0		(none)	23.00	r	259.45	179.12	23.00
AC4			71.0	71.0	71.0	Lw	AC1		0.0	0.0	0.0							0.0		(none)	23.00	r	215.38	126.57	23.00

Buildings

Name	M.	ID	RB	Residents	Absorption	Height	
						Begin	
						(ft)	
B1				0		20.00	r
B2				0		20.00	r
B3				0		20.00	r

Geometry - Buildings

Name	M.	ID	RB	Residents	Absorption	Height		Coordinates			
						Begin		x	y	z	Ground
						(ft)		(ft)	(ft)	(ft)	(ft)
B1				0		20.00	r	210.16	157.87	20.00	0.00
								221.36	149.82	20.00	0.00
								208.35	132.04	20.00	0.00
								213.22	128.72	20.00	0.00
								215.41	131.82	20.00	0.00
								220.97	127.92	20.00	0.00
								234.45	146.72	20.00	0.00
								245.60	138.58	20.00	0.00
								220.72	103.41	20.00	0.00
								204.45	115.00	20.00	0.00
								201.54	110.93	20.00	0.00
								185.18	122.77	20.00	0.00
B2				0		20.00	r	225.41	179.32	20.00	0.00
								227.61	177.70	20.00	0.00
								224.68	173.71	20.00	0.00
								236.44	165.40	20.00	0.00
								244.06	176.12	20.00	0.00
								241.78	177.84	20.00	0.00
								251.81	191.80	20.00	0.00
								254.10	190.12	20.00	0.00
								262.06	201.21	20.00	0.00
								250.69	209.28	20.00	0.00
								247.83	205.19	20.00	0.00
								244.51	207.58	20.00	0.00
B3				0		20.00	r	275.60	206.16	20.00	0.00
								281.24	202.16	20.00	0.00
								282.54	203.93	20.00	0.00
								289.86	198.74	20.00	0.00
								258.25	156.19	20.00	0.00
								246.19	164.93	20.00	0.00

Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Carrier 25HBC5 2.5-ton	AC1	Lw				52.9	60.4	63.4	67.4	64.4	61.9	55.4	71.0	71.3	Manufacturer

Eilar Associates, Inc.
210 South Juniper Street, Suite 100
Escondido, California 92025-4230
Phone: (760) 738-5570

Date: 28 Sep 2020

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receivers

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
1-R1			79.6	-80.2	75.0	0.0				5.00	r	211.16	169.23	5.00
1-R2			69.4	-80.2	75.0	0.0				5.00	r	246.18	232.59	5.00
1-R3			79.4	-80.2	75.0	0.0				5.00	r	253.22	138.32	5.00
1-R4			65.7	-80.2	75.0	0.0				5.00	r	160.52	60.47	5.00
2-R1			79.2	-80.2	75.0	0.0				15.00	r	211.16	169.23	15.00
2-R2			69.6	-80.2	75.0	0.0				15.00	r	246.18	232.59	15.00
2-R3			79.0	-80.2	75.0	0.0				15.00	r	253.22	138.32	15.00
2-R4			66.0	-80.2	75.0	0.0				15.00	r	160.52	60.47	15.00

Point Sources

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(ft²)		(min)	(min)	(min)	(dB)	(Hz)		(ft)		(ft)	(ft)	(ft)
Dozer	+		105.6	105.6	105.6	Lw	C4		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Dump Truck	+		108.8	108.8	108.8	Lw	C5		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Excavator	+		100.6	100.6	100.6	Lw	C6		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Skid Steer	+		99.9	99.9	99.9	Lw	C9		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00

Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Air Compressor	C1	Lw (c)			115.0	104.0	95.0	90.0	88.0	86.0	89.0	78.0	96.5	115.4	DEFRA
Concrete Mixer Truck (26 t)	C2	Lw (c)			103.0	104.0	110.0	103.0	100.0	98.0	94.0	91.0	106.7	112.7	DEFRA
Concrete Pump Truck (2.8 t)	C3	Lw (c)			115.0	107.0	101.0	102.0	104.0	104.0	97.0	89.0	108.8	116.5	DEFRA
Dozer(21 t)	C4	Lw (c)			104.0	110.0	104.0	103.0	100.0	98.0	92.0	88.0	105.6	112.8	DEFRA
Dump Truck	C5	Lw (c)			116.0	111.0	108.0	103.0	105.0	101.0	96.0	89.0	108.8	118.2	DEFRA
Tracked Excavator (14 t)	C6	Lw (c)			105.0	101.0	99.0	98.0	95.0	93.0	89.0	81.0	100.6	108.1	DEFRA
Asphalt Paver (18 t)	C7	Lw (c)			103.0	108.0	105.0	103.0	102.0	101.0	98.0	91.0	107.5	112.3	DEFRA
Roller (22 t)	C8	Lw (c)			118.0	116.0	106.0	104.0	106.0	104.0	100.0	94.0	110.6	120.7	DEFRA
Skid Steer Loader	C9	Lw (c)			103.0	94.0	98.0	98.0	94.0	93.0	87.0	81.0	99.9	106.0	DEFRA
Telescopic Forklift (10 t)	C10	Lw (c)			116.0	110.0	100.0	98.0	95.0	93.0	87.0	78.0	101.5	117.2	DEFRA

Eilar Associates, Inc.
210 South Juniper Street, Suite 100
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Date: 28 Sep 2020

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receivers

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
1-R1			77.5	-80.2	75.0	0.0				5.00	r	211.16	169.23	5.00
1-R2			67.3	-80.2	75.0	0.0				5.00	r	246.18	232.59	5.00
1-R3			77.4	-80.2	75.0	0.0				5.00	r	253.22	138.32	5.00
1-R4			63.5	-80.2	75.0	0.0				5.00	r	160.52	60.47	5.00
2-R1			77.2	-80.2	75.0	0.0				15.00	r	211.16	169.23	15.00
2-R2			67.6	-80.2	75.0	0.0				15.00	r	246.18	232.59	15.00
2-R3			77.0	-80.2	75.0	0.0				15.00	r	253.22	138.32	15.00
2-R4			63.9	-80.2	75.0	0.0				15.00	r	160.52	60.47	15.00

Point Sources

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(ft²)		(min)	(min)	(min)	(dB)	(Hz)		(ft)		(ft)	(ft)	(ft)
Mixer Truck	+		106.7	106.7	106.7	Lw	C2		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Pump Truck	+		108.8	108.8	108.8	Lw	C3		0.0	0.0	0.0				12.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00

Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Air Compressor	C1	Lw (c)			115.0	104.0	95.0	90.0	88.0	86.0	89.0	78.0	96.5	115.4	DEFRA
Concrete Mixer Truck (26 t)	C2	Lw (c)			103.0	104.0	110.0	103.0	100.0	98.0	94.0	91.0	106.7	112.7	DEFRA
Concrete Pump Truck (2.8 t)	C3	Lw (c)			115.0	107.0	101.0	102.0	104.0	104.0	97.0	89.0	108.8	116.5	DEFRA
Dozer(21 t)	C4	Lw (c)			104.0	110.0	104.0	103.0	100.0	98.0	92.0	88.0	105.6	112.8	DEFRA
Dump Truck	C5	Lw (c)			116.0	111.0	108.0	103.0	105.0	101.0	96.0	89.0	108.8	118.2	DEFRA
Tracked Excavator (14 t)	C6	Lw (c)			105.0	101.0	99.0	98.0	95.0	93.0	89.0	81.0	100.6	108.1	DEFRA
Asphalt Paver (18 t)	C7	Lw (c)			103.0	108.0	105.0	103.0	102.0	101.0	98.0	91.0	107.5	112.3	DEFRA
Roller (22 t)	C8	Lw (c)			118.0	116.0	106.0	104.0	106.0	104.0	100.0	94.0	110.6	120.7	DEFRA
Skid Steer Loader	C9	Lw (c)			103.0	94.0	98.0	98.0	94.0	93.0	87.0	81.0	99.9	106.0	DEFRA
Telescopic Forklift (10 t)	C10	Lw (c)			116.0	110.0	100.0	98.0	95.0	93.0	87.0	78.0	101.5	117.2	DEFRA

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Date: 28 Sep 2020

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receivers

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
1-R1			73.0	-80.2	75.0	0.0				5.00	r	211.16	169.23	5.00
1-R2			62.8	-80.2	75.0	0.0				5.00	r	246.18	232.59	5.00
1-R3			72.8	-80.2	75.0	0.0				5.00	r	253.22	138.32	5.00
1-R4			59.1	-80.2	75.0	0.0				5.00	r	160.52	60.47	5.00
2-R1			72.6	-80.2	75.0	0.0				15.00	r	211.16	169.23	15.00
2-R2			63.0	-80.2	75.0	0.0				15.00	r	246.18	232.59	15.00
2-R3			72.4	-80.2	75.0	0.0				15.00	r	253.22	138.32	15.00
2-R4			59.3	-80.2	75.0	0.0				15.00	r	160.52	60.47	15.00

Point Sources

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(ft²)		(min)	(min)	(min)	(dB)	(Hz)		(ft)		(ft)	(ft)	(ft)
Compressor	+		96.5	96.5	96.5	Lw	C1		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Skid Steer	+		99.9	99.9	99.9	Lw	C9		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Forklift	+		101.5	101.5	101.5	Lw	C10		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00

Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Air Compressor	C1	Lw (c)			115.0	104.0	95.0	90.0	88.0	86.0	89.0	78.0	96.5	115.4	DEFRA
Concrete Mixer Truck (26 t)	C2	Lw (c)			103.0	104.0	110.0	103.0	100.0	98.0	94.0	91.0	106.7	112.7	DEFRA
Concrete Pump Truck (2.8 t)	C3	Lw (c)			115.0	107.0	101.0	102.0	104.0	104.0	97.0	89.0	108.8	116.5	DEFRA
Dozer(21 t)	C4	Lw (c)			104.0	110.0	104.0	103.0	100.0	98.0	92.0	88.0	105.6	112.8	DEFRA
Dump Truck	C5	Lw (c)			116.0	111.0	108.0	103.0	105.0	101.0	96.0	89.0	108.8	118.2	DEFRA
Tracked Excavator (14 t)	C6	Lw (c)			105.0	101.0	99.0	98.0	95.0	93.0	89.0	81.0	100.6	108.1	DEFRA
Asphalt Paver (18 t)	C7	Lw (c)			103.0	108.0	105.0	103.0	102.0	101.0	98.0	91.0	107.5	112.3	DEFRA
Roller (22 t)	C8	Lw (c)			118.0	116.0	106.0	104.0	106.0	104.0	100.0	94.0	110.6	120.7	DEFRA
Skid Steer Loader	C9	Lw (c)			103.0	94.0	98.0	98.0	94.0	93.0	87.0	81.0	99.9	106.0	DEFRA
Telescopic Forklift (10 t)	C10	Lw (c)			116.0	110.0	100.0	98.0	95.0	93.0	87.0	78.0	101.5	117.2	DEFRA

Eilar Associates, Inc.
210 South Juniper Street, Suite 100
Escondido, California 92025-4230
Phone: (760) 738-5570

Date: 28 Sep 2020

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receivers

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
1-R1			79.4	-80.2	75.0	0.0				5.00	r	211.16	169.23	5.00
1-R2			69.4	-80.2	75.0	0.0				5.00	r	246.18	232.59	5.00
1-R3			79.3	-80.2	75.0	0.0				5.00	r	253.22	138.32	5.00
1-R4			65.6	-80.2	75.0	0.0				5.00	r	160.52	60.47	5.00
2-R1			79.0	-80.2	75.0	0.0				15.00	r	211.16	169.23	15.00
2-R2			69.5	-80.2	75.0	0.0				15.00	r	246.18	232.59	15.00
2-R3			78.9	-80.2	75.0	0.0				15.00	r	253.22	138.32	15.00
2-R4			65.8	-80.2	75.0	0.0				15.00	r	160.52	60.47	15.00

Point Sources

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(ft²)		(min)	(min)	(min)	(dB)	(Hz)		(ft)		(ft)	(ft)	(ft)
Paver	+		107.5	107.5	107.5	Lw	C7		0.0	0.0	0.0				30.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Roller	+		110.6	110.6	110.6	Lw	C8		0.0	0.0	0.0				12.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00

Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height			
			left	right		horz.	vert.	Begin		End	
					(ft)	(ft)	(ft)	(ft)		(ft)	
West PL Wall	-							8.00	r		
East PL Wall	-							8.00	r		

Geometry - Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
West PL Wall	-							8.00	r			172.42	113.63	8.00	0.00
												243.82	213.62	8.00	0.00
East PL Wall	-							8.00	r			213.15	84.40	8.00	0.00
												299.85	205.83	8.00	0.00

Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Air Compressor	C1	Lw (c)			115.0	104.0	95.0	90.0	88.0	86.0	89.0	78.0	96.5	115.4	DEFRA
Concrete Mixer Truck (26 t)	C2	Lw (c)			103.0	104.0	110.0	103.0	100.0	98.0	94.0	91.0	106.7	112.7	DEFRA
Concrete Pump Truck (2.8 t)	C3	Lw (c)			115.0	107.0	101.0	102.0	104.0	104.0	97.0	89.0	108.8	116.5	DEFRA
Dozer(21 t)	C4	Lw (c)			104.0	110.0	104.0	103.0	100.0	98.0	92.0	88.0	105.6	112.8	DEFRA
Dump Truck	C5	Lw (c)			116.0	111.0	108.0	103.0	105.0	101.0	96.0	89.0	108.8	118.2	DEFRA
Tracked Excavator (14 t)	C6	Lw (c)			105.0	101.0	99.0	98.0	95.0	93.0	89.0	81.0	100.6	108.1	DEFRA
Asphalt Paver (18 t)	C7	Lw (c)			103.0	108.0	105.0	103.0	102.0	101.0	98.0	91.0	107.5	112.3	DEFRA
Roller (22 t)	C8	Lw (c)			118.0	116.0	106.0	104.0	106.0	104.0	100.0	94.0	110.6	120.7	DEFRA
Skid Steer Loader	C9	Lw (c)			103.0	94.0	98.0	98.0	94.0	93.0	87.0	81.0	99.9	106.0	DEFRA
Telescopic Forklift (10 t)	C10	Lw (c)			116.0	110.0	100.0	98.0	95.0	93.0	87.0	78.0	101.5	117.2	DEFRA

Eilar Associates, Inc.
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Escondido, California 92025-4230
Phone: (760) 738-5570

Date: 28 Sep 2020

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receivers

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
1-R1			63.5	-80.2	75.0	0.0				5.00	r	211.16	169.23	5.00
1-R2			65.4	-80.2	75.0	0.0				5.00	r	246.18	232.59	5.00
1-R3			63.9	-80.2	75.0	0.0				5.00	r	253.22	138.32	5.00
1-R4			65.7	-80.2	75.0	0.0				5.00	r	160.52	60.47	5.00
2-R1			77.8	-80.2	75.0	0.0				15.00	r	211.16	169.23	15.00
2-R2			68.3	-80.2	75.0	0.0				15.00	r	246.18	232.59	15.00
2-R3			77.6	-80.2	75.0	0.0				15.00	r	253.22	138.32	15.00
2-R4			66.0	-80.2	75.0	0.0				15.00	r	160.52	60.47	15.00

Point Sources

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(ft²)		(min)	(min)	(min)	(dB)	(Hz)		(ft)		(ft)	(ft)	(ft)
Dozer	+		105.6	105.6	105.6	Lw	C4		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Dump Truck	+		108.8	108.8	108.8	Lw	C5		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Excavator	+		100.6	100.6	100.6	Lw	C6		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Skid Steer	+		99.9	99.9	99.9	Lw	C9		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00

Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height			
			left	right		horz.	vert.	Begin		End	
					(ft)	(ft)	(ft)	(ft)		(ft)	
West PL Wall	+							8.00	r		
East PL Wall	+							8.00	r		

Geometry - Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
West PL Wall	+							8.00	r			172.42	113.63	8.00	0.00
												243.82	213.62	8.00	0.00
East PL Wall	+							8.00	r			213.15	84.40	8.00	0.00
												299.85	205.83	8.00	0.00

Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Air Compressor	C1	Lw (c)			115.0	104.0	95.0	90.0	88.0	86.0	89.0	78.0	96.5	115.4	DEFRA
Concrete Mixer Truck (26 t)	C2	Lw (c)			103.0	104.0	110.0	103.0	100.0	98.0	94.0	91.0	106.7	112.7	DEFRA
Concrete Pump Truck (2.8 t)	C3	Lw (c)			115.0	107.0	101.0	102.0	104.0	104.0	97.0	89.0	108.8	116.5	DEFRA
Dozer(21 t)	C4	Lw (c)			104.0	110.0	104.0	103.0	100.0	98.0	92.0	88.0	105.6	112.8	DEFRA
Dump Truck	C5	Lw (c)			116.0	111.0	108.0	103.0	105.0	101.0	96.0	89.0	108.8	118.2	DEFRA
Tracked Excavator (14 t)	C6	Lw (c)			105.0	101.0	99.0	98.0	95.0	93.0	89.0	81.0	100.6	108.1	DEFRA
Asphalt Paver (18 t)	C7	Lw (c)			103.0	108.0	105.0	103.0	102.0	101.0	98.0	91.0	107.5	112.3	DEFRA
Roller (22 t)	C8	Lw (c)			118.0	116.0	106.0	104.0	106.0	104.0	100.0	94.0	110.6	120.7	DEFRA
Skid Steer Loader	C9	Lw (c)			103.0	94.0	98.0	98.0	94.0	93.0	87.0	81.0	99.9	106.0	DEFRA
Telescopic Forklift (10 t)	C10	Lw (c)			116.0	110.0	100.0	98.0	95.0	93.0	87.0	78.0	101.5	117.2	DEFRA

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Phone: (760) 738-5570

Date: 28 Sep 2020

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receivers

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
1-R1			61.3	-80.2	75.0	0.0				5.00	r	211.16	169.23	5.00
1-R2			63.3	-80.2	75.0	0.0				5.00	r	246.18	232.59	5.00
1-R3			61.7	-80.2	75.0	0.0				5.00	r	253.22	138.32	5.00
1-R4			63.5	-80.2	75.0	0.0				5.00	r	160.52	60.47	5.00
2-R1			75.8	-80.2	75.0	0.0				15.00	r	211.16	169.23	15.00
2-R2			66.4	-80.2	75.0	0.0				15.00	r	246.18	232.59	15.00
2-R3			75.7	-80.2	75.0	0.0				15.00	r	253.22	138.32	15.00
2-R4			63.9	-80.2	75.0	0.0				15.00	r	160.52	60.47	15.00

Point Sources

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(ft²)		(min)	(min)	(min)	(dB)	(Hz)		(ft)		(ft)	(ft)	(ft)
Mixer Truck	+		106.7	106.7	106.7	Lw	C2		0.0	0.0	0.0				24.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Pump Truck	+		108.8	108.8	108.8	Lw	C3		0.0	0.0	0.0				12.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00

Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height			
			left	right		horz.	vert.	Begin		End	
					(ft)	(ft)	(ft)	(ft)		(ft)	
West PL Wall	+							8.00	r		
East PL Wall	+							8.00	r		

Geometry - Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
West PL Wall	+							8.00	r			172.42	113.63	8.00	0.00
												243.82	213.62	8.00	0.00
East PL Wall	+							8.00	r			213.15	84.40	8.00	0.00
												299.85	205.83	8.00	0.00

Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Air Compressor	C1	Lw (c)			115.0	104.0	95.0	90.0	88.0	86.0	89.0	78.0	96.5	115.4	DEFRA
Concrete Mixer Truck (26 t)	C2	Lw (c)			103.0	104.0	110.0	103.0	100.0	98.0	94.0	91.0	106.7	112.7	DEFRA
Concrete Pump Truck (2.8 t)	C3	Lw (c)			115.0	107.0	101.0	102.0	104.0	104.0	97.0	89.0	108.8	116.5	DEFRA
Dozer(21 t)	C4	Lw (c)			104.0	110.0	104.0	103.0	100.0	98.0	92.0	88.0	105.6	112.8	DEFRA
Dump Truck	C5	Lw (c)			116.0	111.0	108.0	103.0	105.0	101.0	96.0	89.0	108.8	118.2	DEFRA
Tracked Excavator (14 t)	C6	Lw (c)			105.0	101.0	99.0	98.0	95.0	93.0	89.0	81.0	100.6	108.1	DEFRA
Asphalt Paver (18 t)	C7	Lw (c)			103.0	108.0	105.0	103.0	102.0	101.0	98.0	91.0	107.5	112.3	DEFRA
Roller (22 t)	C8	Lw (c)			118.0	116.0	106.0	104.0	106.0	104.0	100.0	94.0	110.6	120.7	DEFRA
Skid Steer Loader	C9	Lw (c)			103.0	94.0	98.0	98.0	94.0	93.0	87.0	81.0	99.9	106.0	DEFRA
Telescopic Forklift (10 t)	C10	Lw (c)			116.0	110.0	100.0	98.0	95.0	93.0	87.0	78.0	101.5	117.2	DEFRA

Eilar Associates, Inc.
210 South Juniper Street, Suite 100
Escondido, California 92025-4230
Phone: (760) 738-5570

Date: 28 Sep 2020

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	0.50
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receivers

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(ft)		(ft)	(ft)	(ft)
1-R1			62.8	-80.2	75.0	0.0				5.00	r	211.16	169.23	5.00
1-R2			65.1	-80.2	75.0	0.0				5.00	r	246.18	232.59	5.00
1-R3			63.2	-80.2	75.0	0.0				5.00	r	253.22	138.32	5.00
1-R4			65.6	-80.2	75.0	0.0				5.00	r	160.52	60.47	5.00
2-R1			77.6	-80.2	75.0	0.0				15.00	r	211.16	169.23	15.00
2-R2			68.1	-80.2	75.0	0.0				15.00	r	246.18	232.59	15.00
2-R3			77.5	-80.2	75.0	0.0				15.00	r	253.22	138.32	15.00
2-R4			65.8	-80.2	75.0	0.0				15.00	r	160.52	60.47	15.00

Point Sources

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(ft²)		(min)	(min)	(min)	(dB)	(Hz)		(ft)		(ft)	(ft)	(ft)
Paver	+		107.5	107.5	107.5	Lw	C7		0.0	0.0	0.0				30.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00
Roller	+		110.6	110.6	110.6	Lw	C8		0.0	0.0	0.0				12.00	0.00	0.00	0.0		(none)	6.00	r	232.56	154.65	6.00

Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height			
			left	right		horz.	vert.	Begin		End	
					(ft)	(ft)	(ft)	(ft)		(ft)	
West PL Wall	+							8.00	r		
East PL Wall	+							8.00	r		

Geometry - Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height				Coordinates			
			left	right		horz.	vert.	Begin		End		x	y	z	Ground
					(ft)	(ft)	(ft)	(ft)		(ft)		(ft)	(ft)	(ft)	(ft)
West PL Wall	+							8.00	r			172.42	113.63	8.00	0.00
												243.82	213.62	8.00	0.00
East PL Wall	+							8.00	r			213.15	84.40	8.00	0.00
												299.85	205.83	8.00	0.00

Sound Level Spectra

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Air Compressor	C1	Lw (c)			115.0	104.0	95.0	90.0	88.0	86.0	89.0	78.0	96.5	115.4	DEFRA
Concrete Mixer Truck (26 t)	C2	Lw (c)			103.0	104.0	110.0	103.0	100.0	98.0	94.0	91.0	106.7	112.7	DEFRA
Concrete Pump Truck (2.8 t)	C3	Lw (c)			115.0	107.0	101.0	102.0	104.0	104.0	97.0	89.0	108.8	116.5	DEFRA
Dozer(21 t)	C4	Lw (c)			104.0	110.0	104.0	103.0	100.0	98.0	92.0	88.0	105.6	112.8	DEFRA
Dump Truck	C5	Lw (c)			116.0	111.0	108.0	103.0	105.0	101.0	96.0	89.0	108.8	118.2	DEFRA
Tracked Excavator (14 t)	C6	Lw (c)			105.0	101.0	99.0	98.0	95.0	93.0	89.0	81.0	100.6	108.1	DEFRA
Asphalt Paver (18 t)	C7	Lw (c)			103.0	108.0	105.0	103.0	102.0	101.0	98.0	91.0	107.5	112.3	DEFRA
Roller (22 t)	C8	Lw (c)			118.0	116.0	106.0	104.0	106.0	104.0	100.0	94.0	110.6	120.7	DEFRA
Skid Steer Loader	C9	Lw (c)			103.0	94.0	98.0	98.0	94.0	93.0	87.0	81.0	99.9	106.0	DEFRA
Telescopic Forklift (10 t)	C10	Lw (c)			116.0	110.0	100.0	98.0	95.0	93.0	87.0	78.0	101.5	117.2	DEFRA