Appendix G:
Noise Supporting Information

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September 24, 2018
Revised January 22, 2019,
March 8, 2019, May 22, 2019,
and July 24, 2019

Mr. Christos Hardt, Architectural Designer
MILLER ARCHITECTURE
1177 Idaho Street, Suite 200
Redlands, California 92374

Dear Mr. Hardt:

INTRODUCTION

Ganddini Group, Inc. is pleased to provide this focused noise analysis for the proposed SD Homes Redlands Apartments Project in the City of Redlands. The project site is located adjacent to Orange Avenue between Iowa Street and Alabama Street in the City of Redlands. A vicinity map showing the project location is provided on Figure 1.

To assist the reader with those terms unique to noise analysis, a list of acronyms and a glossary of terms have been provided in Appendix A and Appendix B, respectively.

PROJECT DESCRIPTION

The project proposes to develop the 21.84 gross acre (18.94 net acre) project site with 328 multi-family (low-rise) attached residential dwelling units and a 14,663 square foot clubhouse. The southern portion of the site will include a passive park area which will include shaded rest areas and trails. The proposed project is shown on Figure 2.

APPLICABLE STANDARDS

CITY OF REDLANDS GENERAL PLAN 2035[1]

Table 1 shows the City's noise level standards related to land use compatibility. According to this matrix, exterior noise levels of up to 60 CNEL are considered to be "clearly compatible" for multi-family residential uses. The policies that are applicable to the proposed project from the Noise section of the General Plan have been listed below:

Policies

Principles

7-P.41 Ensure that new development is compatible with the noise environment by continuing to use potential noise exposure as a criterion in land use planning.

[1] City of Redlands General Plan 2035, 7.5 Noise. December 2017.

Actions

7-A.135 Use the noise and land use compatibility matrix (see Table 1) and Future Noise Contours map (General Plan Figure 7-9) as criteria to determine the acceptability of a given land use, including the improvement/construction of streets, railroads, freeways, and highways. Do not permit new noise-sensitive uses—including schools, hospitals, places of worship, and homes—where noise levels are "normally unacceptable" or higher, if alternative locations are available for the uses in the City.

7-A.136 Require a noise analysis be conducted for all development proposals located where projected noise exposure would be other than "clearly" or "normally compatible" as specified in Table 1.

7-A.137 For all projects that have noise exposure levels that exceed the standards in Table 1, require site planning and architecture to incorporate noise-attenuating features. With mitigation, development should meet the allowable outdoor and indoor noise exposure standards in Table 2. When a building's openings to the exterior are required to be closed to meet the interior noise standard, mechanical ventilation shall be provided.

Measure U Policies

9.0e Use the criteria specified in Table 1 to assess the compatibility of proposed land uses with the projected noise environment, and apply the noise standards in Table 2, which prescribe interior and exterior noise standards in relation to specific land uses. Do not approve projects that would not comply with the standards in Tables 1 and 2.

9.0i Require construction of barriers to mitigate sound emissions where necessary or where feasible, and encourage use of walls and berms to protect residential or other noise sensitive land uses that are adjacent to major roads, commercial, or industrial areas.

9.0s Require mitigation to ensure that indoor noise levels for residential living spaces do not exceed 45 dB LDN/CNEL due to combined effect of all exterior noise sources.

9.0v Consider the following impacts as possibly "significant":

- An increase in exposure of 4 or more dB if the resulting noise level would exceed that described as clearly compatible for the affected land use, as established in Tables 1 and 2;
- Any increase of 6 dB or more, due to potential for adverse community response.

9.0w Limit hours of construction or demolition work where site-related noise is audible beyond the site boundary.

CITY OF REDLANDS MUNICIPAL CODE[2]

City of Redlands Municipal Code

Chapter 8.06 of the City's Municipal Code establishes the City's noise standards and regulations.

Section 8.06.070 Exterior Noise Limits.

[2] City of Redlands Municipal Code. September 2017.

A. The noise standards for categories of land uses identified below, unless otherwise specifically indicated, apply to all such property within a designated zone.

Maximum Permissible Sound Levels By Receiving Land Use		
Receiving Land Use Category	Time Period	Noise Level - dBA
Single-family residential districts	10:00 PM - 7:00 AM	50
	7:00 AM – 10:00 PM	60
Multi-family residential districts; public space; institutional	10:00 PM - 7:00 AM	50
	7:00 AM - 10:00 PM	60
Commercial	10:00 PM - 7:00 AM	60
	7:00 AM - 10:00 PM	65
Industrial	Anytime	75

B. No person shall operate, or cause to be operated, any source of sound at any location within the City or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any other property to exceed:

1. The noise standard for that land use specified in the table above of this section for a cumulative period of more than thirty (30) minutes in any hour; or
2. The noise standard specified in the table above of this section plus five (5) dB for a cumulative period of more than fifteen (15) minutes in any hour; or
3. The noise standard specified in the table above of this section plus ten (10) dB for a cumulative period of more than five (5) minutes in any hour; or
4. The noise standard specified in the table above of this section plus fifteen (15) dB for a cumulative period of more than one minute in any hour; or
5. The noise standard specified in the table above of this section plus twenty (20) dB or the maximum measured ambient level, for any period of time.

C. If the measured ambient level exceeds the allowable noise exposure standard within any of the first four (4) noise limit categories above, the allowable noise exposure standard shall be adjusted in five (5) dB increments in each category as appropriate to encompass or reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

Section 8.06.080 Interior Noise Standards.

A. No person shall operate or cause to be operated any source of sound, or allow the creation of any noise, which causes the noise level when measured inside a neighboring receiving occupied building to exceed the following standards:

1. The noise standard for that land use specified in the table below for a cumulative period of more than five (5) minutes in any hour.
2. The noise standard for that land use specified in the table below plus five (5) dB for a cumulative period of more than one minute in any hour.
3. The noise standard for that land use specified in the table below plus ten (10) dB for the maximum measured ambient noise level for any period of time.

B. If the measured ambient level exceeds the allowable exterior noise exposure standard in 8.06.070 of this chapter, the allowable interior noise exposure level shall be adjusted in five (5) dB increments as appropriate to reflect the ambient noise level.

Maximum Permissible Interior Sound Levels by Receiving Land Use		
Receiving Land Use Category	Time Period	Noise Level - dBA
Single-family residential districts	Any time	45
Multi-family residential districts; institutional; hotels	Any time	45
Commercial	Any time	50
Industrial	Any time	60

Section 8.06.090 Noise Disturbances Prohibited.

The following acts, and the causing or permitting thereof, are declared to be in violation of the Noise Ordinance:

F. Construction And/Or Demolition: Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between weekday hours of six o'clock (6:00) PM and seven o'clock (7:00) AM, including Saturdays or at any time on Sundays or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work by public service utilities, the City or another governmental entity. All mobile or stationary internal combustion engine powered equipment or machinery shall be equipped with exhaust and air intake silencers in proper working order, or suitable to meet the standards set forth herein.

G. Vibration: Operating or permitting the operation of any device that creates a vibration, which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (150') from the source if on a public space or public right of way. The City of Redlands Municipal Code, Section 8.06.020, defines the vibration perception threshold as 0.01 inches per second (in/sec) RMS. As such, this noise study uses the City of Redlands Municipal Code vibration perception threshold of 0.01 in/sec RMS to assess the potential vibration impacts due to Project construction. Structural damage would not occur at this level.

K. Noise Sensitive Zones: Creating or causing the creation of any sound within any noise sensitive zone, so as to exceed the specified land use noise standards set forth in 8.06.070A of this chapter and subsection 8.06.070B of this chapter, or so as to interfere with the functions of such activity or annoy the occupants in the activity, provided that conspicuous signs are displayed indicating the presence of the zone.

Section 8.06.120 Exemptions.

Construction Activity: This chapter shall not apply to noise sources associated with new construction, remodeling, rehabilitation or grading of any property provided such activities take place between the hours of seven o'clock (7:00) AM and six o'clock (6:00) PM on weekdays, including Saturdays, with no activities taking place at any time on Sundays or federal holidays. All motorized equipment used in such activity shall be equipped with functioning mufflers.

Further, all mobile or stationary internal combustion engine powered equipment or machinery shall be equipped with exhaust and air intake silencers in proper working order, or suitable to meet the standards set forth herein.

The Ordinance also prohibits the operation of any device that creates a vibration, which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (150') from the source if on a public space or public right-of-way.

EXISTING NOISE ENVIRONMENT

EXISTING LAND USES AND SENSITIVE RECEPTORS

The project site is bordered by Alabama Street and single-family detached residential dwelling units to the east; single-family detached residential dwelling units, vacant land, and Orange Avenue to the south; single-family detached residential dwelling units and Iowa Street to the west; and vacant land and single-family detached residential dwelling units to the north. There are several schools within a few miles of the project site.

The State of California defines sensitive receptors as those land uses that require serenity or are otherwise adversely affected by noise events or conditions. Schools, libraries, churches, hospitals, single and multi-family residential, including transient lodging, motels and hotel uses make up the majority of these areas.

Sensitive receptors that may be affected by project-generated noise include the single-family detached residential dwelling units located north, west, and south of the project site, and multi-family attached residential dwelling units located east of the project site.

AMBIENT NOISE MEASUREMENTS

In order to document the existing noise environment, an American National Standards Institute (ANSI Section SI4 1979, Type 1) Larson Davis model LxT sound level meter was used to document existing ambient noise levels. In order to document existing ambient noise levels in the project area, four (4) 10-minute daytime noise measurements were taken between 2:06 PM and 3:25 PM on March 23, 2018. Field worksheets and noise measurement output data are included in Appendix C.

As shown on Figure 3, the noise measurements were taken along the single-family detached residential dwelling units located to the south and west of the project site, and the multi-family attached residential dwelling units located to the east of the project site. Table 3 provides a summary of the short-term ambient noise data. Ambient noise levels measured between 56.6 and 66.3 dBA L_{eq} during the daytime (7:00 AM to 10:00 PM). Estimated ambient nighttime noise levels are anticipated to decrease by five dBA to between 51.6 and 61.3 dBA L_{eq} during nighttime hours. The dominant noise sources were from vehicles traveling along Alabama Street, Orange Avenue, and Iowa Street.

DISCUSSION AND RECOMMENDATIONS

CONSTRUCTION NOISE IMPACTS

Construction noise is considered a short-term impact and would be considered significant if construction activities are undertaken outside the allowable times as described by the City's Municipal Code Section 8.06.120 (G). Existing single-family detached residential dwelling unit located to the east, south, and west of the project site, and the multi-family attached residential dwelling units located to the east of the project site may be affected by short-term noise impacts associated with the transport of workers, the movement of

construction materials to and from the project site, ground clearing, excavation, grading, and building activities. Project generated construction noise will vary depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. The Federal Highway Administration's Roadway Construction Noise Model (RCNM) was utilized to model worst-case construction and demolition noise levels (see Appendix D).

Demolition activities are expected to produce the highest sustained construction noise levels. Demolition is expected to include the use of a concrete saw, three excavators, and two dozers. Noise levels associated with equipment used during the demolition are shown in Table 4. A worst-case construction noise scenario assuming the above listed equipment was operating between 25 and 200 feet from the property line, assuming a use factor of 40 percent for each piece of equipment, unmitigated noise levels could reach 86.4 dBA L_{eq} and 89.6 dBA L_{max} at the property line, and the nearest sensitive receptors during demolition. These noise levels will vary throughout each workday as equipment are moved around the site. Grading activities will produce slightly lower noise levels but will last for a longer period of time.

Construction noise levels at receptors not immediately adjacent to the property line in the immediate vicinity include single and multiple-family residential land uses east of Alabama Street, a church south of the project site, medical offices southwest of the project site. Construction noise levels at these land uses as well as at schools located within approximately ½ mile of the project site are presented in Table 5. It is important to note that the listed noise levels due not take into account any attenuation provided by ground absorption, or by any existing buildings and/or walls. The sound level data in Table 5 shows that construction noise levels at properties not adjacent to the project site can be expected to reach up to 60.4 dBA L_{eq}, and that construction noise at other nearby land uses, including schools will not exceed 50.6 dBA L_{eq}. As listed in Table 3, existing measured ambient noise levels range between 56.6 dBA L_{eq} and 66.3 dBA L_{eq}.

As stated earlier, any construction activities that occur outside the allowable time as identified in Section 8.06.120 (G) of the City's Municipal Code would be considered significant. Further, as required in the City's Municipal Code, all motorized equipment used must be equipped with functioning mufflers. Noise reduction measures are provided below to minimize construction noise impacts. The impact is considered less than significant with compliance of hours of operation restrictions outlined in the Municipal Code and implementation of the mitigation measures (MM 1-5) listed below.

MM1 During all project site excavation and grading on-site, construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturer standards.

MM2 The contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the project site.

MM3 Equipment shall be shut off and not left to idle when not in use.

MM4 The contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise/vibration sources and sensitive receptors nearest the project site during all project construction.

MM5 Jackhammers, pneumatic equipment and all other portable stationary noise sources shall be shielded and noise shall be directed away from sensitive receptors.

VIBRATION IMPACTS

Potential for Damage

Vibration generated by construction activity has the potential to damage structures. This damage could be structural damage, such as cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile.

Caltrans has produced a guidance manual for evaluating potential vibration impacts "Transportation- and Construction-Induced Vibration Guidance Manual" dated September 2013). The manual provides thresholds for potential impacts on human comfort and damage to buildings, as well as guidance for reducing potential vibration impacts and addressing vibration issues. The manual gathers data from multiple sources including the Federal Transit Administration (FTA). As shown in Table 7, 0.20 PPV is the threshold at which there is arisk to "architectural" damage to normal houses.

Vibration levels in the project area may be influenced by construction. Vibration impacts related to structural damage would generally be considered significant if it involves any construction-related or operations-related impacts in excess of 0.2 +inches per second (in/sec) PPV. Further, Section 8.06.090 (G) of the City's Municipal Code prohibits vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred and fifty feet (150 feet) from the source if on a public space or public right-of-way.

Vibratory rollers and/or large bulldozers are the most vibratory pieces of equipment that may be utilized on the project site. As shown in Table 5, vibratory roller could generate up to 0.21 PPV at a distance of 25 feet; and operation of a large bulldozer (0.089 PPV) at a distance of 25 feet. Sensitive receptors in the vicinity of the project site are located adjacent to the south, east, west, and north of the project site. The only receptors that could possibly be affected by groundborne vibration are the homes located immediately adjacent to the project site if a vibrator roller is utilized within 25 feet of a structure or if a large bulldozer is utilized within 15 of a structure. Vibration calculations are provided in Appendix E. With incorporation of mitigation measure 6 listed below, impacts related to groundborne vibration would be less than significant.

MM6 The use of vibratory rollers is to be restricted within 25 feet of the existing structures and the use of large bulldozers is to be restricted within 15 feet of existing structures.

Annoyance

As shown in Table 2, groundborne vibration becomes readily perceptible at 0.8 PPV. A vibratory roller generates vibration levels of 0.8 PPV at a distance of 10 feet and a large bulldozer generates vibration levels of 0.8 PPV at a distance of 6 feet (See Appendix E). Vibratory equipment is not expected to be utilized within 10 feet of an existing structure. Impacts associated annoyance associated with groundborne vibration would be less than significant. Mitigation is not required.

TRAFFIC NOISE IMPACTS

Noise Impacts to Off-Site Receptors Due to Project Generated Trips

A worst-case project generated traffic noise level was modeled utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108. Traffic noise levels were calculated from the centerline of the roadway to the roadway right-of-way (ROW). The modeling is theoretical and does not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Therefore, the levels are shown for comparative purposes only to show the difference in with and without project conditions. Roadway input parameters including average daily traffic volumes (ADTs), speeds, and vehicle distribution data are shown in Table 7. Existing and Existing Plus Project FHWA worksheets are included in Appendix F. The potential off-

site noise impacts caused by an increase of traffic from operation of the proposed project on the nearby roadways were calculated for the following scenarios:

Existing Year (without Project): This scenario refers to existing year traffic noise conditions and is demonstrated in Table 7.

Existing Year (Plus Project): This scenario refers to existing year plus project traffic noise conditions and is also demonstrated in Table 7.

As shown in Table 8, modeled Existing traffic noise levels range between 62.98-75.63 dBA CNEL and the modeled Existing Plus Project traffic noise levels range between 63.35-75.66 dBA CNEL at the right-of-way of each modeled roadway segment. The City's General Plan 2035 identifies a potentially substantial increase as either an increase of four or more dB if the resulting noise level would exceed the clearly compatible standards as identified in Tables 1 and 2 or any increase of 6 dB.

Table 8 shows that all modeled roadway segments are anticipated to change the noise a nominal amount (approximately 0.01 to 1.5 dBA CNEL). Therefore, a change in noise level would not be audible at any sensitive receptors, including nearby schools, and would be considered less than significant. No mitigation is required.

Noise Impacts to the Proposed Project

As stated previously, the City of Redlands has identified noise levels of up to 60 CNEL as "clearly compatible" for multi-family attached residential uses (see Table 1). However, if exterior noise levels range between 60 and 75 CNEL, the City's guidelines recommend discouraging new residential development in that area; and if new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise reduction features included in the design.

The project site is bordered by Orange Avenue, Alabama Street, and Iowa Street. The City of Redlands General Plan 2035 identifies Alabama Street as a Major Arterial roadway and Iowa Street and Orange Avenue as Collector roadways. Future noise levels associated with vehicular traffic traveling on these roadways were modeled using the SoundPLAN model. The Traffic Impact Analysis prepared for the proposed project projects approximately 19,900 average daily traffic volumes to the roadway segment of Alabama Street north of Orange Avenue; 16,400 average daily traffic volumes to the roadway segment of Alabama Street south of Orange Avenue; 3,500 average daily traffic volumes to the roadway segment of Iowa Street along the project site frontage; and 8,000 average daily traffic volumes to the roadway segment of Orange Avenue along the project site frontage. A speed of 30 miles per hour was utilized for modeling input for Orange Avenue and Iowa Street. The posted speed limit for Alabama Street in the vicinity of the project site is 45 miles per hour. SoundPLAN modeling data is included in Appendix G.

As shown on Figure 4, future exterior traffic noise levels at the proposed multi-family (low-rise) attached residential facades along Alabama Street, north of Orange Avenue, are expected to reach up to 68 CNEL at the 1st floor, 71 CNEL at the 2nd floor, and 71 CNEL at the 3rd floor. Windows facing or with a line of sight of Alabama Street, north of Orange Avenue, will need an STC rating of at least 29 to meet the interior noise standard of 45 CNEL.

Future exterior noise levels at the proposed multi-family (low-rise) attached residential facades along Alabama Street, south of Orange Avenue, are expected to reach up to 67 CNEL at the 1st floor, 69 CNEL at the 2nd floor, and 70 CNEL at the 3rd floor. Windows facing or with a line of sight of Alabama Street, north of Orange Avenue, will need an STC rating of at least 28 to meet the interior noise standard of 45 dBA CNEL.

Future exterior noise levels at building facades along Orange Avenue are expected to reach up to 60 CNEL

at the 1st floor, 62 CNEL at the 2nd floor, and 63 CNEL at the 3rd floor. For the proposed multi-family (low-rise) attached residential dwelling units located adjacent to Orange Avenue, windows facing or with a line of sight of Orange Street should have an STC rating of at least 28 to meet the interior noise standard of 45 dBA CNEL.

Future exterior noise levels at the proposed multi-family (low-rise) attached residential facades along Iowa Street are expected to reach up to 56 CNEL at the 1st floor, 55 CNEL at the 2nd floor, and 56 CNEL at the 3rd floor. Considering that typical construction provides approximately 20 dB of exterior to interior noise reduction, additional mitigation measures for the proposed multi-family (low-rise) attached residential facades facing Iowa Street are not necessary.

The City's exterior noise level standard for multiple family residential land uses (60 dBA CNEL) would apply to the outdoor active use areas proposed as part of the project, specifically, the recreation center and the pool area. As shown on Figure 4, future noise levels at these locations are expected to reach up to 55 dBA CNEL and would be consistent with the City's Land Use Compatibility criteria. No mitigation is necessary to reduce future noise levels at the active outdoor use areas.

The City's exterior noise level standard of 60 dBA CNEL does not apply to the proposed balconies and patios because they would not be served as exits from the dwelling units, rather, they would be enclosed with a low wall or railing which would prohibit exit from the dwelling. This guidance is contained in footnote 2 of Table 7-11 in the City of Redlands General Plan 2035 and also presented in Table 2 of this letter report. No mitigation would be required to reduce future noise levels at balconies or patios.

With the addition of windows with STC ratings presented below as mitigation measures, interior noise levels are expected to meet the State Building Code/City of Redlands standard of 45 CNEL.

MM6 Windows facing or with a line of sight of Alabama Street, north of Orange Avenue, will need an STC rating of at least 29 to meet the interior noise standard of 45 CNEL.

MM7 Windows facing or with a line of sight of Alabama Street, north of Orange Avenue, will need an STC rating of at least 28 to meet the interior noise standard of 45 dBA CNEL.

MM8 For the proposed multi-family (low-rise) attached residential dwelling units located adjacent to Orange Avenue, windows facing or with a line of sight of Orange Street should have an STC rating of at least 28 to meet the interior noise standard of 45 dBA CNEL.

OPERATIONAL NOISE IMPACTS

On-site noise sources associated with development of the proposed project will include typical noises associated with residential land uses, including vehicles starting and stopping, passenger loading and unloading; refuse trucks, occasional car alarm activation, landscape maintenance, kids playing. These instantaneous or short-term noise events would range between 55 and 70 dBA at 50 feet from the noise source. Noise associated with proposed park uses will include people talking and socializing along the proposed trails and at the shaded rest areas. Normal conversation is typically 65 dBA. These events and conversation, however, would not occur frequently enough or close enough to sensitive receptors to exceed City of Redlands stationary noise standards or result in a substantial increase in the ambient average (L_{eq}) noise levels, and would not result in significant impacts.

Mr. Christos Hardt, Architectural Designer
MILLER ARCHITECTURE
September 24, 2018 (Revised January 22, 2019, March 8, 2019 & May 22, 2019)

CONCLUSIONS

The noise impacts from the proposed SD Homes Redlands Apartments Project are anticipated to be consistent with applicable General Plan and Municipal Code standards.

It has been a pleasure for Ganddini Group, Inc. to service your needs on this project. Should you have any questions or if we can be of further assistance, please do not hesitate to call at (714) 795-3100.

Respectfully submitted,

Roma Stromberg, INCE/MS
Senior Noise Analyst

18-0085

Table 1
City of Redlands Noise/Land Use Compatibility Matrix[1]

Land Use Categories		Community Noise Equivalent Level (CNEL)						
Categories	Uses	< 60	65	70	75	80	85 >	
RESIDENTIAL	Single Family, Duplex, Multi-Family	A	C	C	C	D	D	D
RESIDENTIAL	Mobile Homes	A	C	C	C	D	D	D
COMMERCIAL- Regional, District	Hotels, Motels, Transient Lodging	A	A	B	B	C	C	D
COMMERCIAL- Regional, Village District, Special	Commercial Retail, Bank, Restaurant, Movie Theater	A	A	A	A	B	B	C
COMMERCIAL INDUSTRIAL INSTITUTIONAL	Office Buildings, Research and Development, Professional Offices, City Office Building	A	A	A	B	B	C	D
COMMERCIAL- Recreation INSTITUTIONAL- Civic Center	Amphitheater, Concert Hall, Auditorium, Meeting Hall	B	B	C	C	D	D	D
COMMERCIAL- Recreation	Children's Amusement Park, Miniature Golf Course, Go-cart Track, Equestrian Center, Sports Club	A	A	A	A	B	B	B
COMMERCIAL- General, Special INDUSTRIAL INSTITUTIONAL	Automobile Service Station, Auto Dealership, Manufacturing, Warehousing, Wholesale, Utilities	A	A	A	A	B	B	B
INSTITUTIONAL- General	Hospital, Church, Library, School Classroom	A	A	B	C	C	D	D
OPEN SPACE	Parks	A	A	A	B	C	D	D
OPEN SPACE	Golf Course, Cemeteries, Nature Centers, Wildlife Reserves, Wildlife Habitat	A	A	A	A	B	C	C
AGRICULTURE	Agriculture	A	A	A	A	A	A	A
Zone A: Clearly Compatible		Specified land use is satisfactory, based up the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.						
Zone B: Normally Compatible		New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements are made and needed noise insulation features in the design are determined. Conventional constuction, with closed windows and fresh air supply systems or air conditioning, will normally suffice.						
Zone C: Normally Incompatible		New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise reduction features included in the design.						
Zone D: Clearly Incompatible:		New construction or development should generally not be undertaken.						

Notes:

(1) Source: City of Redlands General Plan Noise Element (GP Table 9.1), 2010.

Table 2
City of Redlands Interior and Exterior Noise Standards[1]

Land Use Categories	Community Noise Equivalent Level (CNEL)	
	Interior[1]	Exterior[2]
Residential		
Single Family, Duplex, Multiple Family	45 [3]	60
Mobile Home	-	60 [4]
Commercial. Industrial, Institutional		
Hotel, Motel, Transient Lodging	45	65 [5]
Commercial Retail, Bank, Restaurant	55	-
Office Building, Research & Development, Professional Offices, City Office Building	50	-
Amphitheater, Concert Hall, Auditorium, Meeting Hall	45	-
Gymnasium (Multipurpose)	50	-
Sports Club	55	-
Manufacturing, Warehousing, Wholesale, Utilities	60	-
Movie Theaters	45	-
Institutional		
Hospitals, Schools, Classrooms	45	60
Open Space		
Parks	-	60

Notes:

* CNEL (Community Noise Equivalent Level) - The average equivalent A-Weighted sound level during a 24 hour day, obtained afte approximately five decibels to sound levels in the evening from 7:00 PM to 10:00 PM and ten decibels to sound levels at night a and before 7:00 AM.

(1) Indoor environment excluding bathrooms, toilets, closest, corridors.

(2) Outdoor environment limited to private yard of single-family as measured at the property line; multi-family private patio or balcc means of exit from inside; mobile home park; hospital patio; park picnic area; school playground; hotel and recreational area.

(3) Noise level requirement with open windows, if they are used to meet natural ventilation requirement.

(4) Exterior noise level should be such that interior level will not exceed 45 CNEL.

(5) Except those areas affected by aircraft noise.

Table 3
Short-Term Noise Measurement Summary (dBA)[1,2]

Daytime								
Site Location	Time Started	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)
NM1	2:06 PM	64.6	80.3	41.6	73.8	68.5	63.9	57.8
NM2	2:27 PM	59.4	73.9	40.2	68.1	64.9	58.8	51.0
NM3	2:49 PM	56.6	77.0	41.3	64.1	61.0	55.7	50.5
NM4	3:15 PM	66.3	80.4	45.0	73.5	70.2	67.1	63.3

Notes:

(1) See Figure 3 for noise measurement locations. Each noise measurement was performed over a 10-minute duration.

(2) Noise measurements performed on March 23, 2018.

Table 4
Typical Construction Equipment Noise Levels

Type of Equipment	Sound Levels Measured (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Rock Drills	83-99	96
Jack Hammers	75-85	82
Pneumatic Tools	78-88	85
Pumps	74-84	80
Dozers	77-90	85
Scrappers	83-91	87
Haul Trucks	83-94	88
Cranes	79-86	82
Portable Generators	71-87	80
Rollers	75-82	80
Tractors	77-82	80
Front-End Loaders	77-90	86
Hydraulic Excavators	81-90	86
Graders	79-89	86
Air Compressors	76-89	86
Trucks	81-87	86

Notes:
(1) Source: Bolt, Beranek & Newman; Noise Control for Buildings and Manufacturing Plants, 1987.

Table 5
Construction Noise Levels

Land Use	Distance from Project (miles)	Distance from Project (Approximate feet)	Construction Noise Levels (Leq)
Adjacent Land Uses	(Adjacent)	(Adjacent)	86.4
Single Family Residential East of Alabama Street	0.01	60	60.4
Multiple Family East of Alabama Street	0.04	250	48
Single Family South of the Project Site	0.03	185	50.6
Church South of the Project Site	0.06	330	45.6
Medical Offices Southwest of the Project Site	0.05	280	47
The Grove School Farm Campus	0.02	105.6	55.5
Barton Road KinderCare	0.1	528	41.6
Montessori in Redlands	0.13	686.4	39.3
Grove High School	0.13	686.4	39.3
Barton House Playschool	0.24	1,267.20	34
Arrowhead Christian Academy	0.38	2,006.40	30
Redlands Adventist Academy	0.52	2,745.60	27.3

Source: Google Earth, 2018.

[1] Construction noise calculations do not take into account additional attenuation provided by ground absorption, and intervening buildings and fences.

Table 6
Construction Equipment Vibration Source Levels[1]

Equipment	Community Noise Equivalent Level (CNEL) or Day-Night Level (Ldn), dB		
	at 25 feet	at 50 feet	at 100 feet
Clam Shovel Drop (slurry wall)	**0.202**	0.071	0.025
Vibratory Roller	**0.210**	0.074	0.026
Hoe Ram	**0.089**	0.031	0.011
Large Bulldozer	**0.089**	0.031	0.011
Caisson Drilling	**0.089**	0.031	0.011
Loaded Trucks	0.076	0.027	0.010
Jackhammer	0.035	0.012	0.004
Small Bulldozer	0.003	0.001	0.0004

Notes:

(1) Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, 2006.

(2) Bold values are considered annoying to people.

Table 7
Typical Human Reaction and Effect on Buildings Due to Groundborne Vibration

Vibration Level Peak Particle Velocity (PPV)	Human Reaction	Effect on Buildings
0.006–0.019 in/sec	Threshold of perception, possibility of intrusion	Vibrations unlikely to cause damage of any type
0.08 in/sec	Vibrations readily perceptible	Recommended upper level of vibration to which ruins and ancient monuments should be subjected
0.10 in/sec	Level at which continuous vibration begins to annoy people	Virtually no risk of "architectural" (i.e., not structural) damage to normal buildings
0.20 in/sec	Vibrations annoying to people in buildings	Threshold at which there is a risk to "architectural" damage to normal dwelling – houses with plastered walls and ceilings
0.4–0.6 in/sec	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage

Notes:
(1) Source: California Department of Transportation. Transportation and Construction Vibration Guidance Manual, Chapter 6 Tables 5 and 12, September 2013.

Table 9
Comparison of Existing and Existing Plus Project Traffic Noise Levels

Roadway	Segment	Distance from roadway centerline to receiver (feet)[1]	Modeled Noise Levels (dBA CNEL)					
			Existing	Existing Plus Project	Increase	Exceeds Land Use Compatibility Standards	Over 4 dB Increase?	Substantial Increase?
Iowa Street	Orange Avenue to Barton Road	32	62.98	63.35	0.37	NO	NO	NO
Alabama Street	North of Redlands Boulevard	55	74.44	74.48	0.04	YES	NO	NO
	Redlands Boulevard to Park Avenue	55	73.29	73.39	0.10	YES	NO	NO
	Park Avenue to Citrus Avenue/State Street	55	74.37	74.50	0.13	YES	NO	NO
	Citrus Avenue/State Street to Orange Avenue	55	74.23	74.37	0.14	YES	NO	NO
	Orange Avenue to Barton Road	55	74.23	74.28	0.05	YES	NO	NO
Redlands Boulevard	West of Alabama Street	55	74.89	74.92	0.03	YES	NO	NO
	East of Alabama Street	55	74.31	74.34	0.03	YES	NO	NO
Orange Avenue	West of Iowa Street	32	64.15	64.56	0.41	NO	NO	NO
	East of Iowa Street	32	64.39	65.02	0.63	NO	NO	NO
	West of Alabama Street	32	64.96	66.46	1.50	NO	NO	NO
	East of Alabama Street	32	64.96	65.07	0.11	NO	NO	NO
Barton Road	West of Iowa Street	55	75.63	75.66	0.03	YES	NO	NO
	Iowa Street to Alabama Street	55	75.59	75.60	0.01	YES	NO	NO
	East of Alabama Street	55	74.43	74.46	0.03	YES	NO	NO

Notes:
(1) Distance from the roadway centerline to the roadway ROW. ROW distances were estimated based on the Illustrative Street Sections provided in the City of Redlands General Plan 2035 (December 2017).

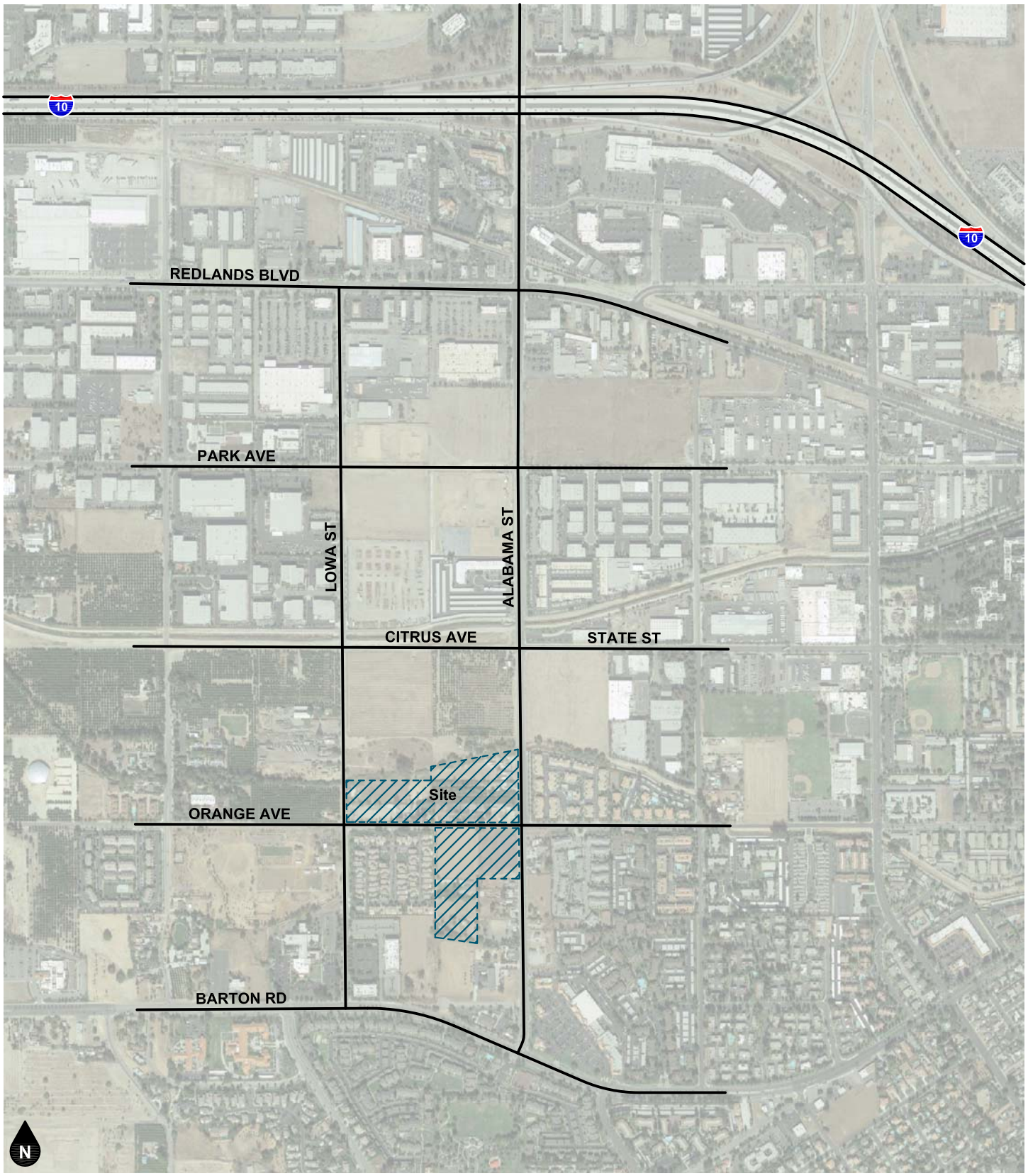


Figure 1
Project Location Map

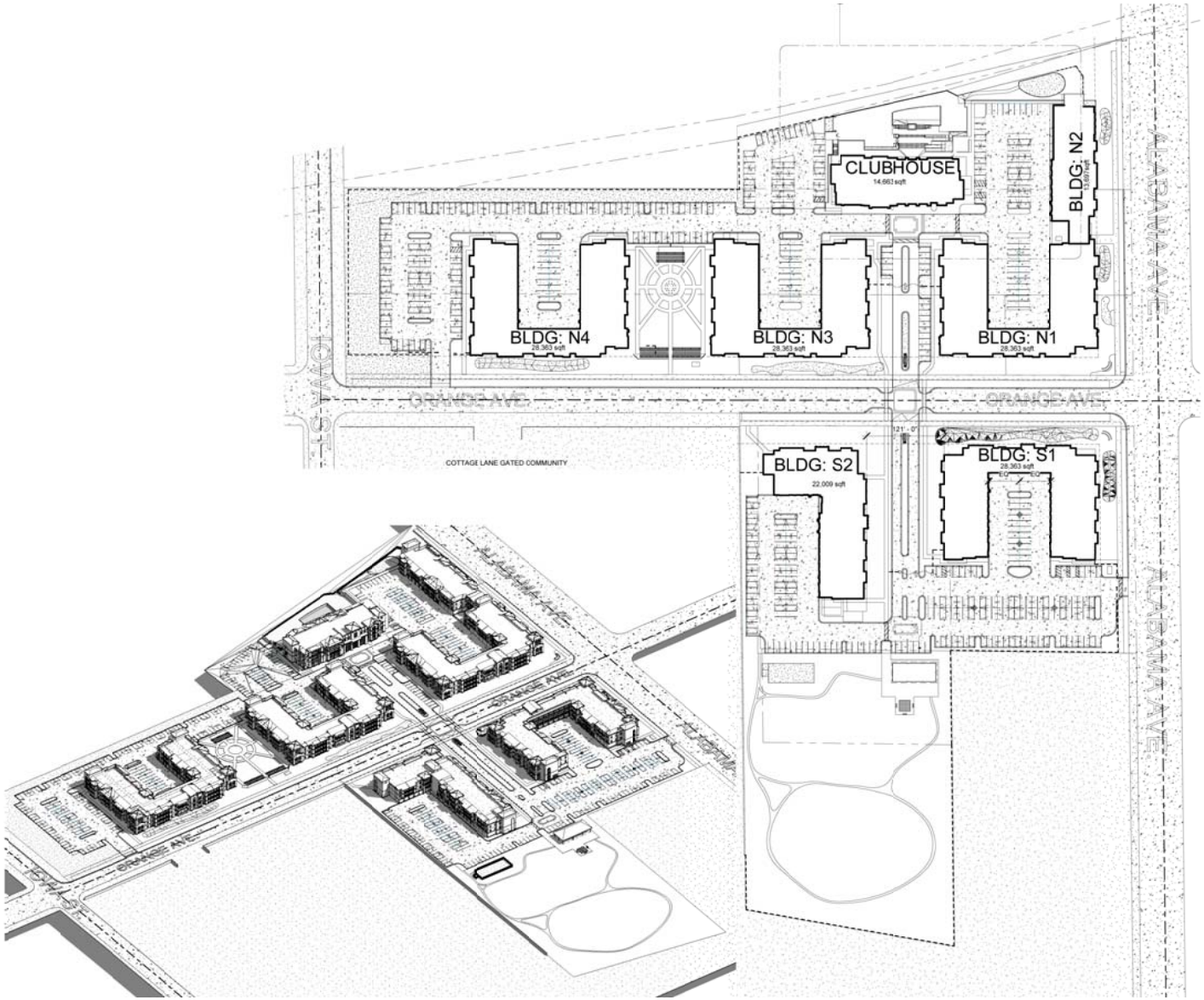
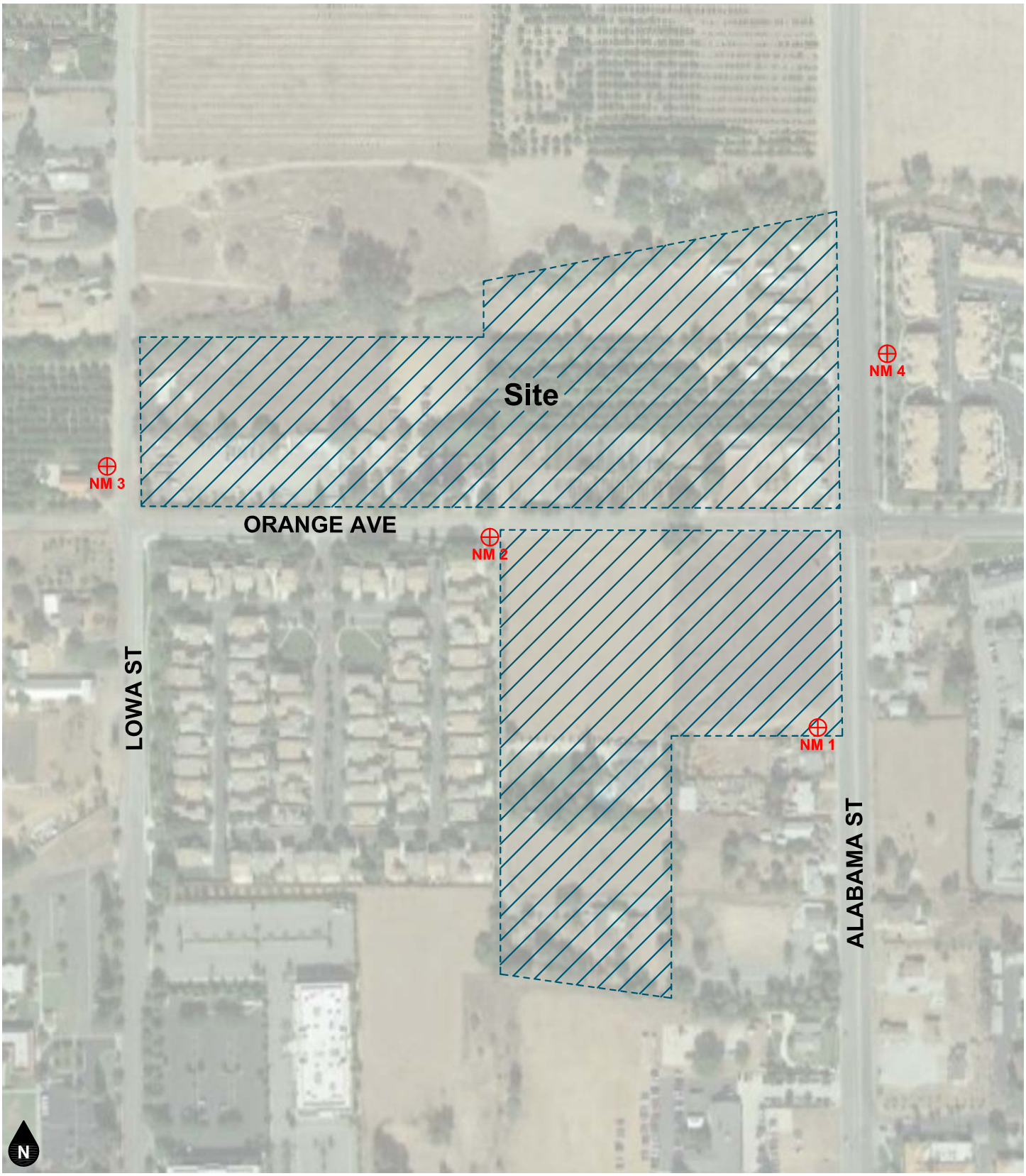


Figure 2
Site Plan



Legend
⊕ Noise Measurement Location
NM 1

Figure 3
Noise Measurement Location Map

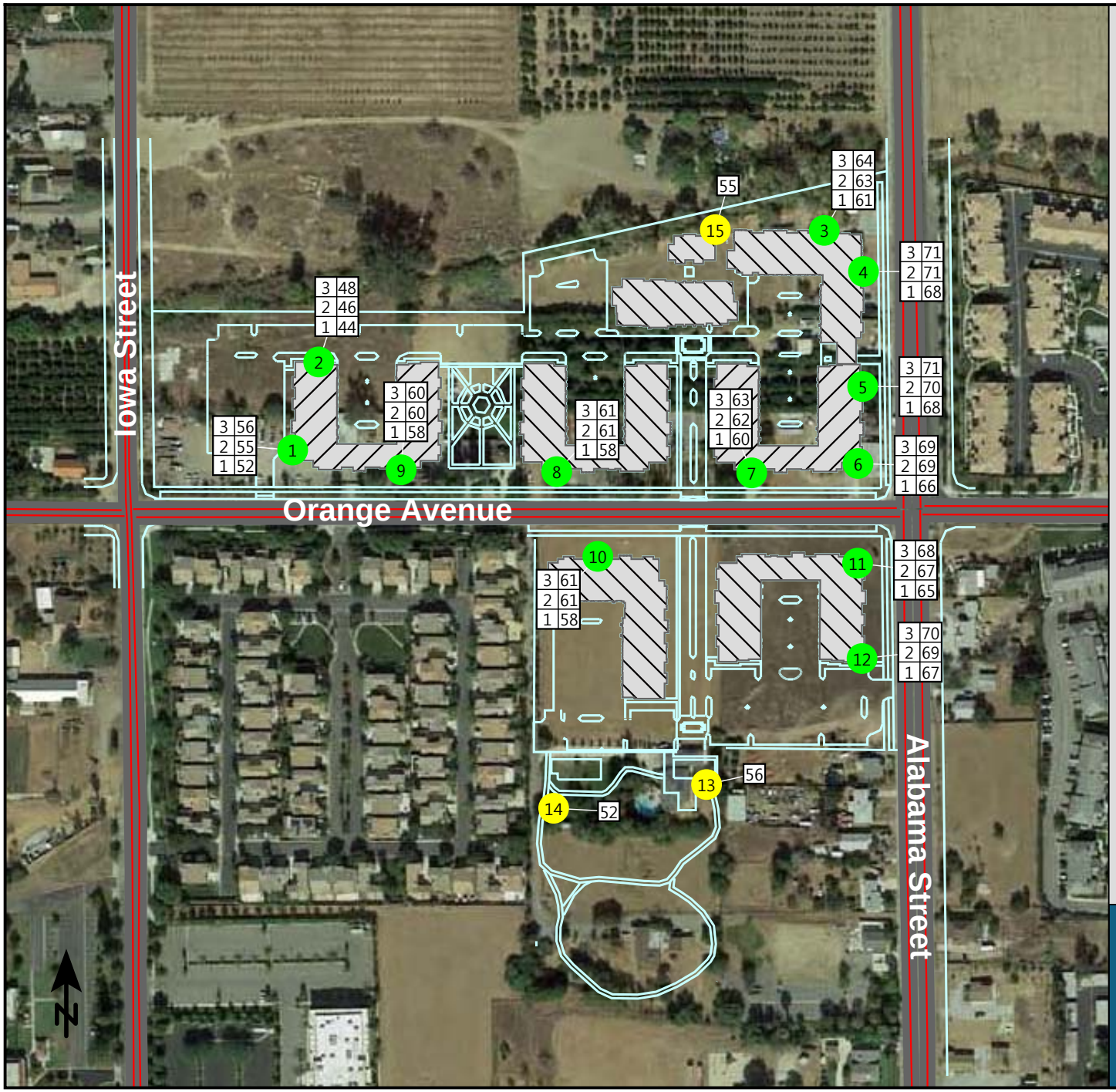


Figure 4
Horizon Year 2040
Future Traffic Noise Levels

Signs and symbols

- Parking Areas & Project Boundary
- Proposed Buildings
- Receiver
- Receiver at building
- Roads
- Noise Levels (1st, 2nd, 3rd Floors)

1 : 250

0 50 100 200 300 400 feet

gandini

APPENDIX A

LIST OF ACRONYMS

TERMS	DEFINITIONS
ADT	Average Daily Traffic volume
ANSI	American National Standard Institute
APN	Assessor's Parcel Number
Caltrans	California Department of Transportation
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
D/E/N	Day/Evening/Night
dB	Decibel
dBA or dB(A)	Decibel "A-Weighted"
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
Hz	Hertz
INCE	Institute of Noise Control Engineering
L_{02},L_{08},L_{50},L_{90}	A-weighted Noise Levels at 2 percent, 8 percent, 50 percent, and 90 percent, Respectively, of the time period
DNL	Day-Night Average Noise Level
$L_{eq(x)}$	Equivalent Noise Level for "x" period of Time
L_{max}	Maximum Level of Noise (measured using a sound level meter)
L_{min}	Minimum Level of Noise (measured using a sound level meter)
LOS C	Level of Service C
MPH	Miles Per Hour
NEPA	National Environmental Policy Act
OPR	California Governor's Office of Planning and Research
Peak Hour L_{eq}	Peak Hour Equivalent Sound Level
PPV	Peak Particle Velocity
RCNM	Road Construction Noise Model
RMS	Root Mean Square
SEL	Single Event Level or Sound Exposure Level
SPL	Sound Pressure Level
STC	Sound Transmission Class
VdB	Vibration Velocity Decibels

APPENDIX B

DEFINITIONS OF ACOUSTICAL TERMS

Term	Definition
Ambient Noise Level	The all-encompassing noise environment associated with a given environment, at a specified time, usually a composite of sound from many sources, at many directions, near and far, in which usually no particular sound is dominant.
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear.
CNEL	Community Noise Equivalent Level. CNEL is a weighted 24-hour noise level that is obtained by adding five decibels to sound levels in the evening (7:00 PM to 10:00 PM), and by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the evening and nighttime hours.
Decibel, dB	A logarithmic unit of noise level measurement that relates the energy of a noise source to that of a constant reference level; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
DNL, Ldn	Day Night Level. The DNL, or Ldn is a weighted 24-hour noise level that is obtained by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the nighttime hours.
Equivalent Continuous Noise Level, L_{eq}	A level of steady state sound that in a stated time period, and a stated location, has the same A-weighted sound energy as the time-varying sound.
Fast/Slow Meter Response	The fast and slow meter responses are different settings on a sound level meter. The fast response setting takes a measurement every 100 milliseconds, while a slow setting takes one every second.
Frequency, Hertz	In a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., the number of cycles per second).
L_{02}, L_{08}, L_{50}, L_{90}	The A-weighted noise levels that are equaled or exceeded by a fluctuating sound level, 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period, respectively.
L_{max}, L_{min}	L_{max} is the RMS (root mean squared) maximum level of a noise source or environment measured on a sound level meter, during a designated time interval, using fast meter response. L_{min} is the minimum level.
Offensive/ Offending/ Intrusive Noise	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of sound depends on its amplitude, duration, frequency, and time of occurrence, and tonal information content as well as the prevailing ambient noise level.
Root Mean Square (RMS)	A measure of the magnitude of a varying noise source quantity. The name derives from the calculation of the square root of the mean of the squares of the values. It can be calculated from either a series of lone values or a continuous varying function.

APPENDIX C

NOISE MONITORING FIELD WORKSHEETS

Noise Measurement
Field Data

Project Name: SD Homes Date: **23-Mar-18**

Project #: 18-0085

Noise Measurement #: NM1 **3099 LxT_Data131.xlsx** Technician: **Ian Edward Gallagher**

Nearest Address or Cross Street: **Alabama Street & Orange Avenue**

Site Description (Type of Existing Land Use and any other notable features) **Empty lot, grassy field. Surrounding, rural, farm style homes, cittrus groves, developing compact residemtial.**

Weather: **~30% cloudy, cumulus above and heavy rain clouds to the North, sunshine and blue sky between the clouds.** **Settings:** **SLOW** **FAST** (Circle one)

Temperature: 68 deg F **Wind: Calm - 3 mph** **Humidity: 47%** **Flat**

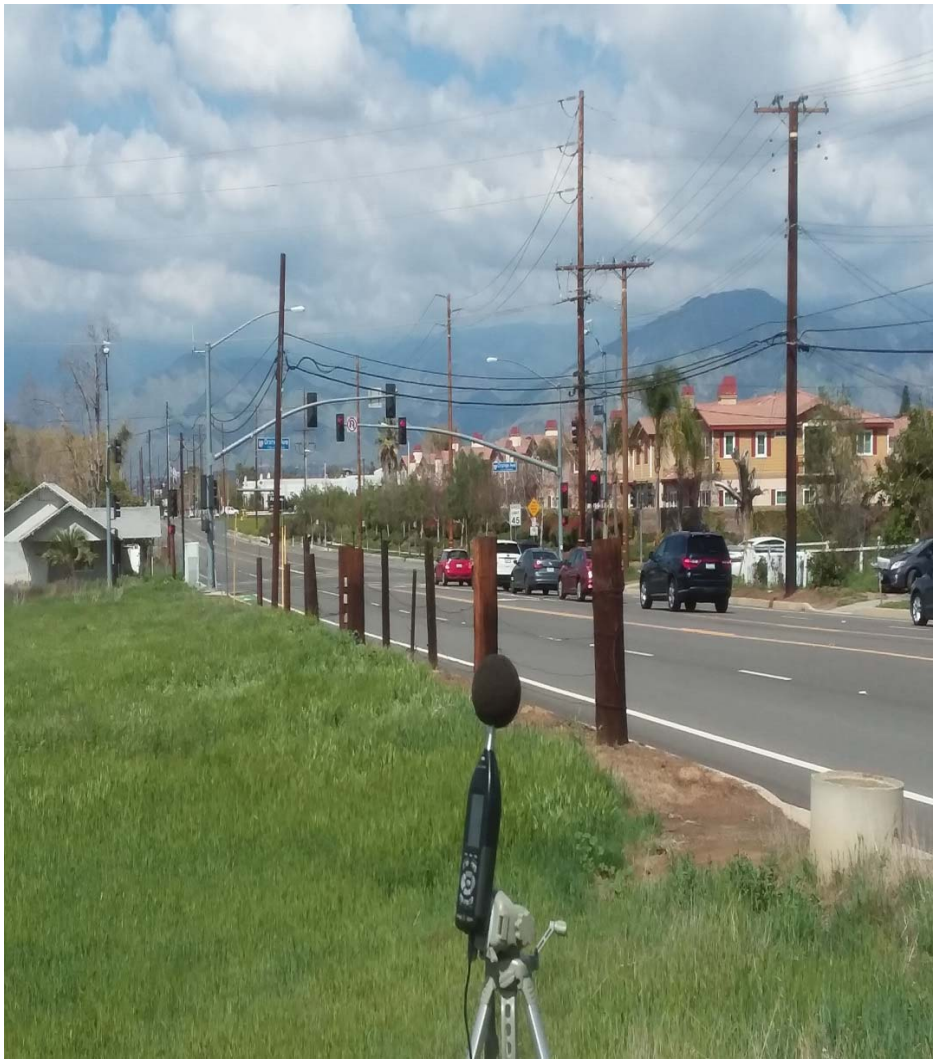
Start Time: **2:06 PM** **End Time:** **2:16 PM** **Run Time:** **10 minutes**

Leq:	64.6 **dB**	**Primary Noise Source:**	**Traffic noise from vehicles running along Alabama Street**
Lmax	80.3 **dB**		
L2	73.8 **dB**	**Secondary Noise Sources:**	**Overhead aircraft, propellor planes and higher altitude commercial jet aircraft**
L8	68.5 **dB**		**Bird song**
L25	63.9 **dB**		**Occasional dog bark from distant residence.**
L50	57.8 **dB**		

NOISE METER:	SoundTrack LxT Class 1 ;	**CALIBRATOR:**	Larson Davis CAL250 Acoustic Calibrator
MAKE:	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LxT1	**MODEL:**	Cal250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	6/23/2017	**FACTORY CALIBRATION DATE:**	6/9/2017
FIELD CALIBRATION DATE:	3/23/2018		

Noise Measurement
Field Data

Additional Notes/Sketch



JN 18-0085 NM1 looking North towards Alabama Street & Orange Avenue intersection.

JN 18-0085 NM1 looking East across Alabama Street towards 76 Alabama Street residence.

Summary						
File Name	LxT_Data.131					
Serial Number	0003099					
Model	SoundTrack LxT®					
Firmware Version	2.301					
User	Ian Edward Gallagher					
Location	JN18-0085 NM1					
Job Description	10 minute noise sample					
Start	2018-03-23 14:06:26					
Stop	2018-03-23 14:16:26					
Duration	0:10:00.0					
Run Time	0:10:00.0					
Pause	0:00:00.0					
Pre Calibration	2018-03-23 14:06:14					
Post Calibration	None					
Calibration Deviation	---					
Overall Settings						
RMS Weight	A Weighting					
Peak Weight	Z Weighting					
Detector	Slow					
Preamp	PRMLxT1L					
Microphone Correction	Off					
Integration Method	Linear					
OBA Range	Low					
OBA Bandwidth	1/1 and 1/3					
OBA Freq. Weighting	Z Weighting					
OBA Max Spectrum	Bin Max					
Overload	122.5 dB					
Results						
LAeq	64.6 dB					
LAE	92.4 dB					
EA	190.905 µPa²h					
EA8	9.163 mPa²h					
EA40	45.817 mPa²h					
LZpeak (max)	2018-03-23 14:08:22	102.3 dB				
LASmax	2018-03-23 14:08:22	80.3 dB				
LASmin	2018-03-23 14:16:13	41.6 dB				
SEA	-99.9 dB					
			Statistics			
LCeq	72.5 dB		**LAS2.00**	73.8 dB		
LAeq	64.6 dB		**LAS8.00**	68.5 dB		
LCeq - LAeq	7.9 dB		**LAS25.00**	63.9 dB		
LAIeq	66.5 dB		**LAS50.00**	57.8 dB		
LAeq	64.6 dB		**LAS66.60**	54.8 dB		
LAIeq - LAeq	1.9 dB		**LAS90.00**	48.5 dB		
# Overloads	0					

Noise Measurement
Field Data

Project Name: SD Homes Date: **23-Mar-18**

Project #: 18-0085

Noise Measurement #: NM2 **3099 LxT_Data132.xlsx** Technician: **Ian Edward Gallagher**

Nearest Address or Cross Street: Alabama Street & Orange Avenue

Site Description (Type of Existing Land Use and any other notable features): Empty lot, grassy field. Surrounding, rural, farm style homes, cittrus groves, developing compact residemces.

Weather: ~30% cloudy, cumulus above and heavy rain clouds to the North, sunshine and blue sky between the clouds. **Settings:** **SLOW** **FAST** (Circle one)

Temperature: 68 deg F **Wind:** Calm - 3 mph **Humidity:** 47% **Flat**

Start Time: 2:27 PM **End Time:** 2:37 PM **Run Time:** 10 minutes

Leq:	59.4 dB	**Primary Noise Source:**	Traffic noise from vehicles running along Orange Avenue
Lmax	73.9 dB		
L2	68.1 dB	**Secondary Noise Sources:**	Overhead aircraft, propellor planes and higher altitude commercial jet aircraft
L8	64.9 dB		Bird song
L25	58.8 dB		Occasional dog bark from distant residence.
L50	51.0 dB		Residential ambiance, children playing near by.

NOISE METER:	SoundTrack LxT Class 1 ;	**CALIBRATOR:**	Larson Davis CAL250 Acoustic Calibrator
MAKE: ;	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LxT1	**MODEL:**	Cal250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	6/23/2017	**FACTORY CALIBRATION DATE:**	6/9/2017
FIELD CALIBRATION DATE:	3/23/2018		

Noise Measurement
Field Data

Additional Notes/Sketch

JN 18-0085 NM2 looking East down Orange Avenue towards Alabama Street.

JN 18-0085 NM2 looking North across Orange Ave towards 27154 Orange Ave residence.

Summary					
File Name	LxT_Data.132				
Serial Number	0003099				
Model	SoundTrack LxT®				
Firmware Version	2.301				
User	Ian Edward Gallagher				
Location	JN18-0085 NM2				
Job Description	10 minute noise sample				
Start	2018-03-23 14:27:57				
Stop	2018-03-23 14:37:57				
Duration	0:10:00.0				
Run Time	0:10:00.0				
Pause	0:00:00.0				
Pre Calibration	2018-03-23 14:27:37				
Post Calibration	None				
Calibration Deviation	---				
Overall Settings					
RMS Weight	A Weighting				
Peak Weight	Z Weighting				
Detector	Slow				
Preamp	PRMLxT1L				
Microphone Correction	Off				
Integration Method	Linear				
OBA Range	Low				
OBA Bandwidth	1/1 and 1/3				
OBA Freq. Weighting	Z Weighting				
OBA Max Spectrum	Bin Max				
Overload	122.6 dB				
Results					
LAeq	59.4 dB				
LAE	87.2 dB				
EA	58.137 µPa²h				
EA8	2.791 mPa²h				
EA40	13.953 mPa²h				
LZpeak (max)	2018-03-23 14:30:50	94.2 dB			
LASmax	2018-03-23 14:29:29	73.9 dB			
LASmin	2018-03-23 14:31:50	40.2 dB			
SEA	-99.9 dB				
			Statistics		
LCeq	65.7 dB		**LAS2.00**	68.1 dB	
LAeq	59.4 dB		**LAS8.00**	64.9 dB	
LCeq - LAeq	6.3 dB		**LAS25.00**	58.8 dB	
LAIeq	61.5 dB		**LAS50.00**	51.0 dB	
LAeq	59.4 dB		**LAS66.60**	47.1 dB	
LAIeq - LAeq	2.1 dB		**LAS90.00**	43.6 dB	
# Overloads	0				

Noise Measurement
Field Data

Project Name: SD Homes Date: **23-Mar-18**

Project #: 18-0085

Noise Measurement #: NM3 **3099 LxT_Data133.xlsx** Technician: **Ian Edward Gallagher**

Nearest Address or Cross Street: Iowa Street & Orange Avenue

Site Description (Type of Existing Land Use and any other notable features) Empty lot, grassy field. Surrounding, rural, farm style homes, cittrus groves, developing compact residemces.

Weather: ~30% cloudy, cumulus above and heavy rain clouds to the North, sunshine and blue sky between the clouds. **Settings:** **SLOW** **FAST** (Circle one)

Temperature: 69 deg F **Wind: Calm - 3 mph** **Humidity: 45%** **Flat**

Start Time: 2:49 PM **End Time:** 2:59 PM **Run Time:** 10 minutes

Leq:	56.6 **dB**	**Primary Noise Source:**	Traffic noise from vehicles running along Iowa Street & Orange Avenue
Lmax	77 **dB**		Truck parks on Iowa St at 2:58 PM ~50' from NM3 location. Air brakes, diesel engine noise.
L2	64.1 **dB**	**Secondary Noise Sources:**	Overhead aircraft, propellor planes and higher altitude commercial jet aircraft
L8	61.0 **dB**		Bird song.
L25	55.7 **dB**		Occasional dog bark from distant residence.
L50	50.5 **dB**		

NOISE METER:	SoundTrack LxT Class 1 ;	**CALIBRATOR:**	Larson Davis CAL250 Acoustic Calibrator
MAKE: ;	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LxT1	**MODEL:**	Cal250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	6/23/2017	**FACTORY CALIBRATION DATE:**	6/9/2017
FIELD CALIBRATION DATE:	3/23/2018		

Noise Measurement
Field Data

Additional Notes/Sketch

JN 18-0085 NM3 looking South towards Iowa Street & Orange Avenue intersection

JN 18-0085 NM3 looking West at empty residence .

Summary						
File Name	LxT_Data.133					
Serial Number	0003099					
Model	SoundTrack LxT®					
Firmware Version	2.301					
User						
Location						
Measurement Description						
Start	2018-03-23 14:49:11					
Stop	2018-03-23 14:59:11					
Duration	0:10:00.0					
Run Time	0:10:00.0					
Pause	0:00:00.0					
Pre Calibration	2018-03-23 14:48:57					
Post Calibration	None					
Calibration Deviation	---					
Overall Settings						
RMS Weight	A Weighting					
Peak Weight	Z Weighting					
Detector	Slow					
Preamp	PRMLxT1L					
Microphone Correction	Off					
Integration Method	Linear					
OBA Range	Low					
OBA Bandwidth	1/1 and 1/3					
OBA Freq. Weighting	Z Weighting					
OBA Max Spectrum	Bin Max					
Overload	122.5 dB					
Results						
LAeq	56.6 dB					
LAE	84.4 dB					
EA	30.364 µPa²h					
EA8	1.457 mPa²h					
EA40	7.287 mPa²h					
LZpeak (max)	2018-03-23 14:58:20	98.5 dB				
LASmax	2018-03-23 14:58:20	77.0 dB				
LASmin	2018-03-23 14:53:28	41.3 dB				
SEA	-99.9 dB					
			Statistics			
LCeq	66.2 dB		**LAS2.00**	64.1 dB		
LAeq	56.6 dB		**LAS8.00**	61.0 dB		
LCeq - LAeq	9.6 dB		**LAS25.00**	55.7 dB		
LAIeq	62.3 dB		**LAS50.00**	50.5 dB		
LAeq	56.6 dB		**LAS66.60**	47.9 dB		
LAIeq - LAeq	5.7 dB		**LAS90.00**	44.7 dB		
# Overloads	0					

Noise Measurement
Field Data

Project Name: SD Homes Date: **23-Mar-18**

Project #: 18-0085

Noise Measurement #: NM4 **3099 LxT_Data134.xlsx** Technician: **Ian Edward Gallagher**

Nearest Address or Cross Street: **Alabama Street & Orange Avenue**

Site Description (Type of Existing Land Use and any other notable features) **Empty lot, grassy field. Surrounding, rural, farm style homes, cittrus groves, developing compact residemces.**

Weather: **~30% cloudy, cumulus above and heavy rain clouds to the North, sunshine and blue sky between the clouds.** **Settings:** **SLOW** **FAST** (Circle one)

Temperature: 69 deg F **Wind: Calm - 3 mph** **Humidity: 43%** **Flat**

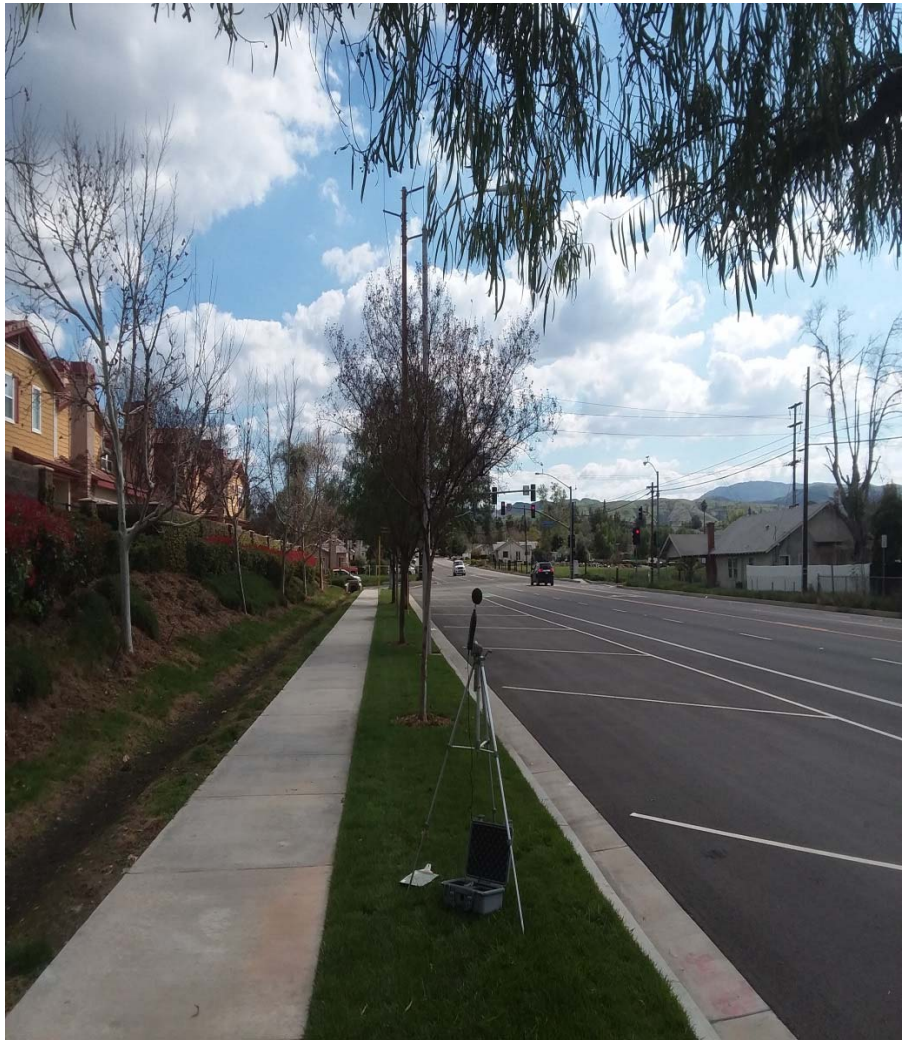
Start Time: **3:15 PM** **End Time:** **3:25 PM** **Run Time:** **10 minutes**

Leq:	66.3 **dB**	**Primary Noise Source:**	**Traffic noise from vehicles running along Alabama Street**
Lmax	80.4 **dB**		
L2	73.5 **dB**	**Secondary Noise Sources:**	**Overhead aircraft, propellor planes and higher altitude commercial jet aircraft**
L8	70.2 **dB**		**Bird song.**
L25	67.1 **dB**		
L50	63.3 **dB**		

NOISE METER:	SoundTrack LxT Class 1 ;	**CALIBRATOR:**	Larson Davis CAL250 Acoustic Calibrator
MAKE: ;	Larson Davis	**MAKE:**	Larson Davis
MODEL:	LxT1	**MODEL:**	Cal250
SERIAL NUMBER:	3099	**SERIAL NUMBER:**	2723
FACTORY CALIBRATION DATE:	6/23/2017	**FACTORY CALIBRATION DATE:**	6/9/2017
FIELD CALIBRATION DATE:	3/23/2018		

Noise Measurement
Field Data

Additional Notes/Sketch



JN 18-0085 NM4 looking South down Alabama Street towards Orange Avenue.

JN 18-0085 NM4 looking West across Alabama Street towards residences.

Summary

File Name	LxT_Data.134
Serial Number	0003099
Model	SoundTrack LxT®
Firmware Version	2.301
User	Ian Edward Gallagher
Location	JN 18-0085 NM4
Job Description	10 minute noise sample
Start	2018-03-23 15:15:25
Stop	2018-03-23 15:25:25
Duration	0:10:00.0
Run Time	0:10:00.0
Pause	0:00:00.0

Pre Calibration	2018-03-23 15:15:08
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamp	PRMLxT1L
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Freq. Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Overload	122.6 dB

Results

LAeq	66.3 dB		
LAE	94.1 dB		
EA	284.340 µPa²h		
EA8	13.648 mPa²h		
EA40	68.242 mPa²h		
LZpeak (max)	2018-03-23 15:22:01	97.8 dB	
LASmax	2018-03-23 15:22:02	80.4 dB	
LASmin	2018-03-23 15:22:48	45.0 dB	
SEA	-99.9 dB		
		Statistics	
LCeq	72.3 dB	**LAS2.00**	73.5 dB
LAeq	66.3 dB	**LAS8.00**	70.2 dB
LCeq - LAeq	6.0 dB	**LAS25.00**	67.1 dB
LAIeq	67.4 dB	**LAS50.00**	63.3 dB
LAeq	66.3 dB	**LAS66.60**	60.9 dB
LAIeq - LAeq	1.1 dB	**LAS90.00**	53.4 dB
# Overloads	0		

APPENDIX D

RCNM NOISE MODELING OUTPUT

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/24/2018
Case Description: SD Homes

		Baselines (dBA)		---- Receptor #1 ----
Description	Land Use	Daytime	Evening	Night
Demolition	Residential	65	65	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Saw	No	20		89.6	50	0
Excavator	No	40		80.7	50	0
Excavator	No	40		80.7	25	0
Dozer	No	40		81.7	100	0
Dozer	No	40		81.7	200	0

		Calculated (dBA)		Results
Equipment		*Lmax	Leq	
Concrete Saw		89.6	82.6	
Excavator		80.7	76.7	
Excavator		86.7	82.8	
Dozer		75.6	71.7	
Dozer		69.6	65.6	
	Total	**89.6**	**86.4**	

*Calculated Lmax is the Loudest value.

APPENDIX E

VIBRATION WORKSHEETS

GROUNDBORNE VIBRATION ANALYSIS

Project:	SD Homes	Date:	3/8/19
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Project Site		
Address:			

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment Type =	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	25.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	0.21	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	SD Homes	Date:	3/8/19
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Project Site		
Address:			

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	15.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	0.2	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	SD Homes	Date:	3/8/19
Source:	Vibratory Roller		
Scenario:	Unmitigated		
Location:	Project Site		
Address:			

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment Type	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	10.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	0.8	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	SD Homes	Date:	3/8/19
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Project Site		
Address:			

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment Type =	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	6.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

RESULTS

PPV =	0.8	IN/SEC	OUTPUT IN BLUE

APPENDIX F

PROJECT-GENERATED TRAFFIC FHWA WORKSHEETS

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**

Road: **Iowa Street**

Segment: **Orange Avenue to Barton Road**

	DAYTIME			EVENING			NIGHTTIME			ADT	2600.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	32.00
INPUT PARAMETERS											
Vehicles per hour	159.46	1.95	0.76	117.84	0.35	0.35	29.52	2.60	1.01	% A	97.4
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.84
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	0.74
ADJUSTMENTS											
Flow	16.28	-2.85	-6.95	14.97	-10.36	-10.34	8.95	-1.60	-5.70		
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	62.98
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	59.27
LEQ	58.26	48.85	49.97	56.94	41.34	46.57	50.93	50.10	51.22	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	59.27		EVENING LEQ	57.43		NIGHT LEQ	55.55		Use hour?	no
										GRADE dB	0.00
		CNEL	**62.98**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Iowa Street**
Segment: **Orange Avenue to Barton Road**

	DAYTIME			EVENING			NIGHTTIME			ADT	2829.95
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	32.00
INPUT PARAMETERS											
Vehicles per hour	173.56	2.12	0.83	128.27	0.38	0.38	32.13	2.83	1.10	% A	97.40
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.84
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	0.74
ADJUSTMENTS											
Flow	16.65	-2.48	-6.58	15.33	-9.99	-9.98	9.32	-1.23	-5.33		
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	63.35
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	59.64
LEQ	58.63	49.22	50.33	57.31	41.71	46.94	51.30	50.47	51.58	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	59.64		EVENING LEQ	57.80		NIGHT LEQ	55.91		Use hour?	no
										GRADE dB	0.00
		CNEL	**63.35**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**

Road: **Alabama Street**

Segment: **North of Redlands Boulevard**

	DAYTIME			EVENING			NIGHTTIME			ADT	22300.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1291.54	26.76	44.60	958.90	4.46	7.43	237.87	37.17	61.94	% A	92
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	5
ADJUSTMENTS											
Flow	25.36	8.53	10.75	24.07	0.75	2.97	18.02	9.96	12.17		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.44
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	68.55
LEQ	64.99	57.87	65.31	63.70	50.09	57.53	57.64	59.30	66.74	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	68.55		EVENING LEQ	64.79		NIGHT LEQ	67.89		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.44**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Alabama Street**
Segment: **North of Redlands Boulevard**

	DAYTIME			EVENING			NIGHTTIME			ADT	22749.91
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1319.13	27.09	44.73	979.39	4.52	7.46	242.95	37.63	62.13	% A	92.11
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2.98
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	4.92
ADJUSTMENTS											
Flow	25.46	8.58	10.76	24.16	0.80	2.98	18.11	10.01	12.19		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.48
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	68.60
LEQ	65.08	57.93	65.32	63.79	50.14	57.54	57.73	59.35	66.75	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	68.60		EVENING LEQ	64.86		NIGHT LEQ	67.91		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.48**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**

Road: **Alabama Street**

Segment: **Redlands Boulevard to Park Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	17100.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	990.38	20.52	34.20	735.30	3.42	5.70	182.40	28.50	47.50	% A	92
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	5
ADJUSTMENTS											
Flow	24.21	7.38	9.59	22.92	-0.41	1.81	16.86	8.80	11.02		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	73.29
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	67.40
LEQ	63.84	56.72	64.16	62.54	48.94	56.37	56.49	58.15	65.58	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	67.40		EVENING LEQ	63.63		NIGHT LEQ	66.73		Use hour?	no
										GRADE dB	0.00
		CNEL	**73.29**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Alabama Street**
Segment: **Redlands Boulevard to Park Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	18229.77
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1059.66	21.35	34.53	786.74	3.56	5.76	195.16	29.66	47.96	% A	92.34
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2.93
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	4.74
ADJUSTMENTS											
Flow	24.51	7.55	9.64	23.21	-0.23	1.85	17.16	8.97	11.06		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	73.39
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	67.56
LEQ	64.13	56.89	64.20	62.84	49.11	56.42	56.78	58.32	65.62	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	67.56		EVENING LEQ	63.88		NIGHT LEQ	66.82		Use hour?	no
										GRADE dB	0.00
		CNEL	**73.39**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**

Road: **Alabama Street**

Segment: **Park Avenue to Citrus Avenue/State Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	15400.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	891.92	18.48	30.80	662.20	3.08	5.13	164.27	25.67	42.78	% A	92
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	5
ADJUSTMENTS											
Flow	22.67	5.83	8.05	21.37	-1.95	0.27	15.32	7.26	9.47		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.37
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	69.07
LEQ	66.53	57.97	64.71	65.23	50.19	56.92	59.18	59.39	66.13	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	69.07		EVENING LEQ	65.95		NIGHT LEQ	67.64		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.37**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Alabama Street**
Segment: **Park Avenue to Citrus Avenue/State Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	16529.77
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	961.20	19.31	31.13	713.64	3.22	5.19	177.03	26.82	43.24	% A	92.37
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2.92
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.71
ADJUSTMENTS											
Flow	22.99	6.02	8.09	21.70	-1.76	0.31	15.64	7.45	9.52		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.50
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	69.29
LEQ	66.85	58.16	64.75	65.56	50.38	56.97	59.50	59.59	66.18	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	69.29		EVENING LEQ	66.23		NIGHT LEQ	67.74		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.50**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**

Road: **Alabama Street**

Segment: **Citrus Avenue/State Street to Orange Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	14900.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	862.96	17.88	29.80	640.70	2.98	4.97	158.93	24.83	41.39	% A	92
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	5
ADJUSTMENTS											
Flow	22.52	5.69	7.90	21.23	-2.10	0.12	15.17	7.11	9.33		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.23
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	68.93
LEQ	66.38	57.82	64.56	65.09	50.04	56.78	59.03	59.25	65.99	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	68.93		EVENING LEQ	65.80		NIGHT LEQ	67.49		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.23**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**

Road: **Alabama Street**

Segment: **Citrus Avenue/State Street to Orange Avenue**

	DAYTIME			EVENING			NIGHTTIME			ADT	16029.77
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	932.25	18.71	30.13	692.14	3.12	5.02	171.69	25.99	41.85	% A	92.38
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2.92
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.70
ADJUSTMENTS											
Flow	22.86	5.88	7.95	21.56	-1.90	0.17	15.51	7.31	9.38		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.37
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	69.15
LEQ	66.72	58.02	64.61	65.42	50.24	56.83	59.37	59.45	66.04	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	69.15		EVENING LEQ	66.10		NIGHT LEQ	67.60		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.37**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**

Road: **Alabama Street**

Segment: **Orange Avenue to Barton Road**

	DAYTIME			EVENING			NIGHTTIME			ADT	14900.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	862.96	17.88	29.80	640.70	2.98	4.97	158.93	24.83	41.39	% A	92
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	5
ADJUSTMENTS											
Flow	22.52	5.69	7.90	21.23	-2.10	0.12	15.17	7.11	9.33		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.23
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	68.93
LEQ	66.38	57.82	64.56	65.09	50.04	56.78	59.03	59.25	65.99	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	68.93		EVENING LEQ	65.80		NIGHT LEQ	67.49		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.23**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Alabama Street**
Segment: **Orange Avenue to Barton Road**

	DAYTIME			EVENING			NIGHTTIME			ADT	15349.91
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	890.55	18.21	29.93	661.19	3.04	4.99	164.02	25.29	41.57	% A	92.16
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2.97
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.88
ADJUSTMENTS											
Flow	22.66	5.77	7.92	21.37	-2.02	0.14	15.31	7.19	9.35		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.28
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	69.02
LEQ	66.52	57.90	64.58	65.23	50.12	56.80	59.17	59.33	66.01	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	69.02		EVENING LEQ	65.92		NIGHT LEQ	67.54		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.28**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**

Road: **Redlands Boulevard**

Segment: **West of Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	20600.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	40.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1193.08	24.72	41.20	885.80	4.12	6.87	219.73	34.33	57.22	% A	92
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	5
ADJUSTMENTS											
Flow	24.44	7.60	9.82	23.15	-0.18	2.04	17.09	9.03	11.25		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.89
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	69.31
LEQ	66.32	58.43	65.50	65.02	50.65	57.72	58.97	59.86	66.92	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	69.31		EVENING LEQ	65.90		NIGHT LEQ	68.25		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.89**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Redlands Boulevard**
Segment: **West of Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	20939.93
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	40.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1213.93	24.97	41.30	901.28	4.16	6.88	223.57	34.68	57.36	% A	92.09
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2.98
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	4.93
ADJUSTMENTS											
Flow	24.52	7.65	9.83	23.22	-0.13	2.05	17.17	9.07	11.26		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.92
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	69.35
LEQ	66.39	58.48	65.51	65.10	50.70	57.73	59.04	59.90	66.94	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	69.35		EVENING LEQ	65.96		NIGHT LEQ	68.27		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.92**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**

Road: **Redlands Boulevard**

Segment: **East of Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	18000.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	40.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1042.50	21.60	36.00	774.00	3.60	6.00	192.00	30.00	50.00	% A	92
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	5
ADJUSTMENTS											
Flow	23.85	7.02	9.24	22.56	-0.76	1.46	16.51	8.44	10.66		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.31
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	68.72
LEQ	65.73	57.85	64.91	64.44	50.07	57.13	58.38	59.27	66.34	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	68.72		EVENING LEQ	65.31		NIGHT LEQ	67.66		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.31**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Redlands Boulevard**
Segment: **East of Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	18339.93
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	40.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1063.35	21.85	36.10	789.48	3.64	6.02	195.84	30.35	50.14	% A	92.10
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2.98
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	4.92
ADJUSTMENTS											
Flow	23.94	7.07	9.25	22.65	-0.71	1.47	16.59	8.49	10.68		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.34
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	68.77
LEQ	65.82	57.90	64.92	64.52	50.12	57.14	58.47	59.32	66.35	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	68.77		EVENING LEQ	65.38		NIGHT LEQ	67.69		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.34**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**
Road: **Orange Avenue**
Segment: **West of Iowa Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	3400.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	32.00
INPUT PARAMETERS											
Vehicles per hour	208.52	2.55	0.99	154.10	0.45	0.45	38.60	3.40	1.32	% A	97.4
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.84
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	0.74
ADJUSTMENTS											
Flow	17.44	-1.68	-5.78	16.13	-9.19	-9.18	10.12	-0.43	-4.53		
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.15
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	60.44
LEQ	59.42	50.01	51.13	58.11	42.51	47.74	52.10	51.26	52.38	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	60.44		EVENING LEQ	58.60		NIGHT LEQ	56.71		Use hour?	no
										GRADE dB	0.00
		CNEL	**64.15**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Orange Avenue**
Segment: **West of Iowa Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	3739.93
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	32.00
INPUT PARAMETERS											
Vehicles per hour	229.37	2.80	1.09	169.51	0.50	0.50	42.46	3.74	1.45	% A	97.40
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.84
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	0.74
ADJUSTMENTS											
Flow	17.86	-1.27	-5.37	16.55	-8.78	-8.76	10.53	-0.02	-4.12		
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.56
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	60.85
LEQ	59.84	50.43	51.55	58.52	42.92	48.15	52.51	51.68	52.79	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	60.85		EVENING LEQ	59.01		NIGHT LEQ	57.12		Use hour?	no
										GRADE dB	0.00
		CNEL	**64.56**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**
Road: **Orange Avenue**
Segment: **East of Iowa treet**

	DAYTIME			EVENING			NIGHTTIME			ADT	3600.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	32.00
INPUT PARAMETERS											
Vehicles per hour	220.79	2.70	1.05	163.16	0.48	0.48	40.87	3.60	1.40	% A	97.4
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.84
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	0.74
ADJUSTMENTS											
Flow	17.69	-1.43	-5.53	16.38	-8.94	-8.93	10.37	-0.18	-4.28		
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.39
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	60.68
LEQ	59.67	50.26	51.38	58.36	42.75	47.98	52.35	51.51	52.63	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	60.68		EVENING LEQ	58.85		NIGHT LEQ	56.96		Use hour?	no
										GRADE dB	0.00
		CNEL	**64.39**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Orange Avenue**
Segment: **East of Iowa treet**

	DAYTIME			EVENING			NIGHTTIME			ADT	4159.89
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	32.00
INPUT PARAMETERS											
Vehicles per hour	255.13	3.12	1.21	188.55	0.55	0.56	47.23	4.16	1.62	% A	97.40
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.84
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	0.74
ADJUSTMENTS											
Flow	18.32	-0.81	-4.91	17.01	-8.31	-8.30	11.00	0.44	-3.66		
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	65.02
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	61.31
LEQ	60.30	50.89	52.01	58.99	43.38	48.61	52.97	52.14	53.26	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	61.31		EVENING LEQ	59.47		NIGHT LEQ	57.59		Use hour?	no
										GRADE dB	0.00
		CNEL	**65.02**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **7221a SD Homes**

Road: **Orange Avenue**

Segment: **East of Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	4100.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	32.00
INPUT PARAMETERS											
Vehicles per hour	251.45	3.07	1.20	185.83	0.55	0.55	46.55	4.10	1.59	% A	97.4
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.84
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	0.74
ADJUSTMENTS											
Flow	18.26	-0.87	-4.97	16.94	-8.38	-8.37	10.93	0.38	-3.72		
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.96
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	61.25
LEQ	60.24	50.83	51.94	58.92	43.32	48.55	52.91	52.08	53.19	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	61.25		EVENING LEQ	59.41		NIGHT LEQ	57.52		Use hour?	no
										GRADE dB	0.00
		CNEL	**64.96**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **7221a SD Homes**
Road: **Orange Avenue**
Segment: **East of Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	5789.66
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	32.00
INPUT PARAMETERS											
Vehicles per hour	355.10	4.34	1.69	262.42	0.77	0.77	65.73	5.79	2.25	% A	97.41
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.84
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	0.74
ADJUSTMENTS											
Flow	19.76	0.63	-3.47	18.44	-6.88	-6.87	12.43	1.88	-2.22		
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	66.46
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	62.75
LEQ	61.73	52.33	53.44	60.42	44.82	50.05	54.41	53.58	54.69	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	62.75		EVENING LEQ	60.91		NIGHT LEQ	59.02		Use hour?	no
										GRADE dB	0.00
		CNEL	**66.46**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**

Road: **Orange Avenue**

Segment: **East of Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	4100.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	32.00
INPUT PARAMETERS											
Vehicles per hour	251.45	3.07	1.20	185.83	0.55	0.55	46.55	4.10	1.59	% A	97.4
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.84
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	0.74
ADJUSTMENTS											
Flow	18.26	-0.87	-4.97	16.94	-8.38	-8.37	10.93	0.38	-3.72		
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	64.96
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	61.25
LEQ	60.24	50.83	51.94	58.92	43.32	48.55	52.91	52.08	53.19	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	61.25		EVENING LEQ	59.41		NIGHT LEQ	57.52		Use hour?	no
										GRADE dB	0.00
		CNEL	**64.96**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Orange Avenue**
Segment: **East of Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	4209.98
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	35.00
										DISTANCE	32.00
INPUT PARAMETERS											
Vehicles per hour	258.20	3.16	1.23	190.81	0.56	0.56	47.79	4.21	1.64	% A	97.40
Speed in MPH	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	1.84
NOISE CALCULATIONS											
Reference levels	65.11	74.83	80.05	65.11	74.83	80.05	65.11	74.83	80.05	% HT	0.74
ADJUSTMENTS											
Flow	18.37	-0.75	-4.85	17.06	-8.26	-8.25	11.05	0.50	-3.61		
Distance	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	1.87	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	65.07
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	61.36
LEQ	60.35	50.94	52.06	59.04	43.43	48.66	53.03	52.19	53.31	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	61.36		EVENING LEQ	59.53		NIGHT LEQ	57.64		Use hour?	no
										GRADE dB	0.00
		CNEL	**65.07**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**
Road: **Barton Road**
Segment: **West of Iowa Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	20600.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1193.08	24.72	41.20	885.80	4.12	6.87	219.73	34.33	57.22	% A	92
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	5
ADJUSTMENTS											
Flow	23.93	7.09	9.31	22.64	-0.69	1.53	16.58	8.52	10.74		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	75.63
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	70.33
LEQ	67.79	59.23	65.97	66.50	51.45	58.19	60.44	60.66	67.40	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	70.33		EVENING LEQ	67.21		NIGHT LEQ	68.90		Use hour?	no
										GRADE dB	0.00
		CNEL	**75.63**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Barton Road**
Segment: **West of Iowa Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	20939.93
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1213.93	24.97	41.30	901.28	4.16	6.88	223.57	34.68	57.36	% A	92.09
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2.98
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.93
ADJUSTMENTS											
Flow	24.00	7.14	9.32	22.71	-0.65	1.54	16.66	8.56	10.75		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	75.66
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	70.38
LEQ	67.86	59.27	65.98	66.57	51.49	58.20	60.52	60.70	67.41	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	70.38		EVENING LEQ	67.28		NIGHT LEQ	68.92		Use hour?	no
										GRADE dB	0.00
		CNEL	**75.66**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**

Road: **Barton Road**

Segment: **Iowa Street to Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	20400.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1181.50	24.48	40.80	877.20	4.08	6.80	217.60	34.00	56.67	% A	92
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	5
ADJUSTMENTS											
Flow	23.89	7.05	9.27	22.59	-0.73	1.49	16.54	8.48	10.70		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	75.59
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	70.29
LEQ	67.75	59.19	65.93	66.45	51.41	58.14	60.40	60.62	67.35	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	70.29		EVENING LEQ	67.17		NIGHT LEQ	68.86		Use hour?	no
										GRADE dB	0.00
		CNEL	**75.59**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Barton Road**
Segment: **Iowa Street to Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	20509.98
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	45.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1188.24	24.56	40.83	882.21	4.09	6.81	218.84	34.11	56.71	% A	92.03
Speed in MPH	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2.99
NOISE CALCULATIONS											
Reference levels	69.34	77.62	82.14	69.34	77.62	82.14	69.34	77.62	82.14	% HT	4.98
ADJUSTMENTS											
Flow	23.91	7.06	9.27	22.62	-0.72	1.49	16.56	8.49	10.70		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	75.60
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	70.31
LEQ	67.77	59.20	65.93	66.48	51.42	58.15	60.42	60.63	67.36	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	70.31		EVENING LEQ	67.19		NIGHT LEQ	68.86		Use hour?	no
										GRADE dB	0.00
		CNEL	**75.60**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Traffic Noise

Project: **18-0085 SD Homes**

Road: **Barton Road**

Segment: **East of Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	18500.00
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	40.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1071.46	22.20	37.00	795.50	3.70	6.17	197.33	30.83	51.39	% A	92
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	3
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	5
ADJUSTMENTS											
Flow	23.97	7.14	9.36	22.68	-0.64	1.57	16.63	8.56	10.78		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.43
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	68.84
LEQ	65.85	57.97	65.03	64.56	50.18	57.25	58.50	59.39	66.46	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	68.84		EVENING LEQ	65.43		NIGHT LEQ	67.78		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.43**								

FHWA Traffic Noise Prediction Model FHWA-RD-77-108

Existing Plus Project Traffic Noise

Project: **18-0085 SD Homes**
Road: **Barton Road**
Segment: **East of Alabama Street**

	DAYTIME			EVENING			NIGHTTIME			ADT	18839.93
	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	AUTOS	M.TRUCKS	H.TRUCKS	SPEED	40.00
										DISTANCE	55.00
INPUT PARAMETERS											
Vehicles per hour	1092.31	22.45	37.10	810.98	3.74	6.18	201.17	31.18	51.53	% A	92.10
Speed in MPH	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00		
Left angle	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00	-90.00		
Right angle	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	% MT	2.98
NOISE CALCULATIONS											
Reference levels	67.36	76.31	81.16	67.36	76.31	81.16	67.36	76.31	81.16	% HT	4.92
ADJUSTMENTS											
Flow	24.06	7.19	9.37	22.76	-0.60	1.59	16.71	8.61	10.79		
Distance	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	-0.48	LEFT	-90.00
Finite Roadway	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	RIGHT	90.00
Barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CNEL	74.46
Constant	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	-25.00	DAY LEQ	68.89
LEQ	65.93	58.01	65.04	64.64	50.23	57.26	58.59	59.44	66.47	Day hour	89.00
										Absorbtive?	no
	DAY LEQ	68.89		EVENING LEQ	65.50		NIGHT LEQ	67.81		Use hour?	no
										GRADE dB	0.00
		CNEL	**74.46**								

APPENDIX G

SOUNDPLAN INPUTS AND OUTPUTS

Noise emissions of road traffic

Station km	ADT Veh/24	Vehicles type	Traffic values: Vehicle name	day Veh/h	evening Veh/h	night Veh/h	Speed km/h	Control device	Constr. Speed km/h	Affect. veh. %	Road surface	Gradient Min / Max %
N Alabama- Northbound			Traffic direction: In entry direction									
0+000	10231	Total	-	608	433	150	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	576	428	106	72					
		Medium trucks	-	12	2	17	72					
		Heavy trucks	-	20	3	28	72					
		Buses	-	-	-	-	72					
		Motorcycles	-	-	-	-	72					
		Auxiliary vehicle	-	-	-	-	72					
0+288	10180	Total	-	605	431	150	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	573	426	106	72					
		Medium trucks	-	12	2	17	72					
		Heavy trucks	-	20	3	28	72					
		Buses	-	-	-	-	72					
		Motorcycles	-	-	-	-	72					
		Auxiliary vehicle	-	-	-	-	72					
0+401	-							-	-	-	-	-
N Alabama- Southbound			Traffic direction: In entry direction									
0+288	10231	Total	-	608	433	150	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	576	428	106	72					
		Medium trucks	-	12	2	17	72					
		Heavy trucks	-	20	3	28	72					
		Buses	-	-	-	-	72					
		Motorcycles	-	-	-	-	72					
		Auxiliary vehicle	-	-	-	-	72					
0+516	10180	Total	-	605	431	150	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	573	426	106	72					
		Medium trucks	-	12	2	17	72					
		Heavy trucks	-	20	3	28	72					
		Buses	-	-	-	-	72					
		Motorcycles	-	-	-	-	72					
		Auxiliary vehicle	-	-	-	-	72					
0+689	-							-	-	-	-	-
N Alabama- Southbound1			Traffic direction: In entry direction									
0+288	8432	Total	-	501	357	124	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	475	353	87	72					
		Medium trucks	-	10	2	14	72					
		Heavy trucks	-	16	3	23	72					
		Buses	-	-	-	-	72					
		Motorcycles	-	-	-	-	72					
		Auxiliary vehicle	-	-	-	-	72					
0+780	-							-	-	-	-	-
N Alabama- Northbound1			Traffic direction: In entry direction									
0+288	8432	Total	-	501	357	124	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	475	353	87	72					
		Medium trucks	-	10	2	14	72					
		Heavy trucks	-	16	3	23	72					
		Buses	-	-	-	-	72					
		Motorcycles	-	-	-	-	72					
		Auxiliary vehicle	-	-	-	-	72					
0+620	8381	Total	-	498	355	123	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	472	350	87	72					
		Medium trucks	-	10	2	14	72					
		Heavy trucks	-	16	3	23	72					
		Buses	-	-	-	-	72					
		Motorcycles	-	-	-	-	72					
		Auxiliary vehicle	-	-	-	-	72					
0+780	-							-	-	-	-	-

Noise emissions of road traffic

Station km	ADT Veh/24	Vehicles type	Vehicle name	Traffic values day Veh/h	evenin Veh/h	night Veh/h	Speed km/h	Control device	Constr Speed km/h	Affect. veh. %	Road surface	Gradien Min / M %
Iowa St -Northbound				Traffic direction: In entry direction								
0+288	1807	Total	-	109	80	22	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	107	79	20	48					
		Medium trucks	-	1	0	2	48					
		Heavy trucks	-	1	0	1	48					
		Buses	-	-	-	-	48					
		Motorcycles	-	-	-	-	48					
		Auxiliary vehicle	-	-	-	-	48					
0+841	1807	Total	-	109	80	22	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	107	79	20	72					
		Medium trucks	-	1	0	2	72					
		Heavy trucks	-	1	0	1	72					
		Buses	-	-	-	-	72					
		Motorcycles	-	-	-	-	72					
		Auxiliary vehicle	-	-	-	-	72					
0+868	1807	Total	-	109	80	22	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	107	79	20	48					
		Medium trucks	-	1	0	2	48					
		Heavy trucks	-	1	0	1	48					
		Buses	-	-	-	-	48					
		Motorcycles	-	-	-	-	48					
		Auxiliary vehicle	-	-	-	-	48					
1+269	-							-	-	-	-	-
Iowa Street Southbound				Traffic direction: In entry direction								
0+288	1807	Total	-	109	80	22	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	107	79	20	72					
		Medium trucks	-	1	0	2	48					
		Heavy trucks	-	1	0	1	48					
		Buses	-	-	-	-	48					
		Motorcycles	-	-	-	-	48					
		Auxiliary vehicle	-	-	-	-	48					
0+542	1807	Total	-	109	80	22	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	107	79	20	48					
		Medium trucks	-	1	0	2	48					
		Heavy trucks	-	1	0	1	48					
		Buses	-	-	-	-	48					
		Motorcycles	-	-	-	-	48					
		Auxiliary vehicle	-	-	-	-	48					
1+267	-							-	-	-	-	-
Orange Ave Eastbound				Traffic direction: In entry direction								
0+712	4131	Total	-	250	182	51	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	245	181	45	48					
		Medium trucks	-	3	1	4	48					
		Heavy trucks	-	1	1	2	48					
		Buses	-	-	-	-	48					
		Motorcycles	-	-	-	-	48					
		Auxiliary vehicle	-	-	-	-	48					
1+099	-							-	-	-	-	-
Orange Ave Eastbound1				Traffic direction: In entry direction								
0+712	4131	Total	-	250	182	51	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	245	181	45	48					
		Medium trucks	-	3	1	4	48					
		Heavy trucks	-	1	1	2	48					
		Buses	-	-	-	-	48					
		Motorcycles	-	-	-	-	48					
		Auxiliary vehicle	-	-	-	-	48					
1+105	-							-	-	-	-	-

Noise emissions of road traffic

Station km	ADT Veh/24	Vehicles type	Traffic values: Vehicle name	day Veh/h	evenin Veh/h	night Veh/h	Speed km/h	Control device	Constr Speed km/h	Affect. veh. %	Road surface	Gradien Min / M %
Orange Ave Eastbound 2			Traffic direction: In entry direction									
0+712	4131	Total	-	250	182	51	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	245	181	45	48					
		Medium trucks	-	3	1	4	48					
		Heavy trucks	-	1	1	2	48					
		Buses	-	-	-	-	48					
		Motorcycles	-	-	-	-	48					
		Auxiliary vehicle	-	-	-	-	48					
1+225	-							-	-	-	-	-
Orange Ave Westbound			Traffic direction: In entry direction									
0+712	4131	Total	-	250	182	51	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	245	181	45	48					
		Medium trucks	-	3	1	4	48					
		Heavy trucks	-	1	1	2	48					
		Buses	-	-	-	-	48					
		Motorcycles	-	-	-	-	48					
		Auxiliary vehicle	-	-	-	-	48					
1+225	-							-	-	-	-	-
Orange Ave Westbound1			Traffic direction: In entry direction									
0+712	4131	Total	-	250	182	51	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	245	181	45	48					
		Medium trucks	-	3	1	4	48					
		Heavy trucks	-	1	1	2	48					
		Buses	-	-	-	-	48					
		Motorcycles	-	-	-	-	48					
		Auxiliary vehicle	-	-	-	-	48					
1+105	-							-	-	-	-	-
Orange Ave Westbound2			Traffic direction: In entry direction									
0+712	4082	Total	-	247	180	50	-	none	-	-	Average (of DGAC and PCC)	0.0
		Automobiles	-	242	179	45	48					
		Medium trucks	-	3	1	4	48					
		Heavy trucks	-	1	1	2	48					
		Buses	-	-	-	-	48					
		Motorcycles	-	-	-	-	48					
		Auxiliary vehicle	-	-	-	-	48					
1+097	-							-	-	-	-	-

Receiver list

No.	Receiver name	Building side	Floor	Limit Lden dB(A)	Level w/o NP Lden dB(A)	Level w NP Lden dB(A)	Difference Lden dB	Conflict Lden dB
1	1	West	GF	-	52.4	52.4	0.0	-
			1.Fl	-	55.0	55.0	0.0	-
			2.Fl	-	56.0	56.0	0.0	-
2	2	North	GF	-	44.1	44.0	-0.1	-
			1.Fl	-	46.5	46.5	0.0	-
			2.Fl	-	47.9	47.9	0.0	-
3	3	North	GF	-	60.6	60.6	0.0	-
			1.Fl	-	62.8	62.8	0.0	-
			2.Fl	-	64.4	64.4	0.0	-
4	4	East	GF	-	68.3	65.5	-2.7	-
			1.Fl	-	70.7	70.7	0.0	-
			2.Fl	-	70.9	70.9	0.0	-
5	5	East	GF	-	68.0	67.8	-0.2	-
			1.Fl	-	70.5	70.5	0.0	-
			2.Fl	-	70.7	70.7	0.0	-
6	6	South	GF	-	66.4	66.4	0.0	-
			1.Fl	-	68.8	68.8	0.0	-
			2.Fl	-	69.0	69.0	0.0	-
7	7	South	GF	-	60.2	60.2	0.0	-
			1.Fl	-	62.3	62.3	0.0	-
			2.Fl	-	62.7	62.7	0.0	-
8	8	South	GF	-	58.3	58.3	0.0	-
			1.Fl	-	60.7	60.7	0.0	-
			2.Fl	-	61.0	60.9	0.0	-
9	9	South	GF	-	57.6	57.6	0.0	-
			1.Fl	-	60.2	60.2	0.0	-
			2.Fl	-	60.4	60.4	0.0	-
10	10	North	GF	-	58.2	58.2	0.0	-
			1.Fl	-	60.7	60.7	0.0	-
			2.Fl	-	61.0	61.0	0.0	-
11	11	North	GF	-	65.2	65.1	0.0	-
			1.Fl	-	67.5	67.5	0.0	-
			2.Fl	-	67.9	67.9	0.0	-
12	12	East	GF	-	66.8	66.8	0.0	-
			1.Fl	-	69.2	69.2	0.0	-
			2.Fl	-	69.6	69.6	0.0	-
13	Park 1	-	GF	-	55.9	0.0	-55.9	-
14	Park 2	-	GF	-	51.6	0.0	-51.6	-
15	Pool	-	GF	-	54.5	54.5	0.0	-

Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP Lden dB(A)	Level w NP Lden dB(A)
1 GF		52.4	52.4
Iowa St -Northbound	-	42.1	42.0
Iowa Street Southbound	-	41.3	41.3
N Alabama- Northbound	-	17.7	17.6
N Alabama- Northbound1	-	17.5	18.2
N Alabama- Southbound	-	17.6	17.6
N Alabama- Southbound1	-	17.5	18.2
Orange Ave Eastbound	-	39.5	39.4
Orange Ave Eastbound1	-	48.0	48.0
Orange Ave Eastbound 2	-	7.9	7.9
Orange Ave Westbound	-	7.2	7.1
Orange Ave Westbound1	-	48.2	48.2
Orange Ave Westbound2	-	38.6	38.6
1 1.Fl		55.0	55.0
Iowa St -Northbound	-	44.0	44.0
Iowa Street Southbound	-	43.2	43.2
N Alabama- Northbound	-	22.2	22.2
N Alabama- Northbound1	-	21.9	22.4
N Alabama- Southbound	-	22.0	22.0
N Alabama- Southbound1	-	21.9	22.3
Orange Ave Eastbound	-	41.4	41.4
Orange Ave Eastbound1	-	50.8	50.8
Orange Ave Eastbound 2	-	11.5	11.5
Orange Ave Westbound	-	11.5	11.4
Orange Ave Westbound1	-	50.8	50.8
Orange Ave Westbound2	-	40.6	40.6
1 2.Fl		56.0	56.0
Iowa St -Northbound	-	45.1	45.1
Iowa Street Southbound	-	44.5	44.5
N Alabama- Northbound	-	27.6	27.6
N Alabama- Northbound1	-	27.1	27.6
N Alabama- Southbound	-	27.4	27.4
N Alabama- Southbound1	-	27.1	27.6
Orange Ave Eastbound	-	43.1	43.1
Orange Ave Eastbound1	-	51.8	51.8
Orange Ave Eastbound 2	-	17.2	17.1
Orange Ave Westbound	-	17.2	17.2
Orange Ave Westbound1	-	51.8	51.8
Orange Ave Westbound2	-	42.0	42.0
2 GF		44.1	44.0
Iowa St -Northbound	-	36.7	36.7
Iowa Street Southbound	-	37.4	37.3
N Alabama- Northbound	-	38.8	38.7
N Alabama- Northbound1	-	15.9	16.3
N Alabama- Southbound	-	38.9	38.8
N Alabama- Southbound1	-	15.8	16.2
Orange Ave Eastbound	-	14.6	14.5
Orange Ave Eastbound1	-	18.1	18.0
Orange Ave Eastbound 2	-	14.8	14.7
Orange Ave Westbound	-	14.9	14.8
Orange Ave Westbound1	-	17.8	17.8
Orange Ave Westbound2	-	14.7	14.6
2 1.Fl		46.5	46.5
Iowa St -Northbound	-	38.5	38.5
Iowa Street Southbound	-	39.6	39.6
N Alabama- Northbound	-	41.2	41.2
N Alabama- Northbound1	-	22.2	22.8
N Alabama- Southbound	-	41.4	41.4
N Alabama- Southbound1	-	22.0	22.7
Orange Ave Eastbound	-	20.3	20.3
Orange Ave Eastbound1	-	22.8	22.7
Orange Ave Eastbound 2	-	18.9	18.8

Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP Lden dB(A)	Level w NP Lden dB(A)
Orange Ave Westbound	-	18.8	18.7
Orange Ave Westbound1	-	22.8	22.8
Orange Ave Westbound2	-	20.3	20.2
2	2.Fl	47.9	47.9
Iowa St -Northbound	-	39.7	39.7
Iowa Street Southbound	-	41.0	41.0
N Alabama- Northbound	-	42.5	42.5
N Alabama- Northbound1	-	27.7	28.4
N Alabama- Southbound	-	42.7	42.7
N Alabama- Southbound1	-	27.6	28.3
Orange Ave Eastbound	-	25.6	26.4
Orange Ave Eastbound1	-	27.0	27.0
Orange Ave Eastbound 2	-	21.5	21.5
Orange Ave Westbound	-	21.0	21.0
Orange Ave Westbound1	-	27.0	27.0
Orange Ave Westbound2	-	25.5	26.3
3	GF	60.6	60.6
Iowa St -Northbound	-	25.2	25.1
Iowa Street Southbound	-	26.6	26.5
N Alabama- Northbound	-	57.5	57.5
N Alabama- Northbound1	-	20.9	20.9
N Alabama- Southbound	-	57.7	57.7
N Alabama- Southbound1	-	19.3	19.3
Orange Ave Eastbound	-	6.2	6.1
Orange Ave Eastbound1	-	12.4	12.5
Orange Ave Eastbound 2	-	14.2	14.1
Orange Ave Westbound	-	14.2	14.1
Orange Ave Westbound1	-	12.3	12.4
Orange Ave Westbound2	-	5.8	5.7
3	1.Fl	62.8	62.8
Iowa St -Northbound	-	26.5	26.5
Iowa Street Southbound	-	28.2	28.2
N Alabama- Northbound	-	59.9	59.9
N Alabama- Northbound1	-	24.1	24.0
N Alabama- Southbound	-	59.8	59.8
N Alabama- Southbound1	-	23.5	23.4
Orange Ave Eastbound	-	10.4	10.4
Orange Ave Eastbound1	-	17.5	17.6
Orange Ave Eastbound 2	-	17.4	17.3
Orange Ave Westbound	-	17.4	17.4
Orange Ave Westbound1	-	17.4	17.5
Orange Ave Westbound2	-	10.2	10.1
3	2.Fl	64.4	64.4
Iowa St -Northbound	-	27.8	27.8
Iowa Street Southbound	-	29.9	29.9
N Alabama- Northbound	-	61.4	61.4
N Alabama- Northbound1	-	29.2	29.1
N Alabama- Southbound	-	61.3	61.3
N Alabama- Southbound1	-	28.9	28.9
Orange Ave Eastbound	-	15.9	15.9
Orange Ave Eastbound1	-	23.3	23.4
Orange Ave Eastbound 2	-	22.7	22.7
Orange Ave Westbound	-	22.8	22.7
Orange Ave Westbound1	-	23.2	23.3
Orange Ave Westbound2	-	15.7	15.6
4	GF	68.3	65.5
Iowa St -Northbound	-	7.9	7.9
Iowa Street Southbound	-	8.4	8.3
N Alabama- Northbound	-	64.9	61.8
N Alabama- Northbound1	-	49.4	48.7
N Alabama- Southbound	-	65.3	62.9
N Alabama- Southbound1	-	47.5	47.4

Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP Lden dB(A)	Level w NP Lden dB(A)
Orange Ave Eastbound	-	6.6	6.6
Orange Ave Eastbound1	-	30.0	29.9
Orange Ave Eastbound 2	-	39.1	36.4
Orange Ave Westbound	-	39.0	36.4
Orange Ave Westbound1	-	29.9	29.8
Orange Ave Westbound2	-	6.6	6.3
4	1.Fl	70.7	70.7
Iowa St -Northbound	-	12.4	12.4
Iowa Street Southbound	-	12.7	12.7
N Alabama- Northbound	-	67.3	67.3
N Alabama- Northbound1	-	50.9	50.8
N Alabama- Southbound	-	67.9	67.8
N Alabama- Southbound1	-	49.3	49.3
Orange Ave Eastbound	-	11.1	11.0
Orange Ave Eastbound1	-	32.0	31.9
Orange Ave Eastbound 2	-	40.5	40.4
Orange Ave Westbound	-	40.3	40.3
Orange Ave Westbound1	-	31.8	31.7
Orange Ave Westbound2	-	10.8	10.8
4	2.Fl	70.9	70.9
Iowa St -Northbound	-	17.7	17.7
Iowa Street Southbound	-	18.0	17.9
N Alabama- Northbound	-	67.4	67.4
N Alabama- Northbound1	-	52.3	52.3
N Alabama- Southbound	-	68.1	68.1
N Alabama- Southbound1	-	50.8	50.8
Orange Ave Eastbound	-	16.5	16.4
Orange Ave Eastbound1	-	33.4	33.3
Orange Ave Eastbound 2	-	41.1	41.2
Orange Ave Westbound	-	41.0	41.0
Orange Ave Westbound1	-	33.1	33.0
Orange Ave Westbound2	-	16.2	16.2
5	GF	68.0	67.8
Iowa St -Northbound	-	7.0	7.0
Iowa Street Southbound	-	7.0	7.0
N Alabama- Northbound	-	64.4	64.2
N Alabama- Northbound1	-	53.5	53.4
N Alabama- Southbound	-	65.0	64.8
N Alabama- Southbound1	-	52.1	52.1
Orange Ave Eastbound	-	7.1	7.1
Orange Ave Eastbound1	-	36.9	36.9
Orange Ave Eastbound 2	-	43.3	43.3
Orange Ave Westbound	-	43.1	43.0
Orange Ave Westbound1	-	36.9	36.9
Orange Ave Westbound2	-	6.7	6.6
5	1.Fl	70.5	70.5
Iowa St -Northbound	-	11.7	11.7
Iowa Street Southbound	-	11.7	11.8
N Alabama- Northbound	-	66.8	66.7
N Alabama- Northbound1	-	55.3	55.3
N Alabama- Southbound	-	67.6	67.6
N Alabama- Southbound1	-	54.1	54.1
Orange Ave Eastbound	-	11.4	11.4
Orange Ave Eastbound1	-	39.0	39.0
Orange Ave Eastbound 2	-	44.5	44.5
Orange Ave Westbound	-	44.3	44.3
Orange Ave Westbound1	-	38.7	38.7
Orange Ave Westbound2	-	11.1	11.1
5	2.Fl	70.7	70.7
Iowa St -Northbound	-	17.5	17.5
Iowa Street Southbound	-	17.6	17.6
N Alabama- Northbound	-	66.9	66.9

Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP Lden dB(A)	Level w NP Lden dB(A)
N Alabama- Northbound1	-	56.3	56.3
N Alabama- Southbound	-	67.7	67.7
N Alabama- Southbound1	-	55.6	55.6
Orange Ave Eastbound	-	16.8	16.8
Orange Ave Eastbound1	-	40.9	40.9
Orange Ave Eastbound 2	-	45.4	45.4
Orange Ave Westbound	-	45.0	45.0
Orange Ave Westbound1	-	40.2	40.2
Orange Ave Westbound2	-	16.5	16.5
6	GF	66.4	66.4
Iowa St -Northbound	-	17.7	17.4
Iowa Street Southbound	-	18.1	17.8
N Alabama- Northbound	-	60.8	60.8
N Alabama- Northbound1	-	57.9	57.9
N Alabama- Southbound	-	61.7	61.7
N Alabama- Southbound1	-	57.7	57.7
Orange Ave Eastbound	-	10.6	10.6
Orange Ave Eastbound1	-	52.2	52.2
Orange Ave Eastbound 2	-	48.5	48.5
Orange Ave Westbound	-	48.0	48.0
Orange Ave Westbound1	-	52.4	52.4
Orange Ave Westbound2	-	9.6	9.6
6	1.Fl	68.8	68.8
Iowa St -Northbound	-	18.6	18.6
Iowa Street Southbound	-	18.9	18.8
N Alabama- Northbound	-	63.3	63.3
N Alabama- Northbound1	-	59.5	59.5
N Alabama- Southbound	-	64.5	64.5
N Alabama- Southbound1	-	59.6	59.6
Orange Ave Eastbound	-	16.3	16.2
Orange Ave Eastbound1	-	54.9	54.9
Orange Ave Eastbound 2	-	49.8	49.8
Orange Ave Westbound	-	49.4	49.4
Orange Ave Westbound1	-	55.2	55.1
Orange Ave Westbound2	-	15.5	15.4
6	2.Fl	69.0	69.0
Iowa St -Northbound	-	20.0	20.7
Iowa Street Southbound	-	20.5	21.4
N Alabama- Northbound	-	63.5	63.5
N Alabama- Northbound1	-	60.2	60.2
N Alabama- Southbound	-	64.3	64.3
N Alabama- Southbound1	-	60.5	60.5
Orange Ave Eastbound	-	16.2	16.3
Orange Ave Eastbound1	-	54.9	54.9
Orange Ave Eastbound 2	-	50.7	50.7
Orange Ave Westbound	-	50.5	50.5
Orange Ave Westbound1	-	55.2	55.2
Orange Ave Westbound2	-	14.9	15.0
7	GF	60.2	60.2
Iowa St -Northbound	-	26.8	27.1
Iowa Street Southbound	-	26.3	26.6
N Alabama- Northbound	-	49.0	49.0
N Alabama- Northbound1	-	50.2	50.2
N Alabama- Southbound	-	49.3	49.3
N Alabama- Southbound1	-	50.3	50.3
Orange Ave Eastbound	-	30.8	30.7
Orange Ave Eastbound1	-	55.0	55.0
Orange Ave Eastbound 2	-	41.5	41.4
Orange Ave Westbound	-	40.3	40.3
Orange Ave Westbound1	-	55.2	55.2
Orange Ave Westbound2	-	29.2	29.1

Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP Lden dB(A)	Level w NP Lden dB(A)
7 1.Fl		62.3	62.3
Iowa St -Northbound	-	27.9	28.5
Iowa Street Southbound	-	27.3	27.8
N Alabama- Northbound	-	50.6	50.6
N Alabama- Northbound1	-	51.7	51.7
N Alabama- Southbound	-	50.5	50.5
N Alabama- Southbound1	-	51.8	51.8
Orange Ave Eastbound	-	31.7	31.7
Orange Ave Eastbound1	-	57.4	57.4
Orange Ave Eastbound 2	-	43.2	43.2
Orange Ave Westbound	-	42.2	42.2
Orange Ave Westbound1	-	57.7	57.7
Orange Ave Westbound2	-	30.3	30.3
7 2.Fl		62.7	62.7
Iowa St -Northbound	-	29.1	29.8
Iowa Street Southbound	-	28.5	29.2
N Alabama- Northbound	-	52.0	52.0
N Alabama- Northbound1	-	52.6	52.6
N Alabama- Southbound	-	51.6	51.6
N Alabama- Southbound1	-	52.6	52.6
Orange Ave Eastbound	-	33.0	33.0
Orange Ave Eastbound1	-	57.3	57.3
Orange Ave Eastbound 2	-	44.5	44.5
Orange Ave Westbound	-	43.7	43.7
Orange Ave Westbound1	-	57.9	57.9
Orange Ave Westbound2	-	31.5	31.5
8 GF		58.3	58.3
Iowa St -Northbound	-	32.4	32.6
Iowa Street Southbound	-	31.8	31.6
N Alabama- Northbound	-	39.2	39.0
N Alabama- Northbound1	-	42.0	41.9
N Alabama- Southbound	-	39.4	39.3
N Alabama- Southbound1	-	42.1	41.9
Orange Ave Eastbound	-	33.7	33.6
Orange Ave Eastbound1	-	54.8	54.7
Orange Ave Eastbound 2	-	36.3	36.2
Orange Ave Westbound	-	35.0	34.8
Orange Ave Westbound1	-	54.9	54.9
Orange Ave Westbound2	-	32.4	32.2
8 1.Fl		60.7	60.7
Iowa St -Northbound	-	33.8	34.1
Iowa Street Southbound	-	33.1	33.1
N Alabama- Northbound	-	40.6	40.6
N Alabama- Northbound1	-	43.3	43.3
N Alabama- Southbound	-	40.8	40.8
N Alabama- Southbound1	-	43.4	43.3
Orange Ave Eastbound	-	34.9	34.9
Orange Ave Eastbound1	-	57.3	57.2
Orange Ave Eastbound 2	-	37.5	37.4
Orange Ave Westbound	-	36.3	36.3
Orange Ave Westbound1	-	57.5	57.5
Orange Ave Westbound2	-	33.7	33.7
8 2.Fl		61.0	60.9
Iowa St -Northbound	-	34.9	35.4
Iowa Street Southbound	-	34.3	34.3
N Alabama- Northbound	-	41.9	41.9
N Alabama- Northbound1	-	44.3	44.3
N Alabama- Southbound	-	41.9	42.0
N Alabama- Southbound1	-	44.4	44.3
Orange Ave Eastbound	-	36.5	36.5
Orange Ave Eastbound1	-	57.3	57.2
Orange Ave Eastbound 2	-	39.0	39.0

Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP Lden dB(A)	Level w NP Lden dB(A)
Orange Ave Westbound	-	37.7	37.7
Orange Ave Westbound1	-	57.8	57.8
Orange Ave Westbound2	-	35.1	35.1
9	GF	57.6	57.6
Iowa St -Northbound	-	36.1	36.1
Iowa Street Southbound	-	35.2	35.1
N Alabama- Northbound	-	34.3	34.7
N Alabama- Northbound1	-	39.4	37.9
N Alabama- Southbound	-	34.5	34.9
N Alabama- Southbound1	-	39.6	38.2
Orange Ave Eastbound	-	37.0	36.9
Orange Ave Eastbound1	-	54.2	54.2
Orange Ave Eastbound 2	-	33.7	33.6
Orange Ave Westbound	-	32.8	32.6
Orange Ave Westbound1	-	54.4	54.4
Orange Ave Westbound2	-	35.6	35.5
9	1.Fl	60.2	60.2
Iowa St -Northbound	-	37.8	37.9
Iowa Street Southbound	-	36.7	36.7
N Alabama- Northbound	-	36.4	36.8
N Alabama- Northbound1	-	41.2	39.3
N Alabama- Southbound	-	36.6	37.0
N Alabama- Southbound1	-	41.4	39.5
Orange Ave Eastbound	-	38.6	38.6
Orange Ave Eastbound1	-	56.8	56.8
Orange Ave Eastbound 2	-	34.6	34.6
Orange Ave Westbound	-	33.8	33.8
Orange Ave Westbound1	-	57.1	57.1
Orange Ave Westbound2	-	37.3	37.3
9	2.Fl	60.4	60.4
Iowa St -Northbound	-	38.8	38.9
Iowa Street Southbound	-	37.7	37.7
N Alabama- Northbound	-	37.9	38.3
N Alabama- Northbound1	-	42.3	40.4
N Alabama- Southbound	-	38.0	38.3
N Alabama- Southbound1	-	42.5	40.5
Orange Ave Eastbound	-	40.3	40.3
Orange Ave Eastbound1	-	56.8	56.8
Orange Ave Eastbound 2	-	35.9	35.9
Orange Ave Westbound	-	34.9	35.0
Orange Ave Westbound1	-	57.3	57.3
Orange Ave Westbound2	-	38.9	38.9
10	GF	58.2	58.2
Iowa St -Northbound	-	31.2	31.1
Iowa Street Southbound	-	29.6	29.6
N Alabama- Northbound	-	43.6	43.5
N Alabama- Northbound1	-	41.2	41.3
N Alabama- Southbound	-	43.6	43.6
N Alabama- Southbound1	-	41.2	41.3
Orange Ave Eastbound	-	32.9	32.8
Orange Ave Eastbound1	-	54.7	54.7
Orange Ave Eastbound 2	-	34.9	34.8
Orange Ave Westbound	-	36.2	36.1
Orange Ave Westbound1	-	54.5	54.5
Orange Ave Westbound2	-	33.8	33.7
10	1.Fl	60.7	60.7
Iowa St -Northbound	-	32.5	32.5
Iowa Street Southbound	-	30.8	30.9
N Alabama- Northbound	-	45.1	45.1
N Alabama- Northbound1	-	42.7	42.8
N Alabama- Southbound	-	45.1	45.2
N Alabama- Southbound1	-	42.6	42.8

Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP Lden dB(A)	Level w NP Lden dB(A)
Orange Ave Eastbound	-	34.1	34.1
Orange Ave Eastbound1	-	57.3	57.3
Orange Ave Eastbound 2	-	36.4	36.4
Orange Ave Westbound	-	37.6	37.5
Orange Ave Westbound1	-	57.1	57.1
Orange Ave Westbound2	-	34.8	34.8
10	2.Fl	61.0	61.0
Iowa St -Northbound	-	33.9	33.9
Iowa Street Southbound	-	32.0	32.1
N Alabama- Northbound	-	46.0	46.1
N Alabama- Northbound1	-	43.8	44.0
N Alabama- Southbound	-	45.9	45.9
N Alabama- Southbound1	-	43.6	44.0
Orange Ave Eastbound	-	35.4	35.4
Orange Ave Eastbound1	-	57.6	57.6
Orange Ave Eastbound 2	-	38.0	38.0
Orange Ave Westbound	-	39.2	39.2
Orange Ave Westbound1	-	57.2	57.2
Orange Ave Westbound2	-	36.3	36.3
11	GF	65.2	65.1
Iowa St -Northbound	-	17.5	17.4
Iowa Street Southbound	-	18.2	18.1
N Alabama- Northbound	-	58.2	58.1
N Alabama- Northbound1	-	58.4	58.4
N Alabama- Southbound	-	57.8	57.7
N Alabama- Southbound1	-	59.5	59.5
Orange Ave Eastbound	-	9.7	9.7
Orange Ave Eastbound1	-	52.1	52.0
Orange Ave Eastbound 2	-	47.8	47.8
Orange Ave Westbound	-	48.1	48.1
Orange Ave Westbound1	-	51.7	51.7
Orange Ave Westbound2	-	10.1	10.1
11	1.Fl	67.5	67.5
Iowa St -Northbound	-	18.8	19.0
Iowa Street Southbound	-	19.1	19.3
N Alabama- Northbound	-	59.8	59.7
N Alabama- Northbound1	-	60.9	60.9
N Alabama- Southbound	-	59.6	59.6
N Alabama- Southbound1	-	62.4	62.4
Orange Ave Eastbound	-	16.1	16.1
Orange Ave Eastbound1	-	54.9	54.8
Orange Ave Eastbound 2	-	49.3	49.3
Orange Ave Westbound	-	49.5	49.5
Orange Ave Westbound1	-	54.4	54.4
Orange Ave Westbound2	-	16.3	16.2
11	2.Fl	67.9	67.9
Iowa St -Northbound	-	20.7	21.8
Iowa Street Southbound	-	20.9	22.0
N Alabama- Northbound	-	60.6	60.6
N Alabama- Northbound1	-	61.3	61.3
N Alabama- Southbound	-	60.7	60.7
N Alabama- Southbound1	-	62.4	62.4
Orange Ave Eastbound	-	16.0	16.0
Orange Ave Eastbound1	-	55.0	54.9
Orange Ave Eastbound 2	-	50.4	50.4
Orange Ave Westbound	-	50.5	50.5
Orange Ave Westbound1	-	54.5	54.4
Orange Ave Westbound2	-	16.7	16.7
12	GF	66.8	66.8
Iowa St -Northbound	-	7.9	8.4
Iowa Street Southbound	-	8.0	8.2
N Alabama- Northbound	-	51.3	51.3

Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP Lden dB(A)	Level w NP Lden dB(A)
N Alabama- Northbound1	-	63.1	63.1
N Alabama- Southbound	-	48.8	48.8
N Alabama- Southbound1	-	63.9	63.9
Orange Ave Eastbound	-	3.4	4.9
Orange Ave Eastbound1	-	31.5	31.5
Orange Ave Eastbound 2	-	42.0	42.0
Orange Ave Westbound	-	42.0	42.0
Orange Ave Westbound1	-	29.3	29.2
Orange Ave Westbound2	-	3.7	5.2
12	1.Fl	69.2	69.2
Iowa St -Northbound	-	12.5	13.1
Iowa Street Southbound	-	12.6	12.9
N Alabama- Northbound	-	53.4	53.4
N Alabama- Northbound1	-	65.4	65.4
N Alabama- Southbound	-	50.9	50.9
N Alabama- Southbound1	-	66.6	66.6
Orange Ave Eastbound	-	8.7	9.9
Orange Ave Eastbound1	-	33.4	33.4
Orange Ave Eastbound 2	-	43.3	43.3
Orange Ave Westbound	-	43.3	43.3
Orange Ave Westbound1	-	31.4	31.3
Orange Ave Westbound2	-	8.8	10.1
12	2.Fl	69.6	69.6
Iowa St -Northbound	-	18.2	18.7
Iowa Street Southbound	-	18.3	18.6
N Alabama- Northbound	-	54.5	54.5
N Alabama- Northbound1	-	65.8	65.8
N Alabama- Southbound	-	52.5	52.5
N Alabama- Southbound1	-	66.8	66.8
Orange Ave Eastbound	-	14.8	15.8
Orange Ave Eastbound1	-	35.0	35.1
Orange Ave Eastbound 2	-	44.0	44.0
Orange Ave Westbound	-	44.1	44.1
Orange Ave Westbound1	-	33.4	33.4
Orange Ave Westbound2	-	14.8	15.9
Park 1	GF	55.9	0.0
Iowa St -Northbound	-	31.3	9.2
Iowa Street Southbound	-	31.0	9.2
N Alabama- Northbound	-	31.4	30.2
N Alabama- Northbound1	-	52.4	52.8
N Alabama- Southbound	-	31.0	29.7
N Alabama- Southbound1	-	52.9	53.2
Orange Ave Eastbound	-	28.1	6.3
Orange Ave Eastbound1	-	36.1	25.1
Orange Ave Eastbound 2	-	32.0	32.0
Orange Ave Westbound	-	32.0	31.9
Orange Ave Westbound1	-	36.1	25.1
Orange Ave Westbound2	-	28.0	6.2
Park 2	GF	51.6	0.0
Iowa St -Northbound	-	34.0	33.6
Iowa Street Southbound	-	33.7	33.3
N Alabama- Northbound	-	28.4	20.2
N Alabama- Northbound1	-	47.9	24.4
N Alabama- Southbound	-	27.9	20.5
N Alabama- Southbound1	-	48.1	24.5
Orange Ave Eastbound	-	30.1	29.8
Orange Ave Eastbound1	-	37.4	37.5
Orange Ave Eastbound 2	-	28.1	9.0
Orange Ave Westbound	-	28.1	9.0
Orange Ave Westbound1	-	37.3	37.3
Orange Ave Westbound2	-	29.9	29.6

Contribution levels of the receivers

Source name	Traffic lane	Level w/o NP Lden dB(A)	Level w NP Lden dB(A)
Pool GF		54.5	54.5
Iowa St -Northbound	-	29.5	29.4
Iowa Street Southbound	-	30.7	30.5
N Alabama- Northbound	-	51.3	51.3
N Alabama- Northbound1	-	24.8	24.8
N Alabama- Southbound	-	51.6	51.6
N Alabama- Southbound1	-	24.7	24.6
Orange Ave Eastbound	-	14.9	14.9
Orange Ave Eastbound1	-	18.7	18.6
Orange Ave Eastbound 2	-	16.2	16.2
Orange Ave Westbound	-	16.2	16.2
Orange Ave Westbound1	-	18.4	18.4
Orange Ave Westbound2	-	14.8	14.8

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September 24, 2018
Revised January 22, 2019,
March 8, 2019, May 22, 2019,
and July 23, 2019

Mr. Christos Hardt, Architectural Designer
MILLER ARCHITECTURE
1177 Idaho Street, Suite 200
Redlands, California 92374

Dear Mr. Hardt:

INTRODUCTION

Ganddini Group, Inc. is pleased to provide this focused noise analysis for the proposed SD Homes Redlands Apartments Project in the City of Redlands. The project site is located adjacent to Orange Avenue between Iowa Street and Alabama Street in the City of Redlands. A vicinity map showing the project location is provided on Figure 1.

To assist the reader with those terms unique to noise analysis, a list of acronyms and a glossary of terms have been provided in Appendix A and Appendix B, respectively.

PROJECT DESCRIPTION

The project proposes to develop the 21.84 gross acre (18.94 net acre) project site with 328 multi-family (low-rise) attached residential dwelling units and a 14,663 square foot clubhouse. The southern portion of the site will include a passive park area which will include shaded rest areas and trails. The proposed project is shown on Figure 2.

APPLICABLE STANDARDS

CITY OF REDLANDS GENERAL PLAN 2035[1]

Table 1 shows the City's noise level standards related to land use compatibility. According to this matrix, exterior noise levels of up to 60 CNEL are considered to be "clearly compatible" for multi-family residential uses. The policies that are applicable to the proposed project from the Noise section of the General Plan have been listed below:

Policies

Principles

7-P.41 Ensure that new development is compatible with the noise environment by continuing to use potential noise exposure as a criterion in land use planning.

Actions

7-A.135 Use the noise and land use compatibility matrix (see Table 1) and Future Noise Contours map

[1] City of Redlands General Plan 2035, 7.5 Noise. December 2017.

(General Plan Figure 7-9) as criteria to determine the acceptability of a given land use, including the improvement/construction of streets, railroads, freeways, and highways. Do not permit new noise-sensitive uses—including schools, hospitals, places of worship, and homes—where noise levels are "normally unacceptable" or higher, if alternative locations are available for the uses in the City.

7-A.136 Require a noise analysis be conducted for all development proposals located where projected noise exposure would be other than "clearly" or "normally compatible" as specified in Table 1.

7-A.137 For all projects that have noise exposure levels that exceed the standards in Table 1, require site planning and architecture to incorporate noise-attenuating features. With mitigation, development should meet the allowable outdoor and indoor noise exposure standards in Table 2. When a building's openings to the exterior are required to be closed to meet the interior noise standard, mechanical ventilation shall be provided.

Measure U Policies

9.0e Use the criteria specified in Table 1 to assess the compatibility of proposed land uses with the projected noise environment, and apply the noise standards in Table 2, which prescribe interior and exterior noise standards in relation to specific land uses. Do not approve projects that would not comply with the standards in Tables 1 and 2.

9.0i Require construction of barriers to mitigate sound emissions where necessary or where feasible, and encourage use of walls and berms to protect residential or other noise sensitive land uses that are adjacent to major roads, commercial, or industrial areas.

9.0s Require mitigation to ensure that indoor noise levels for residential living spaces do not exceed 45 dB LDN/CNEL due to combined effect of all exterior noise sources.

9.0v Consider the following impacts as possibly "significant":

- An increase in exposure of 4 or more dB if the resulting noise level would exceed that described as clearly compatible for the affected land use, as established in Tables 1 and 2;
- Any increase of 6 dB or more, due to potential for adverse community response.

9.0w Limit hours of construction or demolition work where site-related noise is audible beyond the site boundary.

CITY OF REDLANDS MUNICIPAL CODE[2]

City of Redlands Municipal Code

Chapter 8.06 of the City's Municipal Code establishes the City's noise standards and regulations.

Section 8.06.070 Exterior Noise Limits.

A. The noise standards for categories of land uses identified below, unless otherwise specifically indicated, apply to all such property within a designated zone.

[2] City of Redlands Municipal Code. September 2017.

Maximum Permissible Sound Levels By Receiving Land Use		
Receiving Land Use Category	Time Period	Noise Level - dBA
Single-family residential districts	10:00 PM - 7:00 AM	50
	7:00 AM – 10:00 PM	60
Multi-family residential districts; public space; institutional	10:00 PM - 7:00 AM	50
	7:00 AM - 10:00 PM	60
Commercial	10:00 PM - 7:00 AM	60
	7:00 AM - 10:00 PM	65
Industrial	Anytime	75

B. No person shall operate, or cause to be operated, any source of sound at any location within the City or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the noise level when measured on any other property to exceed:

1. The noise standard for that land use specified in the table above of this section for a cumulative period of more than thirty (30) minutes in any hour; or
2. The noise standard specified in the table above of this section plus five (5) dB for a cumulative period of more than fifteen (15) minutes in any hour; or
3. The noise standard specified in the table above of this section plus ten (10) dB for a cumulative period of more than five (5) minutes in any hour; or
4. The noise standard specified in the table above of this section plus fifteen (15) dB for a cumulative period of more than one minute in any hour; or
5. The noise standard specified in the table above of this section plus twenty (20) dB or the maximum measured ambient level, for any period of time.

C. If the measured ambient level exceeds the allowable noise exposure standard within any of the first four (4) noise limit categories above, the allowable noise exposure standard shall be adjusted in five (5) dB increments in each category as appropriate to encompass or reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under this category shall be increased to reflect the maximum ambient noise level.

Section 8.06.080 Interior Noise Standards.

A. No person shall operate or cause to be operated any source of sound, or allow the creation of any noise, which causes the noise level when measured inside a neighboring receiving occupied building to exceed the following standards:

1. The noise standard for that land use specified in the table below for a cumulative period of more than five (5) minutes in any hour.
2. The noise standard for that land use specified in the table below plus five (5) dB for a cumulative period of more than one minute in any hour.
3. The noise standard for that land use specified in the table below plus ten (10) dB for the maximum measured ambient noise level for any period of time.

B. If the measured ambient level exceeds the allowable exterior noise exposure standard in 8.06.070 of this chapter, the allowable interior noise exposure level shall be adjusted in five (5) dB increments as appropriate to reflect the ambient noise level.

Maximum Permissible Interior Sound Levels by Receiving Land Use		
Receiving Land Use Category	Time Period	Noise Level - dBA
Single-family residential districts	Any time	45
Multi-family residential districts; institutional; hotels	Any time	45
Commercial	Any time	50
Industrial	Any time	60

Section 8.06.090 Noise Disturbances Prohibited.

The following acts, and the causing or permitting thereof, are declared to be in violation of the Noise Ordinance:

F. Construction And/Or Demolition: Operating or causing the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between weekday hours of six o'clock (6:00) PM and seven o'clock (7:00) AM, including Saturdays or at any time on Sundays or holidays, such that the sound therefrom creates a noise disturbance across a residential or commercial real property line, except for emergency work by public service utilities, the City or another governmental entity. All mobile or stationary internal combustion engine powered equipment or machinery shall be equipped with exhaust and air intake silencers in proper working order, or suitable to meet the standards set forth herein.

G. Vibration: Operating or permitting the operation of any device that creates a vibration, which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (150') from the source if on a public space or public right of way. The City of Redlands Municipal Code, Section 8.06.020, defines the vibration perception threshold as 0.01 inches per second (in/sec) RMS. As such, this noise study uses the City of Redlands Municipal Code vibration perception threshold of 0.01 in/sec RMS to assess the potential vibration impacts due to Project construction. Structural damage would not occur at this level.

K. Noise Sensitive Zones: Creating or causing the creation of any sound within any noise sensitive zone, so as to exceed the specified land use noise standards set forth in 8.06.070A of this chapter and subsection 8.06.070B of this chapter, or so as to interfere with the functions of such activity or annoy the occupants in the activity, provided that conspicuous signs are displayed indicating the presence of the zone.

Section 8.06.120 Exemptions.

Construction Activity: This chapter shall not apply to noise sources associated with new construction, remodeling, rehabilitation or grading of any property provided such activities take place between the hours of seven o'clock (7:00) AM and six o'clock (6:00) PM on weekdays, including Saturdays, with no activities taking place at any time on Sundays or federal holidays. All motorized equipment used in such activity shall be equipped with functioning mufflers.

Further, all mobile or stationary internal combustion engine powered equipment or machinery shall be equipped with exhaust and air intake silencers in proper working order, or suitable to meet the standards set forth herein.

The Ordinance also prohibits the operation of any device that creates a vibration, which is above the vibration

perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (150') from the source if on a public space or public right-of-way.

EXISTING NOISE ENVIRONMENT

EXISTING LAND USES AND SENSITIVE RECEPTORS

The project site is bordered by Alabama Street and single-family detached residential dwelling units to the east; single-family detached residential dwelling units, vacant land, and Orange Avenue to the south; single-family detached residential dwelling units and Iowa Street to the west; and vacant land and single-family detached residential dwelling units to the north.

The State of California defines sensitive receptors as those land uses that require serenity or are otherwise adversely affected by noise events or conditions. Schools, libraries, churches, hospitals, single and multi-family residential, including transient lodging, motels and hotel uses make up the majority of these areas.

Sensitive receptors that may be affected by project-generated noise include the single-family detached residential dwelling units located north, west, and south of the project site, and multi-family attached residential dwelling units located east of the project site.

AMBIENT NOISE MEASUREMENTS

In order to document the existing noise environment, an American National Standards Institute (ANSI Section SI4 1979, Type 1) Larson Davis model LxT sound level meter was used to document existing ambient noise levels. In order to document existing ambient noise levels in the project area, four (4) 10-minute daytime noise measurements were taken between 2:06 PM and 3:25 PM on March 23, 2018. Field worksheets and noise measurement output data are included in Appendix C.

As shown on Figure 3, the noise measurements were taken along the single-family detached residential dwelling units located to the south and west of the project site, and the multi-family attached residential dwelling units located to the east of the project site. Table 3 provides a summary of the short-term ambient noise data. Ambient noise levels measured between 56.6 and 66.3 dBA L_{eq} during the daytime (7:00 AM to 10:00 PM). Estimated ambient nighttime noise levels are anticipated to decrease by five dBA to between 51.6 and 61.3 dBA L_{eq} during nighttime hours. The dominant noise sources were from vehicles traveling along Alabama Street, Orange Avenue, and Iowa Street.

DISCUSSION AND RECOMMENDATIONS

CONSTRUCTION NOISE IMPACTS

~~Construction noise is considered a short-term impact and would be considered significant if construction activities are undertaken outside the allowable times as described by the City's Municipal Code Section 8.06.120 (G).~~ Existing single-family detached residential dwelling units located to the east, south, and west of the project site, and the multi-family attached residential dwelling units located to the east of the project site may be affected by short-term noise impacts associated with the transport of workers, the movement of construction materials to and from the project site, ground clearing, excavation, grading, and building activities.

Project generated construction noise will vary depending on the construction process, type of equipment involved, location of the construction site with respect to sensitive receptors, the schedule proposed to carry out each task (e.g., hours and days of the week) and the duration of the construction work. The Federal Highway Administration's

Roadway Construction Noise Model (RCNM) was utilized to model worst-case construction and demolition noise levels (see Appendix D). The construction equipment used in the modeling was assumed per the CalEEMod modeling provided in the Air Quality Analysis prepared for the proposed project (Ganddini Group, Inc., 2019).

Typical noise levels associated with equipment used during construction activities are shown in Table 4. Construction noise associated with the proposed project was calculated utilizing methodology presented in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018) together with several key construction parameters including: distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site. Distances to receptors were based on the acoustical center of the proposed construction activity for the project parcel closest to the sensitive receptor. Construction noise levels were calculated for each phase. The loudest construction phase's modeled noise level for each modeled sensitive receptor is presented in Table 5.

As shown in **Error! Reference source not found.**~~Table 5~~, construction noise will range between 52.8 and 77.5 dBA L_{eq} at nearby sensitive receptors in the project area.
~~Demolition activities are expected to produce the highest sustained construction noise levels. Demolition is expected to include the use of a concrete saw, three excavators, and two dozers. Noise levels associated with equipment used during the demolition are shown in Table 4. A worst-case construction noise scenario assuming the above listed equipment was operating between 25 and 200 feet from the property line, assuming a use factor of 40 percent for each piece of equipment, unmitigated noise levels could reach 86.4 dBA L_{eq} and 89.6 dBA L_{max} at the property line, and the nearest sensitive receptors during demolition. These noise levels will vary throughout each workday as equipment are moved around the site. Grading activities will produce slightly lower noise levels but will last for a longer period of time.~~

As stated earlier, ~~any construction activities that occur outside the allowable time as identified in~~ Section 8.06.120 (G) of the City's Municipal Code ~~would be considered significant~~limits the hours of construction to between the hours of 7:00 AM and 6:00 PM, including Saturdays or at any time on Sundays or holidays. The proposed project is required to comply with the Municipal Code. Per the EIR prepared for the City of Redlands General Plan (2019), a substantial temporary increase in ambient noise levels from construction noise would be considered less than significant if construction activities comply with the City's Noise Control Ordinance in the Municipal Code, Section 8.06.090.

Further, as required in the City's Municipal Code, all motorized equipment used must be equipped with functioning mufflers. Noise reduction measures are provided below to minimize construction noise impacts. The impact is considered less than significant with compliance of hours of operation restrictions outlined in the Municipal Code and implementation of the mitigation measures (MM 1-5) listed below.

MM1 During all project site excavation and grading on-site, construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturer standards.

MM2 The contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the project site.

MM3 Equipment shall be shut off and not left to idle when not in use.

MM4 The contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise/vibration sources and sensitive receptors nearest the project site during all

project construction.

MM5 Jackhammers, pneumatic equipment and all other portable stationary noise sources shall be shielded and noise shall be directed away from sensitive receptors.

VIBRATION IMPACTS

Potential for Damage

Vibration generated by construction activity has the potential to damage structures. This damage could be structural damage, such as cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile.

Caltrans has produced a guidance manual for evaluating potential vibration impacts "Transportation- and Construction-Induced Vibration Guidance Manual" dated September 2013). The manual provides thresholds for potential impacts on human comfort and damage to buildings, as well as guidance for reducing potential vibration impacts and addressing vibration issues. The manual gathers data from multiple sources including the Federal Transit Administration (FTA). As shown in Table 6, 0.20 PPV is the threshold at which there is arisk to "architectural" damage to normal houses.

Vibration levels in the project area may be influenced by construction. Vibration impacts related to structural damage would generally be considered significant if it involves any construction-related or operations-related impacts in excess of 0.2 +inches per second (in/sec) PPV. Further, Section 8.06.090 (G) of the City's Municipal Code prohibits vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred and fifty feet (150 feet) from the source if on a public space or public right-of-way.

Vibratory rollers and/or large bulldozers are the most vibratory pieces of equipment that may be utilized on the project site. As shown in Table 56, vibratory roller could generate up to 0.21 PPV at a distance of 25 feet; and operation of a large bulldozer (0.089 PPV) at a distance of 25 feet. Sensitive receptors in the vicinity of the project site are located adjacent to the south, east, west, and north of the project site. The only receptors that could possibly be affected by groundborne vibration are the homes located immediately adjacent to the project site if a vibrator roller is utilized within 25 feet of a structure or if a large bulldozer is utilized within 15 of a structure. Vibration calculations are provided in Appendix E. With incorporation of mitigation measure 6 listed below, impacts related to groundborne vibration would be less than significant.

MM6 The use of vibratory rollers is to be restricted within 25 feet of the existing structures and the use of large bulldozers is to be restricted within 15 feet of existing structures.

Annoyance

As shown in Table ~~2~~7, groundborne vibration becomes readily perceptible at 0.8 PPV. A vibratory roller generates vibration levels of 0.8 PPV at a distance of 10 feet and a large bulldozer generates vibration levels of 0.8 PPV at a distance of 6 feet (See Appendix E). Vibratory equipment is not expected to be utilized within 10 feet of an existing structure. Impacts associated annoyance associated with groundborne vibration would be less than significant. Mitigation is not required.

TRAFFIC NOISE IMPACTS

Noise Impacts to Off-Site Receptors Due to Project Generated Trips

A worst-case project generated traffic noise level was modeled utilizing the FHWA Traffic Noise Prediction Model -

FHWA-RD-77-108. Traffic noise levels were calculated from the centerline of the roadway to the roadway right-of-way (ROW). The modeling is theoretical and does not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Therefore, the levels are shown for comparative purposes only to show the difference in with and without project conditions. Roadway input parameters including average daily traffic volumes (ADTs), speeds, and vehicle distribution data are shown in Table ~~7~~8. Existing and Existing Plus Project FHWA worksheets are included in Appendix F. The potential off-site noise impacts caused by an increase of traffic from operation of the proposed project on the nearby roadways were calculated for the following scenarios:

Existing Year (without Project): This scenario refers to existing year traffic noise conditions and is demonstrated in Table ~~7~~8.

Existing Year (Plus Project): This scenario refers to existing year plus project traffic noise conditions and is also demonstrated in Table ~~7~~8.

As shown in Table ~~8~~9, modeled Existing traffic noise levels range between 62.98-75.63 dBA CNEL and the modeled Existing Plus Project traffic noise levels range between 63.35-75.66 dBA CNEL at the right-of-way of each modeled roadway segment. The City's General Plan 2035 identifies a potentially substantial increase as either an increase of four or more dB if the resulting noise level would exceed the clearly compatible standards as identified in Tables 1 and 2 or any increase of 6 dB.

Table 9~~8~~ shows that all modeled roadway segments are anticipated to change the noise a nominal amount (approximately 0.01 to 1.5 dBA CNEL). Therefore, a change in noise level would not be audible and would be considered less than significant. No mitigation is required.

Noise Impacts to the Proposed Project

As stated previously, the City of Redlands has identified noise levels of up to 60 CNEL as "clearly compatible" for multi-family attached residential uses (see Table 1). However, if exterior noise levels range between 60 and 75 CNEL, the City's guidelines recommend discouraging new residential development in that area; and if new construction or development does proceed, a detailed analysis of noise reduction requirements must be made and needed noise reduction features included in the design.

The project site is bordered by Orange Avenue, Alabama Street, and Iowa Street. The City of Redlands General Plan 2035 identifies Alabama Street as a Major Arterial roadway and Iowa Street and Orange Avenue as Collector roadways. Future noise levels associated with vehicular traffic traveling on these roadways were modeled using the SoundPLAN model. The Traffic Impact Analysis prepared for the proposed project projects approximately 19,900 average daily traffic volumes to the roadway segment of Alabama Street north of Orange Avenue; 16,400 average daily traffic volumes to the roadway segment of Alabama Street south of Orange Avenue; 3,500 average daily traffic volumes to the roadway segment of Iowa Street along the project site frontage; and 8,000 average daily traffic volumes to the roadway segment of Orange Avenue along the project site frontage. A speed of 30 miles per hour was utilized for modeling input for Orange Avenue and Iowa Street. The posted speed limit for Alabama Street in the vicinity of the project site is 45 miles per hour. SoundPLAN modeling data is included in Appendix G.

As shown on Figure 4, future exterior traffic noise levels at the proposed multi-family (low-rise) attached residential facades along Alabama Street, north of Orange Avenue, are expected to reach up to 68 CNEL at the 1st floor, 71 CNEL at the 2nd floor, and 71 CNEL at the 3rd floor. Windows facing or with a line of sight of Alabama Street, north of Orange Avenue, will need an STC rating of at least 29 to meet the interior noise standard of 45 CNEL.

Future exterior noise levels at the proposed multi-family (low-rise) attached residential facades along Alabama

Street, south of Orange Avenue, are expected to reach up to 67 CNEL at the 1st floor, 69 CNEL at the 2nd floor, and 70 CNEL at the 3rd floor. Windows facing or with a line of sight of Alabama Street, north of Orange Avenue, will need an STC rating of at least 28 to meet the interior noise standard of 45 dBA CNEL.

Future exterior noise levels at building facades along Orange Avenue are expected to reach up to 60 CNEL at the 1st floor, 62 CNEL at the 2nd floor, and 63 CNEL at the 3rd floor. For the proposed multi-family (low-rise) attached residential dwelling units located adjacent to Orange Avenue, windows facing or with a line of sight of Orange Street should have an STC rating of at least 28 to meet the interior noise standard of 45 dBA CNEL.

Future exterior noise levels at the proposed multi-family (low-rise) attached residential facades along Iowa Street are expected to reach up to 56 CNEL at the 1st floor, 55 CNEL at the 2nd floor, and 56 CNEL at the 3rd floor. Considering that typical construction provides approximately 20 dB of exterior to interior noise reduction, additional mitigation measures for the proposed multi-family (low-rise) attached residential facades facing Iowa Street are not necessary.

The City's exterior noise level standard for multiple family residential land uses (60 dBA CNEL) would apply to the outdoor active use areas proposed as part of the project, specifically, the recreation center and the pool area. As shown on Figure 4, future noise levels at these locations are expected to reach up to 55 dBA CNEL and would be consistent with the City's Land Use Compatibility criteria. No mitigation is necessary to reduce future noise levels at the active outdoor use areas.

The City's exterior noise level standard of 60 dBA CNEL does not apply to the proposed balconies and patios because they would not be served as exits from the dwelling units, rather, they would be enclosed with a low wall or railing which would prohibit exit from the dwelling. This guidance is contained in footnote 2 of Table 7-11 in the City of Redlands General Plan 2035 and also presented in Table 2 of this letter report. No mitigation would be required to reduce future noise levels at balconies or patios.

With the addition of windows with STC ratings presented below as mitigation measures, interior noise levels are expected to meet the State Building Code/City of Redlands standard of 45 CNEL.

MM6 Windows facing or with a line of sight of Alabama Street, north of Orange Avenue, will need an STC rating of at least 29 to meet the interior noise standard of 45 CNEL.

MM7 Windows facing or with a line of sight of Alabama Street, north of Orange Avenue, will need an STC rating of at least 28 to meet the interior noise standard of 45 dBA CNEL.

MM8 For the proposed multi-family (low-rise) attached residential dwelling units located adjacent to Orange Avenue, windows facing or with a line of sight of Orange Street should have an STC rating of at least 28 to meet the interior noise standard of 45 dBA CNEL.

OPERATIONAL NOISE IMPACTS

On-site noise sources associated with development of the proposed project will include typical noises associated with residential land uses, including vehicles starting and stopping, passenger loading and unloading; refuse trucks, occasional car alarm activation, landscape maintenance, kids playing. These instantaneous or short-term noise events would range between 55 and 70 dBA at 50 feet from the noise source. Noise associated with proposed park uses will include people talking and socializing along the proposed trails and at the shaded rest areas. Normal conversation is typically 65 dBA. These events and conversation, however, would not occur frequently enough or close enough to sensitive receptors to exceed City of Redlands stationary noise standards or result in a substantial

increase in the ambient average (L_{eq}) noise levels, and would not result in significant impacts.

CONCLUSIONS

The noise impacts from the proposed SD Homes Redlands Apartments Project are anticipated to be consistent with applicable General Plan and Municipal Code standards.

It has been a pleasure for Ganddini Group, Inc. to service your needs on this project. Should you have any questions or if we can be of further assistance, please do not hesitate to call at (714) 795-3100.

Respectfully submitted,

Roma Stromberg, INCE/MS
Senior Noise Analyst

18-0085

APPENDIX A

LIST OF ACRONYMS

TERMS	DEFINITIONS
ADT	Average Daily Traffic volume
ANSI	American National Standard Institute
APN	Assessor's Parcel Number
Caltrans	California Department of Transportation
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
D/E/N	Day/Evening/Night
dB	Decibel
dBA or dB(A)	Decibel "A-Weighted"
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
Hz	Hertz
INCE	Institute of Noise Control Engineering
L_{02},L_{08},L_{50},L_{90}	A-weighted Noise Levels at 2 percent, 8 percent, 50 percent, and 90 percent, Respectively, of the time period
DNL	Day-Night Average Noise Level
$L_{eq(x)}$	Equivalent Noise Level for "x" period of Time
L_{max}	Maximum Level of Noise (measured using a sound level meter)
L_{min}	Minimum Level of Noise (measured using a sound level meter)
LOS C	Level of Service C
MPH	Miles Per Hour
NEPA	National Environmental Policy Act
OPR	California Governor's Office of Planning and Research
Peak Hour L_{eq}	Peak Hour Equivalent Sound Level
PPV	Peak Particle Velocity
RCNM	Road Construction Noise Model
RMS	Root Mean Square
SEL	Single Event Level or Sound Exposure Level
SPL	Sound Pressure Level
STC	Sound Transmission Class
VdB	Vibration Velocity Decibels

APPENDIX B

DEFINITIONS OF ACOUSTICAL TERMS

Term	Definition
Ambient Noise Level	The all-encompassing noise environment associated with a given environment, at a specified time, usually a composite of sound from many sources, at many directions, near and far, in which usually no particular sound is dominant.
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear.
CNEL	Community Noise Equivalent Level. CNEL is a weighted 24-hour noise level that is obtained by adding five decibels to sound levels in the evening (7:00 PM to 10:00 PM), and by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the evening and nighttime hours.
Decibel, dB	A logarithmic unit of noise level measurement that relates the energy of a noise source to that of a constant reference level; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
DNL, Ldn	Day Night Level. The DNL, or Ldn is a weighted 24-hour noise level that is obtained by adding ten decibels to sound levels at night (10:00 PM to 7:00 AM). This weighting accounts for the increased human sensitivity to noise during the nighttime hours.
Equivalent Continuous Noise Level, L_{eq}	A level of steady state sound that in a stated time period, and a stated location, has the same A-weighted sound energy as the time-varying sound.
Fast/Slow Meter Response	The fast and slow meter responses are different settings on a sound level meter. The fast response setting takes a measurement every 100 milliseconds, while a slow setting takes one every second.
Frequency, Hertz	In a function periodic in time, the number of times that the quantity repeats itself in one second (i.e., the number of cycles per second).
L_{02}, L_{08}, L_{50}, L_{90}	The A-weighted noise levels that are equaled or exceeded by a fluctuating sound level, 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period, respectively.
L_{max}, L_{min}	L_{max} is the RMS (root mean squared) maximum level of a noise source or environment measured on a sound level meter, during a designated time interval, using fast meter response. L_{min} is the minimum level.
Offensive/ Offending/ Intrusive Noise	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of sound depends on its amplitude, duration, frequency, and time of occurrence, and tonal information content as well as the prevailing ambient noise level.
Root Mean Square (RMS)	A measure of the magnitude of a varying noise source quantity. The name derives from the calculation of the square root of the mean of the squares of the values. It can be calculated from either a series of lone values or a continuous varying function.

APPENDIX C

NOISE MONITORING FIELD WORKSHEETS

APPENDIX D

RCNM NOISE MODELING OUTPUT

APPENDIX E

VIBRATION WORKSHEETS

APPENDIX F

PROJECT-GENERATED TRAFFIC FHWA WORKSHEETS

APPENDIX G

SOUNDPLAN INPUTS AND OUTPUTS