NOISE ASSESSMENT

1118 N. Anza Street Residential Development
PDS2018-TM-5628/REZ-18-003
County of San Diego, CA

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ATTACHMENTS

GLOSSARY OF COMMON TERMS

Sound Pressure Level (SPL): a ratio of one sound pressure to a reference pressure (L_{ref}) of 20 µPa. Because of the dynamic range of the human ear, the ratio is calculated logarithmically by 20 log (L/L_{ref}).

A-weighted Sound Pressure Level (dBA): Some frequencies of noise are more noticeable than others. To compensate for this fact, different sound frequencies are weighted more.

Minimum Sound Level (L_{min}): Minimum SPL or the lowest SPL measured over the time interval using the A-weighted network and slow time weighting.

Maximum Sound Level (L_{max}): Maximum SPL or the highest SPL measured over the time interval the A-weighted network and slow time weighting.

Equivalent sound level (L_{eq}): the true equivalent sound level measured over the run time. Leq is the A-weighted steady sound level that contains the same total acoustical energy as the actual fluctuating sound level.

Day Night Sound Level (LDN): Representing the Day/Night sound level, this measurement is a 24 –hour average sound level where 10 dB is added to all the readings that occur between 10 pm and 7 am. This is primarily used in community noise regulations where there is a 10 dB "Penalty" for night time noise. Typically LDN's are measured using A weighting.

Community Noise Exposure Level (CNEL): The accumulated exposure to sound measured in a 24-hour sampling interval and artificially boosted during certain hours. For CNEL, samples taken between 7 pm and 10 pm are boosted by 5 dB; samples taken between 10 pm and 7 am are boosted by 10 dB.

Octave Band: An octave band is defined as a frequency band whose upper band-edge frequency is twice the lower band frequency.

Third-Octave Band: A third-octave band is defined as a frequency band whose upper band-edge frequency is 1.26 times the lower band frequency.

Response Time (F,S,I): The response time is a standardized exponential time weighting of the input signal according to fast (F), slow (S) or impulse (I) time response relationships. Time response can be described with a time constant. The time constants for fast, slow and impulse responses are 1.0 seconds, 0.125 seconds and 0.35 milliseconds, respectively.

EXECUTIVE SUMMARY

This noise study has been completed to determine the noise impacts associated with the development of the proposed project (TM 5628). The project known as "1118 N. Anza Street Residential Development" proposes the development of a 3.2 acre lot with 39 townhomes. The project is located adjacent to the City of El Cajon, in the eastern portion of the unincorporated community of Lakeside in San Diego County, CA.

- On-Site Noise Analysis

It was determined from the analysis that the multi-family NSLU's will comply with the County of San Diego 65 dBA CNEL exterior noise standard without mitigation measures. The first floor and second floor building facades were found to be above the General Plan Noise Element Standard of 60 dBA CNEL. Therefore, interior mitigation is required to obtain an interior level of 45 dBA CNEL. It was determined that interior noise reduction methods (i.e., dual-paned glass treatments) having a sound transmission classification (STC) rating of 26 or higher be installed.

- Off-Site Noise Analysis

The project does not create a direct impact of more than 3 dBA CNEL on any roadway segment and no cumulative noise increase of 3 dBA CNEL or more were found. Therefore, the proposed project's direct and cumulative contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

- Construction Noise Analysis

The grading activities will consist of the preparation of the proposed internal roadways, the finished pads, and the water quality detention basins. The grading equipment will be spread out over the project site from distances near the occupied property to distances of 300-feet or more away. Based upon the proposed site plan the majority of the grading operations will occur more than 135-feet from the property lines. At average distances over 135-feet the grading activities are anticipated not to exceed the County's 75-dBA standard and would not require any mitigation measures. No blasting or rock crushing is anticipated during the grading operations. Therefore, no impulsive noise sources are expected and the Project will comply with Section 36.410 of the County Noise Ordinance.

- Operational Noise Analysis

Based on noise levels, the distances to the property lines and the proposed fencing the proposed operations are anticipated to be below the County's Property Lines standards. No impacts are anticipated and no mitigation is required.

1.0 INTRODUCTION

1.1 Project Description

This noise study was completed to determine the noise impacts associated with the development of the proposed 1118 N. Anza Street Residential Development (TM 5628). The project is located at 32° 48′ 37″ N and 116° 56′ 56″ W, north of Broadway between N. Mollison Avenue and N. 1st Street approximately one half mile north of Interstate-8 in the eastern portion of the unincorporated area or San Diego County CA. The project site address is 1118 N. Anza Street. The general location of the project is shown on the Vicinity Map, Figure 1-A.

The proposed project seeks the development of a 3.2 acre lot with 39 two-story townhome style condominiums. The existing County of San Diego General Plan land use designation is RV (Residential Variable) with an underlying land use designation of VR-15 (Village Residential). A site development plan is shown in Figure 1-B on Page 4 of this report.

1.2 Environmental Settings & Existing Conditions

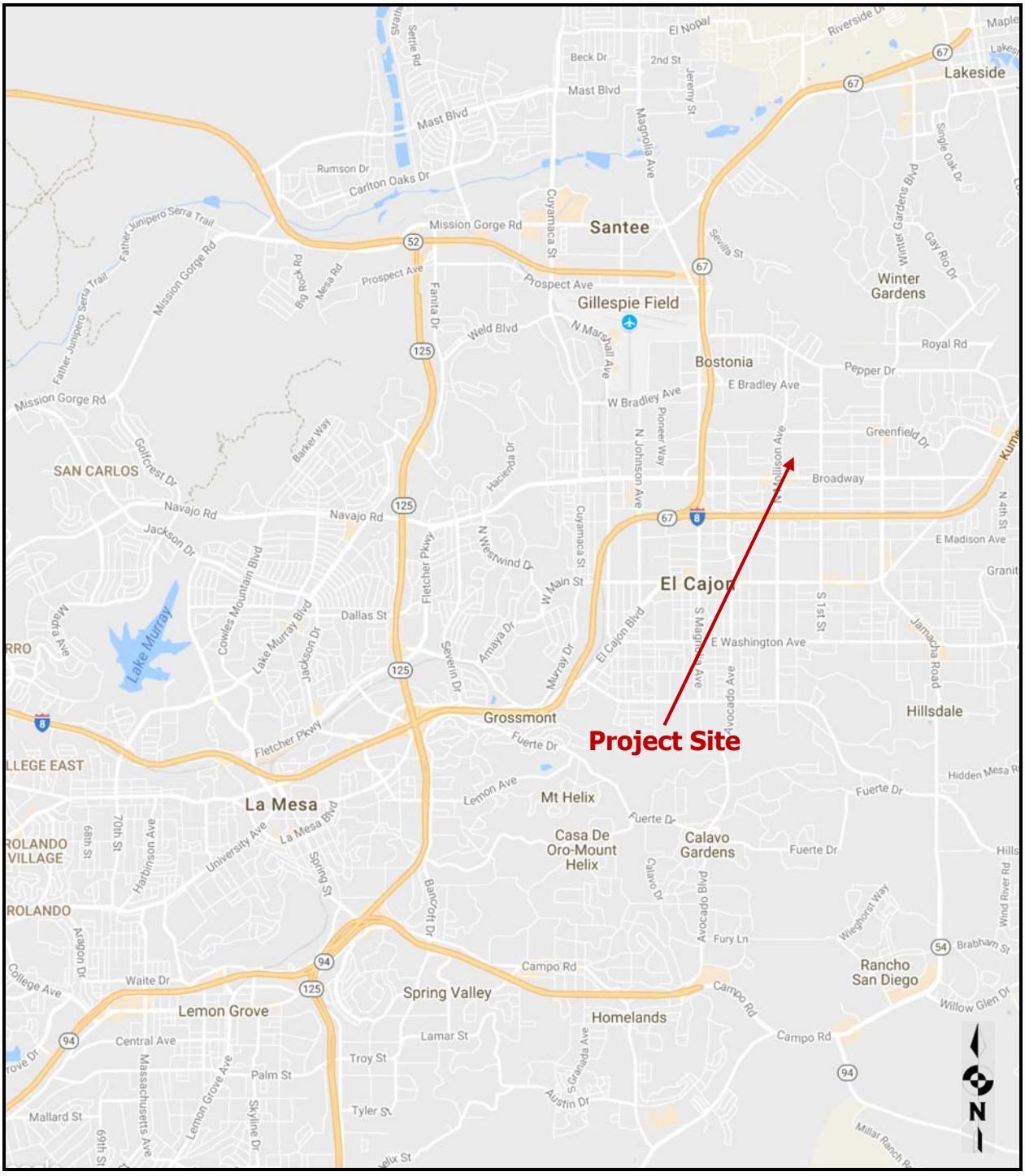
a) Settings & Locations

The project is located at 1118 N. Anza Street. Access to the project site is provided by N. Anza Street by way of Broadway to the south. Broadway is a major arterial that connects the project to other arterials. Existing land uses surrounding the site are residential.

b) Existing Noise Conditions

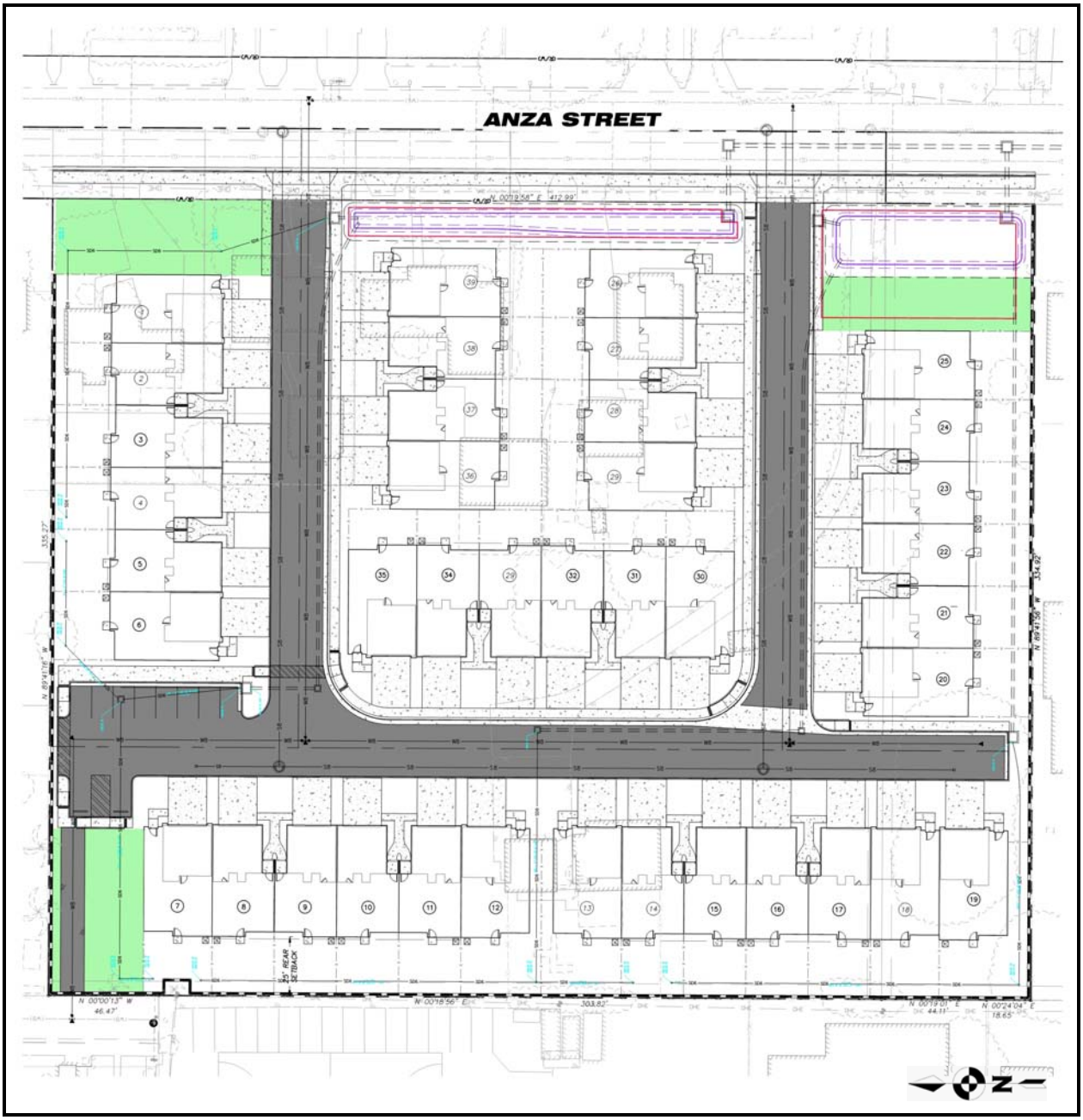
The project is located near Broadway and N. Mollison Ave. Both roads have a roadway classification of 4 lane Boulevard series in the County of San Diego's Circulation Element with a design speed limit of 40 miles per hour (MPH). Existing noise occurs mainly from traffic traveling along both roadways and aircraft traffic from nearby Gillespie Field Airport.

Figure 1-A: Project Vicinity Map



Source: Google Maps, 2018

Figure 1-B: Proposed Project Site Layout



Source: SB&O, Inc, 2018

1.3 Methodology and Equipment

a) Noise Measuring Methodology and Procedures

To determine the existing noise environment and to assess potential noise impacts, measurements were taken at the east end of the project having a relatively flat terrain and no obstruction from trees or rock outcroppings. This was done to determine the worst case conditions at the nearest proposed NSLU. The noise measurements were recorded on April 25 2018 by Ldn Consulting between approximately 9:45 a.m. and 10:15 a.m.

Noise measurements were taken using a Larson-Davis Model LxT Type 1 precision sound level meter, programmed, in "slow" mode, to record noise levels in "A" weighted form. The sound level meter and microphone were mounted on a tripod, five feet above the ground and equipped with a windscreen during all measurements. The sound level meter was calibrated before and after the monitoring using a Larson-Davis calibrator, Model CAL 200.

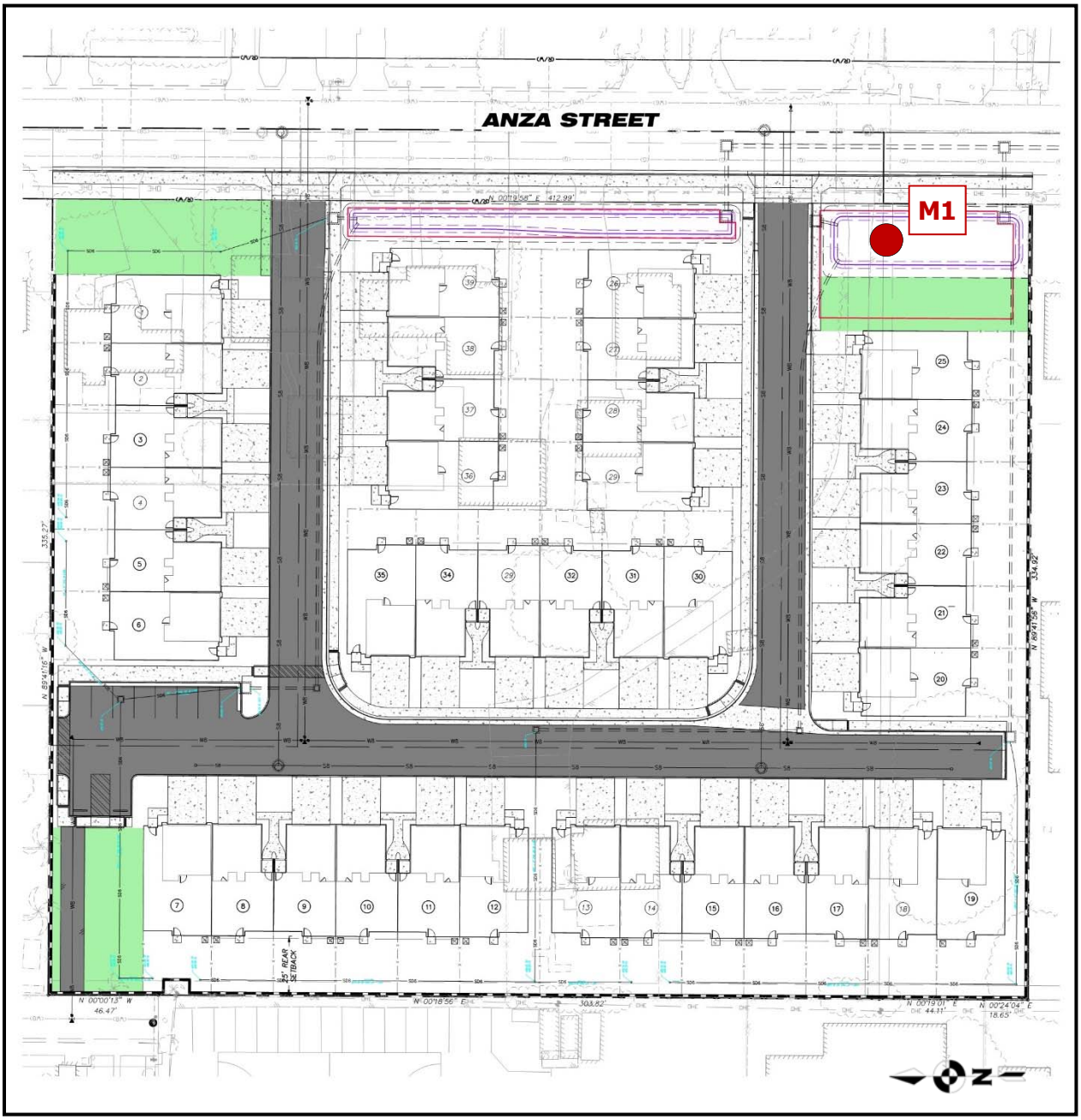
The noise measurement location was determined based on site access and noise impact potential to the proposed sensitive uses. Monitoring location 1 (M1) was located approximately 100-feet from N. Anza Street near the entrance of the project site. The noise monitoring locations are provided graphically in Figure 1-C on the following page.

The results of the noise level measurement is presented in Table 1-1. The noise measurement was monitored for a time period of 15 minutes. The ambient Leq noise levels measured in the area of the project during the morning hour was found to be 49.4 dBA. The existing noise levels in the project area consisted primarily of background noise from Broadway and aircraft noise from nearby Gillespie Field Airport.

Table 1-1: Existing Noise Levels

Location	Time	One Hour Noise Levels (dBA)					
		Leq	Lmin	Lmax	L10	L50	L90
M1	9:55–10:10 a.m.	49.4	44.2	60.45	51.4	48.1	46.0
Source: Ldn Consulting, Inc. April 25, 2018							

Figure 1-C: Noise Measurement Locations



b) Noise Modeling Software

The primary source of noise impacts to the project site will be background vehicular noise from Broadway and N. Mollison Avenue and aircraft noise from nearby Gillespie Field Airport located approximately one mile northwest of the project site. The projected roadway noise levels from vehicular traffic were calculated using the methods in the Highway Noise Model published by the Federal Highway Administration (FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108, December 1978). The FHWA Model uses the traffic volume, vehicle mix, speed, and roadway geometry to compute the equivalent noise level. A spreadsheet calculation was used which computes equivalent noise levels for each of the time periods used in the calculation of CNEL. Weighting these equivalent noise levels and summing them gives the CNEL for the traffic projections.

c) Noise Calculations and Factors

Noise is defined as unwanted or annoying sound which interferes with or disrupts normal activities. Exposure to high noise levels has been demonstrated to cause hearing loss. The individual human response to environmental noise is based on the sensitivity of that individual, the type of noise that occurs and when the noise occurs.

Sound is measured on a logarithmic scale consisting of sound pressure levels known as a decibel (dB). The sounds heard by humans typically do not consist of a single frequency but of a broadband of frequencies having different sound pressure levels. The method for evaluating all the frequencies of the sound is to apply an A-weighting to reflect how the human ear responds to the different sound levels at different frequencies. The A-weighted sound level adequately describes the instantaneous noise whereas the equivalent sound level depicted as Leq represents a steady sound level containing the same total acoustical energy as the actual fluctuating sound level over a given time interval.

The Community Noise Equivalent Level (CNEL) is the 24 hour A-weighted average for sound, with corrections for evening and nighttime hours. The corrections require an addition of 5 decibels to sound levels in the evening hours between 7 p.m. and 10 p.m. and an addition of 10 decibels to sound levels at nighttime hours between 10 p.m. and 7 a.m. These additions are made to account for the increased sensitivity during the evening and nighttime hours when sound appears louder.

A vehicle's noise level is from a combination of the noise produced by the engine, exhaust and tires. The cumulative traffic noise levels along a roadway segment are based on three primary factors: the amount of traffic, the travel speed of the traffic, and the vehicle mix ratio or number of medium and heavy trucks. The intensity of traffic noise is increased by

higher traffic volumes, greater speeds and increased number of trucks.

Because mobile/traffic noise levels are calculated on a logarithmic scale, a doubling of the traffic noise or acoustical energy results in a noise level increase of 3 dBA. Therefore the doubling of the traffic volume, without changing the vehicle speeds or mix ratio, results in a noise increase of 3 dBA. Mobile noise levels radiate in an almost oblique fashion from the source and drop off at a rate of 3 dBA for each doubling of distance under hard site conditions and at a rate of 4.5 dBA for soft site conditions. Hard site conditions consist of concrete, asphalt and hard pack dirt while soft site conditions exist in areas having slight grade changes, landscaped areas and vegetation. On the other hand, fixed/point sources radiate outward uniformly as sound travels away from the source. Their sound levels attenuate or drop off at a rate of 6 dBA for each doubling of distance.

The most effective noise reduction methods consist of controlling the noise at the source, blocking the noise transmission with barriers or relocating the receiver. Any or all of these methods may be required to reduce noise levels to an acceptable level.

d) Interior Noise Methodology

The methodology used to determine the resultant interior noise levels is based upon the exterior noise level minus the sound transmission loss as identified in the American Society of Testing and Materials (ASTM) guidelines: E413 &E90. Standard building construction will provide a noise reduction of approximately 12-15 dBA with a windows open condition and a minimum 20 dBA noise reduction with the windows closed. The exterior noise levels at the proposed structures calculated in terms of dBA are converted to the six octave band sound pressure levels between: 125 - 4000 Hertz.

Acoustical modeling of the proposed project dwelling units was performed in accordance with the above guidelines and included combining the transmission loss for each of the building components that will reduce the interior noise levels. Building components typically include the windows, exterior doors, and exterior walls. The total noise reduction is dependent upon the transmission loss of each building component, their subsequent surface area, quality of the building/construction materials, a building façade and angle correction.

The interior noise level is also dependent on the acoustical energy absorbed within the room based upon the Noise Reduction Coefficients (NRC). NRC is a scalar representation of the amount of sound energy absorbed upon striking a particular surface and the arithmetic value average of sound absorption coefficients indicating a material's ability to absorb sound. The absorption coefficients for individual surface areas such as carpet, drywall and furnishings are used to calculate the interior room effects. The calculated building noise

reduction includes both the room absorption characteristics and the transmission loss from the exterior wall assembly.

The interior noise reduction calculations were performed using Ldn's interior noise model. The model converts the exterior sound level to octave band frequencies and accounts for the transmission loss, correction factors and room absorption. The floor plans used for this analysis were provided by Flair Architects, Inc., received April 2018. The following construction details were utilized for each of the building assemblies to determine the noise reduction characteristics:

Exterior walls must have a Sound Transmission Class (STC) rating of 36 or better. Exterior walls with this rating consist of 2"x4" studs or larger, spaced 16" o.c. with R-13 insulation minimum and an exterior surface of 1/4" lap siding or 7/8" cement plaster (stucco). Interior wall and ceiling surfaces shall be at least 1/2" thick gypsum or plaster. Roof assemblies should have a minimum of 1/2" sheathing, R-19 insulation and sealed to prevent noise leaks.

Exterior entry doors should be of solid core construction and glass assemblies should be dual-glazed and acoustical sealant applied around the exterior edges. The window and door assemblies are generally the weakest noise reducing component but are the most convenient and cost effective elements to change if additional attenuation is needed. The STC ratings for the glass assemblies and exterior entry doors were calculated in the interior noise model and provided in the findings below.

Bathrooms, kitchens, closets and corridors are not required to meet the 45 dBA CNEL standard and therefore were not modeled. All living areas, this includes bedrooms, living rooms and dining rooms were modeled to determine the interior noise reductions. If the modeled interior noise levels were found to be higher than 45 dBA CNEL in the living areas with the minimum assembly requirements described above additional modeling was performed to determine the minimum STC rating for the glass assemblies to further reduce interior noise levels below the acceptable interior threshold of 45 dBA CNEL.

2.0 NOISE SENSITIVE LAND USES (NSLU)

2.1 Guidelines for the Determination of Significance

The County's General Plan Chapter 8 Noise Element uses the Noise Compatibility Guidelines listed in Table N-1 of the General Plan Noise Element (provided below) to determine the compatibility of land use when evaluating proposed development projects. The Noise Compatibility Guidelines indicate ranges of compatibility and are intended to be flexible enough to apply to a range of projects and environments. For example, a commercial project would be evaluated differently than a residential project in a rural area or a mixed-use project in a more densely developed area of the County.

TABLE N-1: NOISE COMPATIBILITY GUIDELINES (CNEL)

Table N-1 Noise Compatibility Guidelines									
		Exterior Noise Level (CNEL)							
	Land Use Category		55	60	65	70	75	80	
A	Residential—single family residences, mobile homes, senior housing, convalescent homes								
B	Residential—multi-family residences, mixed-use (commercial/residential)								
C	Transient lodging—motels, hotels, resorts								
D*	Schools, churches, hospitals, nursing homes, child care facilities								
E*	Passive recreational parks, nature preserves, contemplative spaces, cemeteries								
F*	Active parks, golf courses, athletic fields, outdoor spectator sports, water recreation								
G*	Office\professional, government, medical\dental, commercial, retail, laboratories								
H*	Industrial, manufacturing, utilities, agriculture, mining, stables, ranching, warehouse, maintenance/repair								
	ACCEPTABLE—Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal construction, without any special noise insulation requirements.								
	CONDITIONALLY ACCEPTABLE—New construction or development should be undertaken only after a detailed noise analysis is conducted to determine if noise reduction measures are necessary to achieve acceptable levels for land use. Criteria for determining exterior and interior noise levels are listed in Table N-2, Noise Standards. If a project cannot mitigate noise to a level deemed Acceptable, the appropriate county decision-maker must determine that mitigation has been provided to the greatest extent practicable or that extraordinary circumstances exist.								
	UNACCEPTABLE—New construction or development shall not be undertaken.								

* Denotes facilities used for part of the day; therefore, an hourly standard would be used rather than CNEL (refer to Table N-2).

Note: For projects located within an Airport Influence Area of an adopted Airport Land Use Compatibility Plan (ALUCP), additional Noise Compatibility Criteria restrictions may apply as specified in the ALUCP.

A land use located in an area identified as "acceptable" indicates that standard construction methods would attenuate exterior noise to an acceptable indoor noise level and that people can carry out outdoor activities with minimal noise interference. Land uses that fall into the "conditionally acceptable" noise environment should have an acoustical study that considers the type of noise source, the sensitivity of the noise receptor, and the degree to which the noise source may interfere with sleep, speech, or other activities characteristic of the land use. For land uses indicated as "conditionally acceptable," structures must be able to attenuate the exterior noise to the indoor noise level as indicated in the Noise Standards listed in Table N-2 of the General Plan Noise Element (provided below). For land uses where the exterior noise levels fall within the "unacceptable" range, new construction generally should not be undertaken.

TABLE N-2: NOISE STANDARDS

Table N-2 Noise Standards[Note]
1. The exterior noise level (as defined in Item 3) standard for Category A shall be 60 CNEL, and the interior noise level standard for indoor habitable rooms shall be 45 CNEL.
2. The exterior noise level standard for Categories B and C shall be 65 CNEL, and the interior noise level standard for indoor habitable rooms shall be 45 CNEL.
3. The exterior noise level standard for Categories D and G shall be 65 CNEL and the interior noise level standard shall be 50 dBA L_{eq} (one hour average).
4. For single-family detached dwelling units, "exterior noise level" is defined as the noise level measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum net lot area: *(i)* for lots less than 4,000 square feet in area, the exterior area shall include 400 square feet, *(ii)* for lots between 4,000 square feet to 10 acres in area, the exterior area shall include 10 percent of the lot area; *(iii)* for lots over 10 acres in area, the exterior area shall include 1 acre.
5. For all other residential land uses, "exterior noise level" is defined as noise measured at exterior areas which are provided for private or group usable open space purposes. "Private Usable Open Space" is defined as usable open space intended for use of occupants of one dwelling unit, normally including yards, decks, and balconies. When the noise limit for Private Usable Open Space cannot be met, then a Group Usable Open Space that meets the exterior noise level standard shall be provided. "Group Usable Open Space" is defined as usable open space intended for common use by occupants of a development, either privately owned and maintained or dedicated to a public agency, normally including swimming pools, recreation courts, patios, open landscaped areas, and greenbelts with pedestrian walkways and equestrian and bicycle trails, but not including off-street parking and loading areas or driveways.
6. For non-residential noise sensitive land uses, exterior noise level is defined as noise measured at the exterior area provided for public use.
7. For noise sensitive land uses where people normally do not sleep at night, the exterior and interior noise standard may be measured using either CNEL or the one-hour average noise level determined at the loudest hour during the period when the facility is normally occupied.
8. The exterior noise standard does not apply for land uses where no exterior use area is proposed or necessary, such as a library.
9. For Categories E and F the exterior noise level standard shall not exceed the limit defined as "Acceptable" in Table N-1 or an equivalent one-hour noise standard.

Note: Exterior Noise Level compatibility guidelines for Land Use Categories A-H are identified in Table N-1, Noise Compatibility Guidelines.

2.2 Potential Onsite Noise Impacts

It is expected that the primary source of potential noise impacts to the project site will occur from the combination of traffic noise along Broadway and N. Mollison Avenue and aircraft noise from nearby Gillespie Field Airport.

a) Future Onsite Roadway Noise

The Buildout scenario includes the future year 2030 traffic volume forecasts provided by the County's General Plan Update for 2030. The future traffic along Broadway and N. Mollison Avenue is estimated to be 19,800 ADT and 16,700 ADT in the year 2030, respectively. The future roadway parameters and inputs utilized in this analysis are provided in Table 2-1. Based on the County of San Diego Department of Public Works Public Road Standards, Broadway and N. Mollison Avenue are considered a boulevard roadway with a designed traffic speed of 40 MPH. To assess the peak hour traffic noise conditions, 10% of the ADT was utilized and a conservative vehicle mix was also utilized to predict the worst case noise levels.

Table 2-1: Buildout 2030 Traffic Parameters

Roadway	Average Daily Traffic (ADT)	Peak Hour Volume[1]	Modeled Speeds (MPH)	Vehicle Mix %[2]		
				Auto	Medium Trucks	Heavy Trucks
Broadway	19,800	1,980	40	95	3	2
N. Mollison Avenue	16,700	1,670	40	95	3	2

[1] 10% of the ADT.
[2] Conservative vehicle mix.

Based on the exterior noise model, the worst-case cumulative noise level from the roadways was found to be 63.1 dBA CNEL at the site. It should be noted, the line of sight to the roadways is primarily blocked by numerous residential structures which would result in reduction in noise levels. Due to the distance of the noise sources and the shielding from the existing structures, the resultant noise levels would not have a cumulative effect at the project site. To be conservative, the worst-case building façade level was used for this analysis and the exterior noise levels were found to be below the County's 65 dBA CNEL threshold for multi-family units. The modeling results are provided in Figure 2-A.

Figure 2-A: Future Noise Levels

Project Name:	1118 N. Anza Street		Date:	27-Apr-18
Project Number:	18-32		Location:	San Diego

Traffic Volumes, Mix and Speeds

	Autos	Med. Trucks	Heavy Trucks
Mix Ratio by Percent	95.0	3.0	2.0
Propagation Rule	Hard		

Roadway	**ADT**	**Speed MPH**	**CNEL @ 50 Feet**	**60 CNEL (Feet)**
Broadway	19,800	40	71.3	668
Mollison Ave	16,700	40	70.5	563

Noise Reduction due to Distance

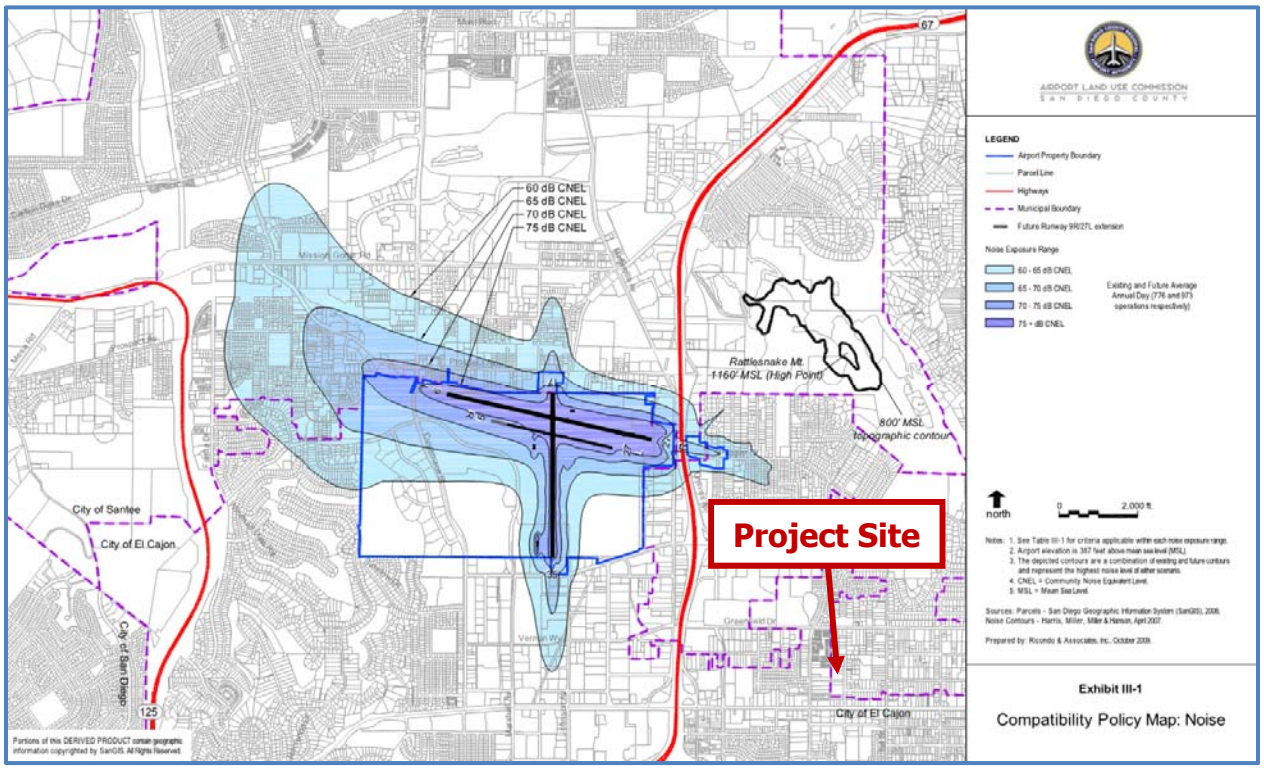
	Distance	**Reduction**	**Resultant Level**
Broadway	675	-11.30	60.0
Mollison Ave	525	-10.21	60.3

Cumulative Noise Level	**63.1**	**dBA CNEL**

b) Airport Related Noise

To determine the airport related noise environment and impact potentials the Gillespie Field Airport Land Use Compatibility Plan was compared to the project site location. According to the ALUCP dated January 25, 2010, the project site is located well outside of the 60 dBA CNEL noise contours from the airport. Therefore, no cumulative noise increase and no mitigation related to airport noise is required. The project site and future noise contours are provided graphically in Figure 2-B on the following page.

Figure 2-B: Gillespie Field Airport Noise Contours



2.3 Interior Noise Findings

The exterior noise levels were determined to be as high as 63.1 dBA CNEL from background traffic noise from Broadway and N. Mollison Avenue. Basic calculations show that a windows open condition will typically reduce the interior noise levels 12-15 dBA CNEL and not provide adequate interior noise mitigation. To meet the 45 dBA CNEL interior noise standard, an overall minimum interior noise level reduction of 18.1 dBA CNEL is needed for the proposed project. Therefore, a closed window condition is required to reduce interior noise levels to comply with CCR Title 24 and County requirements. The windows closed condition requires that mechanical ventilation is installed to move air within the structure and control temperatures. The mechanical ventilation must meet the jurisdictional requirements for these dwelling units.

The necessary Sound Transmission Class and transmission losses for all glass assemblies and entry doors of the residential units are provided in Table 2-2. The modeled results with an anticipated interior noise level of 45 dBA CNEL or less are provided as an ***Attachment A*** to this report.

Table 2-2: Sound Transmission Class Ratings

Assembly	STC Rating[1]	Octave Band Transmission Loss (Hz)					
		125	250	500	1000	2000	4000
Windows	**26**	21	20	23	25	29	32
Fixed Windows	**26**	17	16	22	31	35	27
Glass Doors	**26**	21	24	27	27	24	28
[1] *STC Ratings used in Model*							

2.4 Off-site Noise Impacts

To determine if direct or cumulative off-site noise level increases associated with the development of the proposed project would create noise impacts, the traffic volumes for the existing conditions were compared with the traffic volume increase of existing plus the proposed project. Based on the Draft Traffic Impact Study prepared by LOS Engineering, Inc., dated April 6, 2018, the project is estimated to generate 312 daily trips with a peak hour volume of 31 trips. The existing average daily traffic (ADT) volume along N. Anza Street near the project site is 560 ADT. This would result in a traffic volume increase of approximately 55%. The existing ADT volumes on the area roadways are more than several thousand ADT. The project will add less than a 1% increase to the exiting roadway volumes. Typically, it requires a project to double (or add 100%) the traffic volumes to have a direct impact of 3 dBA CNEL or be a major contributor to the cumulative traffic volumes. Therefore, no direct or cumulative impacts are anticipated.

2.5 Conclusions

It was determined from the analysis that the multi-family NSLU's will comply with the County of San Diego 65 dBA CNEL exterior noise standard without mitigation measures. The first floor and second floor building facades are above the General Plan Noise Element Standard, of 60 dBA CNEL. It was determined that interior noise reduction methods (i.e., dual-paned glass treatments, acoustical sealant) having a sound transmission classification (STC) rating of 26 or higher be installed to obtain an interior level of 45 dBA CNEL.

The project does not create a direct impact of more than 3 dBA CNEL on any roadway segment and no cumulative noise increase of 3 dBA CNEL or more were found. Therefore, the proposed project's direct and cumulative contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

3.0 CONSTRUCTION ACTIVITIES

3.1 Guidelines for the Determination of Significance

Construction Noise: Noise generated by construction activities related to the project will exceed the standards listed in San Diego County Code Sections as follows.

SEC. 36.408: HOURS OF OPERATION OF CONSTRUCTION EQUIPMENT

Except for emergency work, it shall be unlawful for any person to operate or cause to be operated, construction equipment:

a. Between 7 p.m. and 7 a.m.

b. On a Sunday or a holiday. For purposes of this section, a holiday means January 1st, the last Monday in May, July 4th, the first Monday in September, December 25th and any day appointed by the President as a special national holiday or the Governor of the State as a special State holiday. A person may, however, operate construction equipment on a Sunday or holiday between the hours of 10 a.m. and 5 p.m. at the person's residence or for the purpose of constructing a residence for himself or herself, provided that the operation of construction equipment is not carried out for financial consideration or other consideration of any kind and does not violate the limitations in sections 36.409 and 36.410.

SEC. 36.409: SOUND LEVEL LIMITATIONS ON CONSTRUCTION EQUIPMENT

Except for emergency work, it shall be unlawful for any person to operate construction equipment or cause construction equipment to be operated, that exceeds an average sound level of 75 decibels for an eight-hour period, between 7 a.m. and 7 p.m., when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is being received.

SEC. 36.410: SOUND LEVEL LIMITATIONS ON IMPULSIVE NOISE

In addition to the general limitations on sound levels in section 36.404 and the limitations on construction equipment in section 36.409, the following additional sound level limitations shall apply:

(a) Except for emergency work or work on a public road project, no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown in Table 36.410A (provided below), when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25 percent of the minutes in the measurement period, as described in subsection (c) below. The maximum sound level depends on the use being made of the occupied property. The uses in Table 36.410A are as described in the County Zoning Ordinance.

TABLE 36.410A: MAXIMUM SOUND LEVEL (IMPULSIVE) MEASURED AT OCCUPIED PROPERTY IN DECIBELS (dBA)

OCCUPIED PROPERTY USE	DECIBELS (dBA)
Residential, village zoning or civic use	82
Agricultural, commercial or industrial use	85

(b) Except for emergency work, no person working on a public road project shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown in Table 36.410B, when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25 percent of the minutes in the measurement period, as described in subsection (c) below. The maximum sound level depends on the use being made of the occupied property. The uses in Table 36.410B are as described in the County Zoning Ordinance.

TABLE 36.410B: MAXIMUM SOUND LEVEL (IMPULSIVE) MEASURED AT OCCUPIED PROPERTY IN DECIBELS (dBA) FOR PUBLIC ROAD PROJECTS

OCCUPIED PROPERTY USE	dB(A)
Residential, village zoning or civic use	85
Agricultural, commercial or industrial use	90

(c) The minimum measurement period for any measurements conducted under this section shall be one hour. During the measurement period a measurement shall be conducted every minute from a fixed location on an occupied property. The measurements shall measure the maximum sound level during each minute of the measurement period. If the sound level caused by construction equipment or the producer of the impulsive noise exceeds the maximum sound level for any portion of any minute, it will be deemed that the maximum sound level was exceeded during that minute.

3.2 Potential Property Line Noise Impacts

a) Potential Build Out Noise Conditions

Construction noise represents a short-term impact on the ambient noise levels. Noise generated by construction equipment includes haul trucks, water trucks, graders, dozers, loaders and scrapers can reach relatively high levels. Grading activities typically represent one of the highest potential sources for noise impacts. The most effective method of controlling construction noise is through local control of construction hours and by limiting the hours of construction to normal weekday working hours.

The U.S. Environmental Protection Agency (U.S. EPA) has compiled data regarding the noise generating characteristics of specific types of construction equipment. Noise levels generated by heavy construction equipment can range from 60 dBA to in excess of 100 dBA when measured at 50 feet. However, these noise levels diminish rapidly with distance from the construction site at a rate of approximately 6 dBA per doubling of distance. For example, a noise level of 75 dBA measured at 50 feet from the noise source to the receptor would be reduced to 69 dBA at 100 feet from the source to the receptor, and reduced to 63 dBA at 200 feet from the source.

b) Potential Noise Impact Identification

Using a point-source noise prediction model, calculations of the expected construction noise impacts were completed. The essential model input data for these performance equations include the source levels of each type of equipment, relative source to receiver horizontal and vertical separations, the amount of time the equipment is operating in a given day, also referred to as the duty-cycle and any transmission loss from topography or barriers.

Based empirical data and the amount of equipment needed, worst case noise impacts from this construction equipment would occur during the grading operations. In order to determine the worst case scenario for the grading activities all the equipment was place in a common location, which is not physically possible. As can be seen in Table 3-1, even if all the equipment were placed together the cumulative grading activities noise levels would be 83.5 dBA and would attenuate 8.6 dBA at a distance of 135-feet from the point source noise and would be at or below the 75 dBA threshold.

Table 3-1: Construction Noise Levels

Construction Equipment	Quantity	Source Level @ 50-Feet (dBA)[1]	Duty Cycle (Hours/Day)	Cumulative Noise Level @ 50-Feet (dBA)
Dozer - D8	2	72	8	75.0
Tractor/Backhoe	2	74	8	77.0
Loader/Grader	1	73	8	73.0
Water Trucks	1	70	8	70.0
Scraper	2	75	8	78.0
Excavator	2	74	8	77.0
			Cumulative Levels @ 50 Feet	83.5
			Distance to Property Line (Feet)	135
			Noise Reduction Due to Distance	-8.6
			NEAREST PROPERTY LINE NOISE LEVEL	**74.9**

[1] Source: U.S. Environmental Protection Agency (U.S. EPA) and Empirical Data

The grading equipment will be spread out over the project site from distances near the occupied property to distances of over 300-feet away. Based upon the proposed site plan the majority of the grading operations will occur more than 150-feet from the property lines. At average distances over 135-feet the grading activities are anticipated not to exceed the County's 75-dBA standard and would not require any mitigation measures. This means that most of the time the average distance from the equipment to the occupied properties is more than 135-feet and in that situation no impacts are anticipated.

No blasting or rock crushing is anticipated during the grading operations. Therefore, no impulsive noise sources are expected and the Project is anticipated to comply with Section 36.410 of the County Noise Ordinance and no further analysis is required.

3.3 Conclusions

The grading activities will consist of the preparation of the proposed internal roadways, the finished pads, and the water quality detention basins. The grading equipment will be spread out over the project site from distances near the occupied property to distances of 300-feet or more away. Based upon the proposed site plan the majority of the grading operations will occur more than 135-feet from the property lines. At average distances over 135-feet the grading activities are anticipated not to exceed the County's 75-dBA standard and would not require any mitigation measures.

No blasting or rock crushing is anticipated during the grading operations. Therefore, no impulsive noise sources are expected and the Project will comply with Section 36.410 of the County Noise Ordinance.

4.0 OPERATIONAL ACTIVITIES

4.1 Guidelines for the Determination of Significance

Section 36.404 of the County of San Diego noise ordinance provides performance standards and noise control guidelines for determining and mitigating non-transportation, or stationary, noise source impacts to adjacent properties. The purpose of the noise ordinance is to protect, create and maintain an environment free from noise and vibration that may jeopardize the health or welfare, or degrade the quality of life. The sound level limits in Table 36.404 of the County's Noise Ordinance are provided below in Table 4-1.

Table 4-1: Property Line Sound Level Limits in Decibels (dBA)

Zone	Time	One-Hour Average Sound Level Limits (dBA)
(1) RS, RD, RR, RMH, A70, A72, S80, S81, S87, S90, S92, RV, and RU with a density of less than 11 dwelling units per acre.	7 a.m. to 10 p.m.	50
	10 p.m. to 7 a.m.	45
(2) RRO, RC, RM, S86, V5, RV and RU with a density of 11 or more dwelling units per acre.	7 a.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
(3) S94, V4, and all commercial zones.	7 a.m. to 10 p.m.	60
	10 p.m. to 7 a.m.	55
(4) V1, V2	7 a.m. to 7 p.m.	60
V1, V2	7 p.m. to 10 p.m.	55
V1	10 p.m. to 7 a.m.	55
V2	10 p.m. to 7 a.m.	50
V3	7 a.m. to 10 p.m.	70
	10 p.m. to 7 a.m.	65
(5) M50, M52, and M54	Anytime	70
(6) S82, M56, and M58.	Anytime	75
(7) S88 (see subsection (c) below)		

Source: County of San Diego Noise Ordinance Section 36.404

a) Except as provided in section 36.409 of this chapter, it shall be unlawful for any person to cause or allow the creation of any noise, which exceeds the one-hour average sound level limits in Table 36.404, when the one-hour average sound level is measured at the property line of the property on which the noise is produced or at any location on a property that is receiving the noise.

b) Where a noise study has been conducted and the noise mitigation measures recommended by that study have been made conditions of approval of a Major Use Permit, which authorizes the noise-generating use or activity and the decision making body approving the Major Use Permit determined that those mitigation measures reduce potential noise impacts to a level below significance, implementation and compliance with those noise mitigation measures shall constitute compliance with subsection (a) above.

c) S88 zones are Specific Planning Areas which allow different uses. The sound level limits in Table 36.404 above that apply in an S88 zone depend on the use being made of the property. The limits in Table 36.404, subsection (1) apply to property with a residential, agricultural or civic use. The limits in subsection (3) apply to property with a commercial use. The limits in subsection (5) apply to property with an industrial use that would only be allowed in an M50, M52 or M54 zone. The limits in subsection (6) apply to all property with an extractive use or a use that would only be allowed in an M56 or M58 zone.

d) If the measured ambient noise level exceeds the applicable limit in Table 36.404, the allowable one-hour average sound level shall be the one-hour average ambient noise level, plus three decibels. The ambient noise level shall be measured when the alleged noise violation source is not operating.

e) The sound level limit at a location on a boundary between two zones is the arithmetic mean of the respective limits for the two zones. The one-hour average sound level limit applicable to extractive industries, however, including but not limited to borrow pits and mines, shall be 75 decibels at the property line regardless of the zone in which the extractive industry is located.

f) A fixed-location public utility distribution or transmission facility located on or adjacent to a property line shall be subject to the sound level limits of this section measured at or beyond six feet from the boundary of the easement upon which the facility is located.

The project site is adjacent to the City of El Cajon. The City's Municipal Code Section 17.115.130 Subsection C, states that the sound level of any individual operation, land use, or activity other than rail, aircraft, street, or highway transportation, shall not exceed the sound levels indicated in the following table. For the purpose of determining compliance with these noise limitations, the sound levels shall be measured at the property lines of the property upon which the operation, land use, or activity is conducted. The sound level limit at a location on a boundary between two adjoining zoning districts shall be that of the more restrictive zone. The applicable limits are provided in Table 4-2.

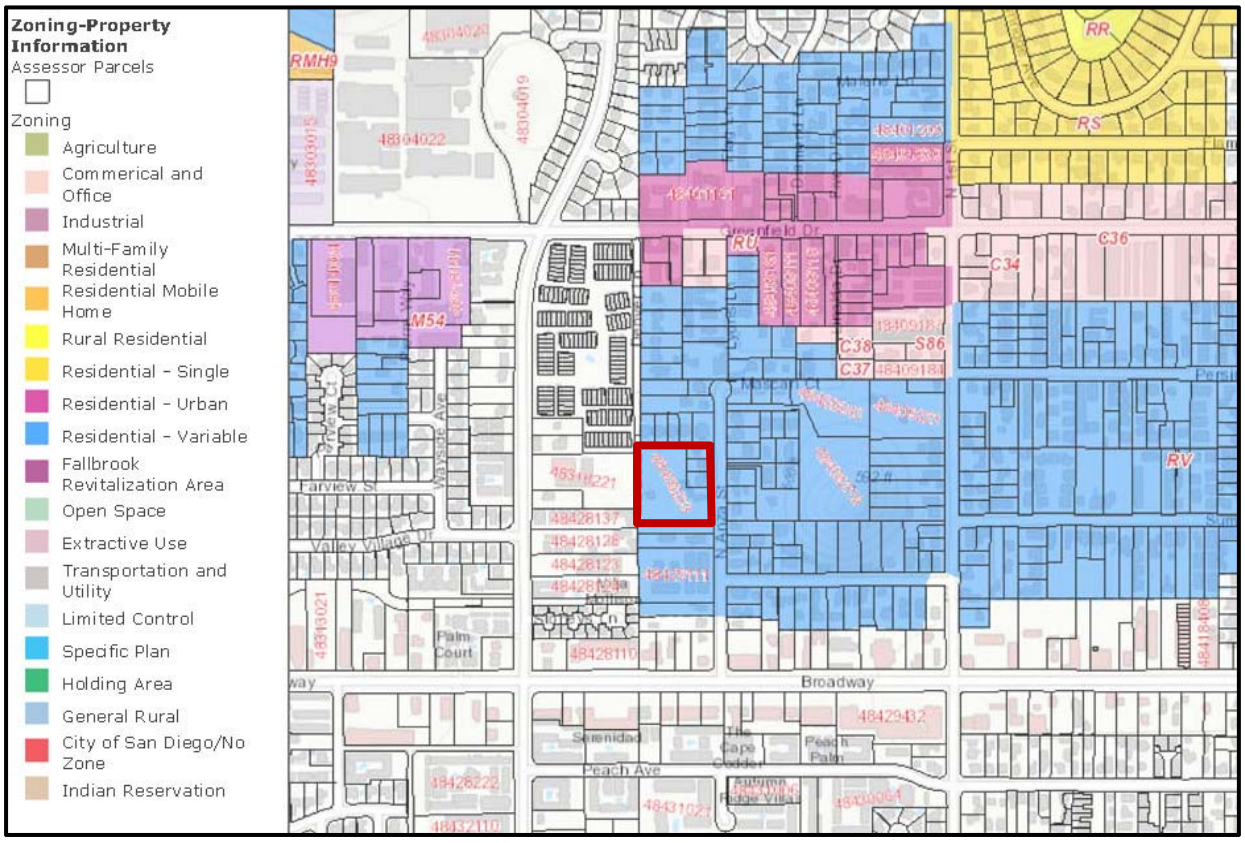
Table 4-2: City of El Cajon Noise Limits

Zones	Time of Day	One-Hour Average Sound Level Decibels
All residentially zoned properties	7 a.m.—7 p.m.	60
	7 p.m.—10 p.m.	55
	10 p.m.—7 a.m.	50
All M-U and commercially zoned properties except the C-M zoned properties	7 a.m.—7 p.m.	65
	7 p.m.—10 p.m.	60
	10 p.m.—7 a.m.	55
All C-M and industrially zoned properties	Any Time	75
	Conditionally*	80
*Where outdoor noise levels are higher, additional noise attenuation measures, i.e., earphones for workers, increased insulation, double-pane glass, etc., may make noise levels acceptable.		

The applicant's property and all surrounding properties are zoned RV in the County of San Diego and residential in the City of El Cajon. According to Section 36.404 of the County of San Diego Noise Ordinance, the surrounding properties zoned RV have a most restrictive property line standard of 55 dBA Leq for the daytime hours of 7 a.m. to 10 p.m. and 50 dBA Leq for the nighttime hours of 10 p.m. to 7 a.m. The properties to the west, in the City of El Cajon, are zoned Residential and have a most restrictive property line standard of 55 dBA Leq for the daytime hours of 7 a.m. to 10 p.m. and 50 dBA Leq for the nighttime hours of 10 p.m. to 7 a.m.

Onsite noise generation due to the proposed residential development project would primarily consist of normal residential activities and mechanical ventilation (HVAC units). The zoning and land uses surrounding the site is shown in Figure 4-A.

Figure 4-A: Zoning and Land Uses Surrounding the Site



4.2 Methodology and Equipment

Sound is measured on a logarithmic scale consisting of sound pressure levels known as a decibel. The sounds heard by humans typically do not consist of a single frequency but of a broadband of frequencies having different sound pressure levels. The method for evaluating all the frequencies of the sound is to apply an A-weighting to reflect how the human ear responds to the different sound levels at different frequencies. The A-weighted sound level adequately describes the instantaneous noise whereas the equivalent sound level depicted as Leq represents a steady sound level containing the same total acoustical energy.

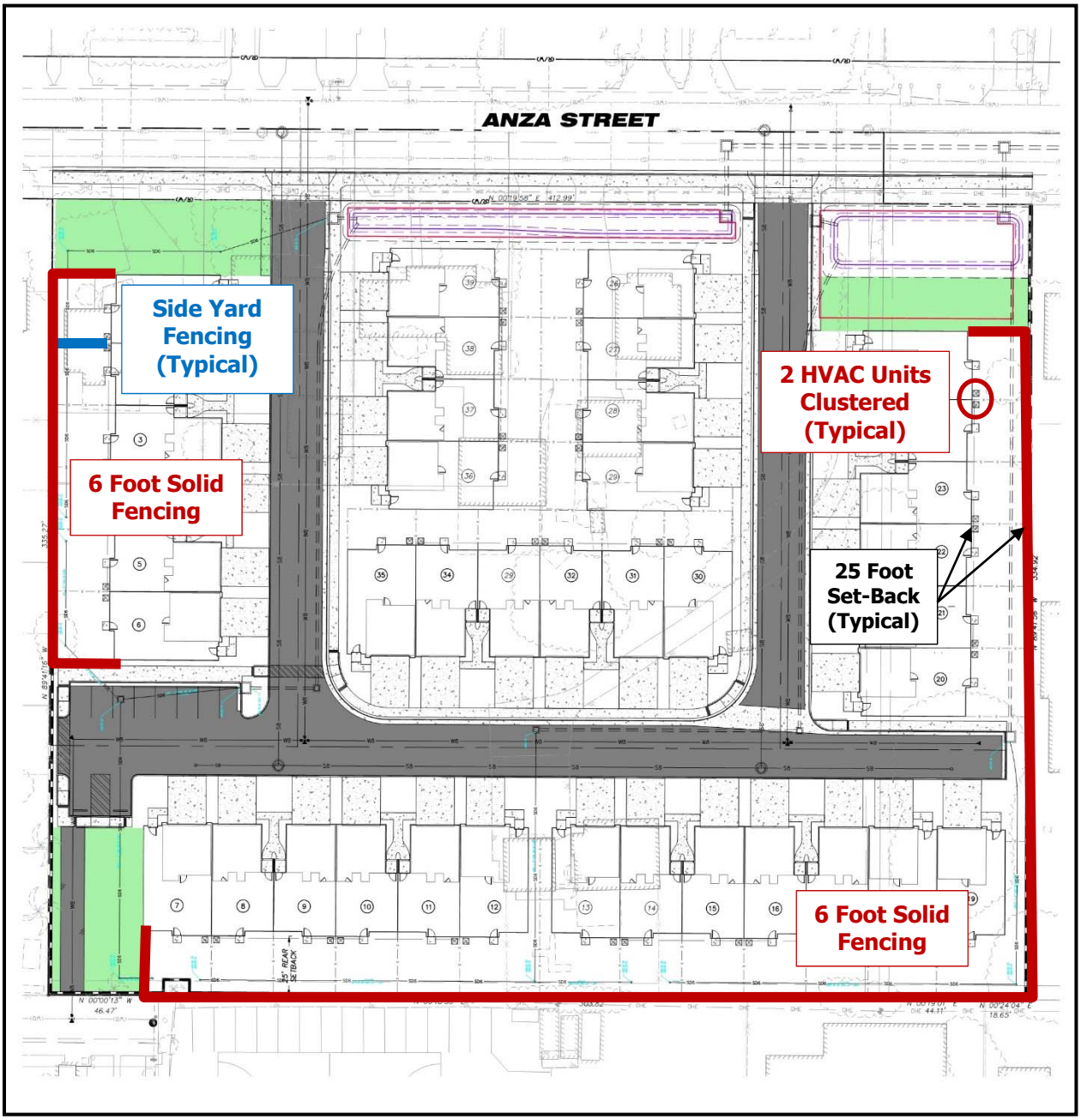
Fixed or point sources radiate outward uniformly as sound travels away from the source. Their sound levels attenuate or drop off at a rate of 6 dBA for each doubling of distance. For example, a noise level of 75 dBA measured at 3 feet from the noise source to the receptor would be reduced to 69 dBA at 6 feet from the source to the receptor and 63 dBA at a distance of 12 feet.

Ground mechanical ventilation units (HVAC) will be installed at the proposed residential units. The project anticipates installing Carrier 24ACS3 (Series, 48-30, and 60-3) AC units with a worst case reference noise level of 74 dBA at 3-feet (Source: Carrier 24ACS3 Comfort 13 Series Air Conditioner), or equivalent HVAC units. The manufacturer's specifications and noise levels are provided in ***Attachment B***.

To predict the worst-case future noise environment, a continuous reference noise level of 74 dBA at 3-feet was used to represent the ground mechanical ventilation system. Even though the mechanical ventilation system will cycle on and off throughout the day, this approach presents the worst-case noise condition. In addition, these units are designed to provide cooling during the peak summer daytime periods, and it is unlikely that all the units will be operating continuously.

The HVAC units are 23 feet from the property line and are also shielded by the proposed homes, solid side yard fences and solid perimeter fencing, six (6) feet in height, as shown in Figure 4-B. The solid fencing will be vinyl, ¾-inch or thicker consisting of solid panels on minimum 4x4-inch posts with no cracks or gaps through or below and all seams or cracks will be filled or caulked. The locations of the proposed HVAC units are also shown in Figure 4-B. The HVAC units are clustered in groups of two and each cluster is separated by approximately 50 feet and have a 6-foot side yard fence shielding them. This separation of 50 feet would result in a 20 dBA difference between two separate clusters of HVAC units and would not cumulatively increase the noise levels. Therefore, the worst case combined noise from the HVAC would occur from two units.

Figure 4-B: Locations of the proposed HVAC Units



Utilizing a 6 dBA decrease per doubling of distance, noise levels at the nearest property line at the distance of 23 feet as described above were calculated for the mechanical units. The noise levels associated with the mechanical ventilation system will be limited with the proposed 6-foot perimeter fencing and 6-foot side yard fencing that will shield them both visually and acoustically. To determine the noise level reductions from the perimeter fencing, the Fresnel Barrier Reduction Calculations based on distance, source height, receiver elevation and the top of barrier were modeled. The noise level reductions due to distance and the fencing for the nearest property line is provided in Table 4-3 below. The Fresnel barrier reduction calculations for the parapets are provided in ***Attachment C*** of this report.

Table 4-3: Project HVAC Noise Levels (Nearest Property Line)

Noise Source	Reference Distance (Feet)	Noise Level (dBA)	Distance to Nearest Property Line (Feet)	Noise Reduction due to distance (dBA)	Noise Reduction from Fencing (dBA)	Resultant Noise Level @ Property Line (dBA)
AC Unit 1	3	74	23	-18	-9	**47**
AC Unit 2	3	74	23	-18	-9	**47**
CUMULATIVE PROPERTY LINE NOISE LEVEL						**50**

No impacts are anticipated at the property lines with the incorporation of the proposed 6-foot perimeter fencing as shown above in Figure 4-B. All other property lines are located further from the proposed HVAC units and the resulting noise levels would also be below the 50 dBA threshold.

4.3 Conclusions

Based on noise levels, the distances to the property lines and the proposed building orientations and fencing the proposed operations are anticipated to be below the County's Property Lines standards. No impacts are anticipated and no mitigation is required.

5.0 SUMMARY OF PROJECT IMPACTS, MITIGATION & CONCLUSIONS

- On-Site Noise Analysis

  It was determined from the analysis that the multi-family NSLU's will comply with the County of San Diego 65 dBA CNEL exterior noise standard without mitigation measures. The first floor and second floor building facades are above the General Plan Noise Element Standard, of 60 dBA CNEL. Therefore, interior mitigation is required to obtain an interior level of 45 dBA CNEL. It was determined that interior noise reduction methods (i.e., dual-paned glass treatments) having a sound transmission classification (STC) rating of 26 or higher be installed.

- Off-Site Noise Analysis

  The project does not create a direct impact of more than 3 dBA CNEL on any roadway segment and no cumulative noise increase of 3 dBA CNEL or more were found. Therefore, the proposed project's direct and cumulative contributions to off-site roadway noise increases will not cause any significant impacts to any existing or future noise sensitive land uses.

- Construction Noise Analysis

  The grading activities will consist of the preparation of the proposed internal roadways, the finished pads, and the water quality detention basins. The grading equipment will be spread out over the project site from distances near the occupied property to distances of 300-feet or more away. Based upon the proposed site plan the majority of the grading operations will occur more than 135-feet from the property lines. At average distances over 135-feet the grading activities are anticipated not to exceed the County's 75-dBA standard and would not require any mitigation measures. No blasting or rock crushing is anticipated during the grading operations. Therefore, no impulsive noise sources are expected and the Project will comply with Section 36.410 of the County Noise Ordinance.

- Operational Noise Analysis

  Based on noise levels, the distances to the property lines and the proposed fencing the proposed operations are anticipated to be below the County's Property Lines standards. No impacts are anticipated and no mitigation is required.

6.0 CERTIFICATIONS

The contents of this report represent an accurate depiction of the future acoustical environment and impacts within and surrounding the residential development. This report was prepared utilizing the latest guidelines and reduction methodologies. This report was prepared by Jeremy Louden; a County approved CEQA Consultant for Acoustics.

DRAFT

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Date July 26, 2018

ATTACHMENT A

INTERIOR NOISE MODEL CALCULATION

INTERIOR NOISE CALCULATIONS

Project Name:	1118 N. Anza Street		Ldn Consulting, Inc.
Building (s)	All		
Floor Level	1	Date:	5/1/18
Arch Plan:	A		
Room Type:	Great Room	Project #	18-32

Exterior Noise Levels

		Frequency (Hz.)					
	dBA CNEL*	***125***	***250***	***500***	***1000***	***2000***	***4000***
Exterior Noise Level (Traffic Spectrum)	63.1	49.1	53.8	56.6	58.9	55.8	50.1

Transmission Loss (TL)

				Transmission Loss (dB)					
				Frequency (Hz.)					
Exterior Assembly	***Source***	***Area***	***STC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Stucco	NBS W-50-71	288	46	27	42	44	46	49	54
Windows	Champion	75	26	21	20	23	25	29	32
Fixed Window	Champion	0	26	17	16	22	31	35	27
Glass Doors	Thermal Tru	24	26	21	24	27	27	24	28
Exterior Door	NBS Monograph 77	24	26	16	14	23	30	36	26

Room Absorption (RA)

				Absorption Coefficients					
				Frequency (Hz.)					
Interior Characteristics	***Source***		***NRC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Carpet	Army TM 5-805-4		0.28	0.15	0.17	0.12	0.32	0.52	0.30
Furnishings	Army TM 5-805-4		0.45	0.32	0.29	0.42	0.58	0.60	0.48
Drywall	Netwell		0.07	0.09	0.08	0.05	0.03	0.06	0.09
Overall Absorption Factor (Furnished Room)			0.8	0.56	0.54	0.59	0.93	1.18	0.87

Noise Reduction

	125	***250***	***500***	***1000***	***2000***	***4000***
Noise Reduction from Absorption based upon Floor Area	-26.0	-26.0	-26.0	-26.0	-26.0	-26.0
Noise Level Increase for Defects and Exposed Surface Area	18.5	18.5	18.5	18.5	18.5	18.5
Overall Reduction from Tranmission Loss + Room Absorption - Surface Exposure						22.9
Building Façade Noise Level (dBA CNEL)						63.1
Resultant Interior Noise Level (dBA CNEL)						**40**

* Corrections for Façade Level was accounted for in the modeling.

INTERIOR NOISE CALCULATIONS

Project Name:	1118 N. Anza Street		Ldn Consulting, Inc.
Building (s)	All		
Floor Level	2	Date:	5/1/18
Arch Plan:	A		
Room Type:	Master Bedroom	Project #	18-32

Exterior Noise Levels

		Frequency (Hz.)					
	dBA CNEL*	***125***	***250***	***500***	***1000***	***2000***	***4000***
Exterior Noise Level (Traffic Spectrum)	63.1	49.1	53.8	56.6	58.9	55.8	50.1

Transmission Loss (TL)

				Transmission Loss (dB)					
				Frequency (Hz.)					
Exterior Assembly	***Source***	***Area***	***STC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Stucco	NBS W-50-71	108	46	27	42	44	46	49	54
Windows	Champion	45	26	21	20	23	25	29	32
Fixed Window	Champion	0	26	17	16	22	31	35	27
Glass Doors	Thermal Tru	0	26	21	24	27	27	24	28
Exterior Door	NBS Monograph 77	0	26	16	14	23	30	36	26

Room Absorption (RA)

				Absorption Coefficients					
				Frequency (Hz.)					
Interior Characteristics	***Source***		***NRC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Carpet	Army TM 5-805-4		0.28	0.15	0.17	0.12	0.32	0.52	0.30
Furnishings	Army TM 5-805-4		0.45	0.32	0.29	0.42	0.58	0.60	0.48
Drywall	Netwell		0.07	0.09	0.08	0.05	0.03	0.06	0.09
Overall Absorption Factor (Furnished Room)			0.8	0.56	0.54	0.59	0.93	1.18	0.87

Noise Reduction

	125	***250***	***500***	***1000***	***2000***	***4000***
Noise Reduction from Absorption based upon Floor Area	-23.2	-23.2	-23.2	-23.2	-23.2	-23.2
Noise Level Increase for Defects and Exposed Surface Area	15.7	15.7	15.7	15.7	15.7	15.7
Overall Reduction from Tranmission Loss + Room Absorption - Surface Exposure						25.3
Building Façade Noise Level (dBA CNEL)						63.1
Resultant Interior Noise Level (dBA CNEL)						**38**

* Corrections for Façade Level was accounted for in the modeling.

INTERIOR NOISE CALCULATIONS

Project Name:	1118 N. Anza Street		Ldn Consulting, Inc.
Building (s)	All		
Floor Level	2	Date:	5/1/18
Arch Plan:	A		
Room Type:	Bedroom 2 & 3	Project #	18-32

Exterior Noise Levels

		Frequency (Hz.)					
	dBA CNEL*	***125***	***250***	***500***	***1000***	***2000***	***4000***
Exterior Noise Level (Traffic Spectrum)	63.1	49.1	53.8	56.6	58.9	55.8	50.1

Transmission Loss (TL)

				Transmission Loss (dB)					
				Frequency (Hz.)					
Exterior Assembly	***Source***	***Area***	***STC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Stucco	NBS W-50-71	90	46	27	42	44	46	49	54
Windows	Champion	25	26	21	20	23	25	29	32
Fixed Window	Champion	0	26	17	16	22	31	35	27
Glass Doors	Thermal Tru	0	26	21	24	27	27	24	28
Exterior Door	NBS Monograph 77	0	26	16	14	23	30	36	26

Room Absorption (RA)

				Absorption Coefficients					
				Frequency (Hz.)					
Interior Characteristics	***Source***		***NRC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Carpet	Army TM 5-805-4		0.28	0.15	0.17	0.12	0.32	0.52	0.30
Furnishings	Army TM 5-805-4		0.45	0.32	0.29	0.42	0.58	0.60	0.48
Drywall	Netwell		0.07	0.09	0.08	0.05	0.03	0.06	0.09
Overall Absorption Factor (Furnished Room)			0.8	0.56	0.54	0.59	0.93	1.18	0.87

Noise Reduction

	125	***250***	***500***	***1000***	***2000***	***4000***
Noise Reduction from Absorption based upon Floor Area	-20.1	-20.1	-20.1	-20.1	-20.1	-20.1
Noise Level Increase for Defects and Exposed Surface Area	15.3	15.3	15.3	15.3	15.3	15.3
Overall Reduction from Tranmission Loss + Room Absorption - Surface Exposure						24.6
Building Façade Noise Level (dBA CNEL)						63.1
Resultant Interior Noise Level (dBA CNEL)						**39**

* Corrections for Façade Level was accounted for in the modeling.

INTERIOR NOISE CALCULATIONS

Project Name:	1118 N. Anza Street		Ldn Consulting, Inc.
Building (s)	All		
Floor Level	1	Date:	5/1/18
Arch Plan:	B		
Room Type:	Living / Dining	Project #	18-32

Exterior Noise Levels

		Frequency (Hz.)					
	dBA CNEL*	***125***	***250***	***500***	***1000***	***2000***	***4000***
Exterior Noise Level (Traffic Spectrum)	63.1	49.1	53.8	56.6	58.9	55.8	50.1

Transmission Loss (TL)

				Transmission Loss (dB)					
				Frequency (Hz.)					
Exterior Assembly	***Source***	***Area***	***STC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Stucco	NBS W-50-71	738	46	27	42	44	46	49	54
Windows	Champion	160	26	21	20	23	25	29	32
Fixed Window	Champion	0	26	17	16	22	31	35	27
Glass Doors	Thermal Tru	24	26	21	24	27	27	24	28
Exterior Door	NBS Monograph 77	24	26	16	14	23	30	36	26

Room Absorption (RA)

				Absorption Coefficients					
				Frequency (Hz.)					
Interior Characteristics	***Source***		***NRC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Carpet	Army TM 5-805-4		0.28	0.15	0.17	0.12	0.32	0.52	0.30
Furnishings	Army TM 5-805-4		0.45	0.32	0.29	0.42	0.58	0.60	0.48
Drywall	Netwell		0.07	0.09	0.08	0.05	0.03	0.06	0.09
Overall Absorption Factor (Furnished Room)			0.8	0.56	0.54	0.59	0.93	1.18	0.87

Noise Reduction

	125	***250***	***500***	***1000***	***2000***	***4000***
Noise Reduction from Absorption based upon Floor Area	-27.5	-27.5	-27.5	-27.5	-27.5	-27.5
Noise Level Increase for Defects and Exposed Surface Area	18.9	18.9	18.9	18.9	18.9	18.9
Overall Reduction from Tranmission Loss + Room Absorption - Surface Exposure						22.3
Building Façade Noise Level (dBA CNEL)						63.1
Resultant Interior Noise Level (dBA CNEL)						**41**

* Corrections for Façade Level was accounted for in the modeling.

INTERIOR NOISE CALCULATIONS

Project Name:	1118 N. Anza Street		Ldn Consulting, Inc.
Building (s)	All		
Floor Level	2	Date:	5/1/18
Arch Plan:	B		
Room Type:	Master Bedroom	Project #	18-32

Exterior Noise Levels

		Frequency (Hz.)					
	dBA CNEL*	***125***	***250***	***500***	***1000***	***2000***	***4000***
Exterior Noise Level (Traffic Spectrum)	63.1	49.1	53.8	56.6	58.9	55.8	50.1

Transmission Loss (TL)

				Transmission Loss (dB)					
				Frequency (Hz.)					
Exterior Assembly	***Source***	***Area***	***STC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Stucco	NBS W-50-71	171	46	27	42	44	46	49	54
Windows	Champion	40	26	21	20	23	25	29	32
Fixed Window	Champion	0	26	17	16	22	31	35	27
Glass Doors	Thermal Tru	0	26	21	24	27	27	24	28
Exterior Door	NBS Monograph 77	0	26	16	14	23	30	36	26

Room Absorption (RA)

				Absorption Coefficients					
				Frequency (Hz.)					
Interior Characteristics	***Source***		***NRC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Carpet	Army TM 5-805-4		0.28	0.15	0.17	0.12	0.32	0.52	0.30
Furnishings	Army TM 5-805-4		0.45	0.32	0.29	0.42	0.58	0.60	0.48
Drywall	Netwell		0.07	0.09	0.08	0.05	0.03	0.06	0.09
Overall Absorption Factor (Furnished Room)			0.8	0.56	0.54	0.59	0.93	1.18	0.87

Noise Reduction

	125	***250***	***500***	***1000***	***2000***	***4000***
Noise Reduction from Absorption based upon Floor Area	-22.9	-22.9	-22.9	-22.9	-22.9	-22.9
Noise Level Increase for Defects and Exposed Surface Area	15.8	15.8	15.8	15.8	15.8	15.8
Overall Reduction from Tranmission Loss + Room Absorption - Surface Exposure						25.2
Building Façade Noise Level (dBA CNEL)						63.1
Resultant Interior Noise Level (dBA CNEL)						**38**

* Corrections for Façade Level was accounted for in the modeling.

INTERIOR NOISE CALCULATIONS

Project Name:	1118 N. Anza Street		Ldn Consulting, Inc.
Building (s)	All		
Floor Level	2	Date:	5/1/18
Arch Plan:	B		
Room Type:	Bedroom 2	Project #	18-32

Exterior Noise Levels

		Frequency (Hz.)					
	dBA CNEL*	***125***	***250***	***500***	***1000***	***2000***	***4000***
Exterior Noise Level (Traffic Spectrum)	63.1	49.1	53.8	56.6	58.9	55.8	50.1

Transmission Loss (TL)

				Transmission Loss (dB)					
				Frequency (Hz.)					
Exterior Assembly	***Source***	***Area***	***STC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Stucco	NBS W-50-71	207	46	27	42	44	46	49	54
Windows	Champion	40	26	21	20	23	25	29	32
Fixed Window	Champion	0	26	17	16	22	31	35	27
Glass Doors	Thermal Tru	0	26	21	24	27	27	24	28
Exterior Door	NBS Monograph 77	0	26	16	14	23	30	36	26

Room Absorption (RA)

				Absorption Coefficients					
				Frequency (Hz.)					
Interior Characteristics	***Source***		***NRC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Carpet	Army TM 5-805-4		0.28	0.15	0.17	0.12	0.32	0.52	0.30
Furnishings	Army TM 5-805-4		0.45	0.32	0.29	0.42	0.58	0.60	0.48
Drywall	Netwell		0.07	0.09	0.08	0.05	0.03	0.06	0.09
Overall Absorption Factor (Furnished Room)			0.8	0.56	0.54	0.59	0.93	1.18	0.87

Noise Reduction

	125	***250***	***500***	***1000***	***2000***	***4000***
Noise Reduction from Absorption based upon Floor Area	-20.8	-20.8	-20.8	-20.8	-20.8	-20.8
Noise Level Increase for Defects and Exposed Surface Area	15.9	15.9	15.9	15.9	15.9	15.9
Overall Reduction from Tranmission Loss + Room Absorption - Surface Exposure						23.1
Building Façade Noise Level (dBA CNEL)						63.1
Resultant Interior Noise Level (dBA CNEL)						**40**

* Corrections for Façade Level was accounted for in the modeling.

INTERIOR NOISE CALCULATIONS

Project Name:	1118 N. Anza Street		Ldn Consulting, Inc.
Building (s)	All		
Floor Level	2	Date:	5/1/18
Arch Plan:	B		
Room Type:	Bedroom 3 & 4	Project #	18-32

Exterior Noise Levels

		Frequency (Hz.)					
	dBA CNEL*	***125***	***250***	***500***	***1000***	***2000***	***4000***
Exterior Noise Level (Traffic Spectrum)	63.1	49.1	53.8	56.6	58.9	55.8	50.1

Transmission Loss (TL)

				Transmission Loss (dB)					
				Frequency (Hz.)					
Exterior Assembly	***Source***	***Area***	***STC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Stucco	NBS W-50-71	108	46	27	42	44	46	49	54
Windows	Champion	30	26	21	20	23	25	29	32
Fixed Window	Champion	0	26	17	16	22	31	35	27
Glass Doors	Thermal Tru	0	26	21	24	27	27	24	28
Exterior Door	NBS Monograph 77	0	26	16	14	23	30	36	26

Room Absorption (RA)

				Absorption Coefficients					
				Frequency (Hz.)					
Interior Characteristics	***Source***		***NRC***	***125***	***250***	***500***	***1000***	***2000***	***4000***
Carpet	Army TM 5-805-4		0.28	0.15	0.17	0.12	0.32	0.52	0.30
Furnishings	Army TM 5-805-4		0.45	0.32	0.29	0.42	0.58	0.60	0.48
Drywall	Netwell		0.07	0.09	0.08	0.05	0.03	0.06	0.09
Overall Absorption Factor (Furnished Room)			0.8	0.56	0.54	0.59	0.93	1.18	0.87

Noise Reduction

	125	***250***	***500***	***1000***	***2000***	***4000***
Noise Reduction from Absorption based upon Floor Area	-20.2	-20.2	-20.2	-20.2	-20.2	-20.2
Noise Level Increase for Defects and Exposed Surface Area	15.5	15.5	15.5	15.5	15.5	15.5
Overall Reduction from Tranmission Loss + Room Absorption - Surface Exposure						23.8
Building Façade Noise Level (dBA CNEL)						63.1
Resultant Interior Noise Level (dBA CNEL)						**39**

* Corrections for Façade Level was accounted for in the modeling.

ATTACHMENT B

HVAC NOISE LEVELS AND SPECIFICATIONS

24ACS3
Comfort™ 13 Series Air Conditioner with R–22 Refrigerant
1–1/2 to 5 Nominal Tons (Size 18 to 60)

Carrier®
Turn to the Experts℠

Product Data

Comfort™ SERIES

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

INDUSTRY LEADING FEATURES / BENEFITS

Efficiency

- 13 - 15 SEER / 11 - 12 EER
- Microtube Technology™ refrigeration system
- Indoor air quality accessories available

Sound

- Sound level as low as 74 dBA
- Compressor sound blanket

Comfort

- System supports Thermidistat™ Control or standard thermostat

Reliability

- Front-seating service valves
- Scroll compressor
- Internal pressure-relief valve
- Internal thermal overload
- High-pressure switch
- Low-pressure switch
- Filter drier
- Balanced refrigeration system for maximum reliability

Durability

WeatherArmor™ protection package:

- Solid, durable sheet metal construction
- Louvered coil guard
- Baked-on, complete outer coverage, powder paint

Applications

- Long-line - up to 250 feet (76.20 m) total equivalent length, up to 200 feet (60.96 m) condenser above evaporator, or up to 60 ft. (18.29 m) evaporator above condenser (See Longline Guide for more information.)
- Low ambient (down to -20°F/-28.9°C) with accessory kit

MODEL NUMBER NOMENCLATURE

1	2	3	4	5	6	7	8	9	10	11	12	13
N	N	A	A	A/N	N	N	N	A/N	A/N	A/N	N	N
2	4	A	C	S	3	3	6	A	0	0	3	0
Product Series		Product Family	Tier	Major Series	SEER	Cooling Capacity		Variations	Open	Open	Voltage	Minor Series
24=AC		A=RES AC	C=Comfort	S=R–22	3=13 SEER (Nominal)			A=Standard	0=Not Defined	0=Not Defined	3=208/230–1	0, 1, 2...

ARI PERFORMANCE CERTIFIED
ARI Standard 210/240
Unitary Air Conditioners

ISO 9001:2000
QMI REGISTERED

c UL US

ENERGY STAR PARTNER

This product has been designed and manufactured to meet Energy Star® criteria for energy efficiency when matched with appropriate coil components. However, proper refrigerant charge and proper air flow are critical to achieve rated capacity and efficiency. Installation of this product should follow all manufacturing refrigerant charging and air flow instructions. Failure to confirm proper charge and air flow may reduce energy efficiency and shorten equipment life.

STANDARD FEATURES

Feature	18	24	30	36	42	48	60
Up to 14 SEER / 11.5 EER	X	X	X	X	X		
Scroll Compressor	X	X	X	X	X	X	X
Louvered Coil Guard	X	X	X	X	X	X	X
Field Installed Filter Drier	X	X	X	X	X	X	X
Front Seating Service Valves	X	X	X	X	X	X	X
Internal Pressure Relief Valve	X	X	X	X	X	X	X
Internal Thermal Overload	X	X	X	X	X	X	X
Long Line capability	X	X	X	X	X	X	X
Low–Ambient capability with Kit	X	X	X	X	X	X	X
Low–Pressure Switch	X	X	X	X	X	X	X
High–Pressure Switch	X	X	X	X	X	X	X
Compressor Sound Blanket	X	X	X	X	X	X	X

X = Standard

PHYSICAL DATA

UNIT SIZE SERIES	18–30	24–30	30–30	36–30	42–30	48–30	60–30/31
Operating Weight lb (kg)	143 (64.7)	149 (67.6)	166 (75.3)	186 (84.4)	225 (102.1)	265 (120.2)	271 (122.9)
Shipping Weight lb (kg)	165 (74.8)	171 (77.6)	193 (87.5)	214 (97.1)	253 (114.8)	299 (135.6)	304 (137.9)
Compressor Type	Scroll						
REFRIGERANT	Freon® (R–22)						
Control	TXV (R–22 Hard Shutoff)						
Charge lb (kg)	4.33 (1.96)	4.44 (2.01)	5.22 (2.37)	5.81 (2.64)	6.84 (3.10)	8.42 (3.82)	11.25/12.07 (5.10/5.47)
COND FAN	Propeller Type, Direct Drive						
Air Discharge	Vertical						
Air Qty (CFM)	1880	2200	3170	3170	3365	4050	4050
Motor HP	1/12	1/10	1/5	1/5	1/4	1/4	1/4
Motor RPM	1100	1100	800	800	800	800	800
COND COIL							
Face Area (sq. ft.)	11.49	13.13	12.93	17.25	21.56	27.66	20.12
Fins per in.	25	25	25	25	25	25	20
Rows	1	1	1	1	1	1	2
Circuits	3	3	4	4	5	7	7
VALVE CONNECT. (in. ID)							
Vapor	5/8	5/8	3/4	3/4	7/8	7/8	7/8
Liquid	3/8						
REFRIGERANT TUBES (in. OD)							
Rated Vapor*	5/8		3/4		7/8		1–1/8
Liquid	3/8						

*Units are rated with 25 ft (7.6 m) of lineset length. See *Vapor Line Sizing and Cooling Capacity Loss* table when using other sizes and lengths of lineset.

NOTE: See unit Installation Instruction for proper installation.

VAPOR LINE SIZING AND COOLING CAPACITY LOSS

LONG LINE APPLICATION: An application is considered "Long line" when the total equivalent tubing length exceeds 80 ft. (24.38 m) or when there is more than 20 ft. (6.09 m) vertical separation between indoor and outdoor units. These applications require additional accessories and system modifications for reliable system operation. The maximum allowable total equivalent length is up to 250 ft. (76.2 m). The maximum vertical separation is 200 ft. (60.96 m) when outdoor unit is above indoor unit, and up to 60 ft. (18.28 m) when the outdoor unit is below the indoor unit. Refer to Accessory Usage Guideline below for required accessories. See Longline Application Guideline for required piping and system modifications. Also, refer to the table below for the vapor tube diameters based on the total length to minimize the cooling capacity loss.

Unit Nominal Size (Btuh)	Maximum Liquid Line Diameters (In. OD)	Vapor Line Diameters (In. OD)	Cooling Capacity Loss (%) Total Equivalent Line Length ft. (m)							
			Standard Application		**Long Line Application Requires Accessories**					
			26–50 (7.9–15.2)	51–80 (15.5–24.4)	81–100 (24.7–30.5)	101–105 (30.8–38.1)	126–150 (38.4–45.7)	151–175 (46.0–50.3)	176–200 (53.6–60.0)	201–225 (61.3–68.6)	226–250 (68.9–76.2)
18000 R–22 AC	3/8	5/8	1	1	2	2	3	4	4	5	6
		3/4	0	0	0	1	1	1	1	2	2
24000 R–22 AC	3/8	5/8	1	2	3	4	5	6	8	9	10
		3/4	0	0	1	1	2	2	3	3	3
		7/8	0	0	0	0	1	1	1	1	2
30000 R–22 AC	3/8	5/8	1	3	5	6	8	10	11	13	15
		3/4	0	1	1	2	3	3	4	5	5
		7/8	0	0	0	1	1	1	2	2	2
36000 R–22 AC	3/8	3/4	1	1	2	3	4	5	6	7	8
		7/8	0	0	1	1	2	2	3	3	4
42000 R–22 AC	3/8	3/4	1	2	3	4	5	7	8	9	10
		7/8	0	1	1	2	2	3	4	4	5
		1–1/8	0	0	0	0	0	0	1	1	1
48000 R–22 AC	3/8	3/4	1	2	4	5	7	8	10	11	13
		7/8	0	1	1	2	3	4	5	5	6
		1–1/8	0	0	0	0	0	0	1	1	1
60000 R–22 AC	3/8	7/8	1	2	3	4	5	7	8	9	10
		1–1/8	0	0	1	1	1	2	2	2	3

Applications in this area are long line. Accessories are required as shown recommended on Long Line Application Guidelines

Applications in this area may have height restrictions that limit allowable total equivalent length, when outdoor unit is below indoor unit See Long Line Application Guidelines.

ACCESSORIES

ORDER NUMBER	DESCRIPTION	18–30	24–30	30–30	36–30	42–30	48–30	60–30	60–31
KAACH1401AAA	CRANKCASE HTR	X	X	X	X				
KAACH1201AAA	CRANKCASE HTR					X	X	X	X
KSACY0101AAA	CYCLE PROTECTOR	X	X	X	X	X	X	X	X
KAAFT0101AAA	FREEZE THERMOSTAT	X	X	X	X	X	X	X	X
KSAHS1501AAA	HARD START (CAP/RELAY)	X	X		X	X	X	X	X
KSAHS1701AAA	HARD START (CAP/RELAY)			X					
KSALA0201R22	LOW–AMBIENT PSW	X	X	X	X	X	X	X	X
HC32GE234	MOTOR FAN BALL BEARING	X							
HC34GE239	MOTOR FAN BALL BEARING		X						
HC38GE228	MOTOR FAN BALL BEARING			X	X				
HC40GE228	MOTOR FAN BALL BEARING					X	X	X	X
KSALA0601AAA	MOTORMASTER 230V	X	X	X	X	X	X	X	X
KAALS0101LLS	SOLENOID VALVE	X	X	X	X	X	X	X	X
KAACS0201PTC	START ASSIST PTC	X	X	X	X	X	X	X	X
KSASF0101AAA	SUPPORT FEET	X	X	X	X	X	X	X	X
KAATD0101TDR	TIME DELAY RELAY	X	X	X	X	X	X	X	X
KSATX0601HSO	TXV (HSO)	X	X	X	X	X			
KSATX0701HSO	TXV (HSO)						X		
KSATX1001HSO	TXV (HSO)							X	X
KAAWS0101AAA	WINTER START	X	X	X	X	X	X	X	X

S = Standard

X = Accessory

ACCESSORY THERMOSTATS

THERMOSTAT / SUBBASE PKG.	DESCRIPTION
TP–PRH–01	Programmable Thermidistat
TP–NRH–01	Non–programmable Thermidistat
TC–PAC–01	Comfort Series Programmable AC Stat
TC–NAC–01	Comfort Series Non–programmable AC Stat
TSTATCCPRH01–B	Thermidistat Control – Programmable / Non–Programmable Thermostat with Humidity control
TSTATCCPAC01–B	Thermostat – Auto Changeover, 7–Day Programmable, °F/°C, 1–Stage Heat, 1–Stage Cool
TSTATCCNAC01–C	Thermostat – Auto Changeover, Non–Programmable, °F/°C, 1–Stage Heat, 1–Stage Cool
TSTATCCBAC01–B	Builder's Thermostat – Manual Changeover, Non–Programmable, °F/°C, 1–Stage Heat, 1–Stage Cool
TSTATCCSEN01–B	Outdoor Air Temperature Sensor
TSTATXXBBP01	Backplate for Builder's Thermostat
TSTATXXNBP01	Backplate for Non–Programmable Thermostat
TSTATXXPBP01	Backplate for Programmable Thermostat
TSTATXXCNV10	Thermostat Conversion Kit (4 to 5 wires) – 10 Pack

ACCESSORY USAGE GUIDELINE

ACCESSORY	REQUIRED FOR LOW−AMBIENT COOLING APPLICATIONS (Below 55°F/12.8°C)	REQUIRED FOR LONG LINE APPLICATIONS* (Over 80 ft./24.38 m)	REQUIRED FOR SEA COAST APPLICATIONS (Within 2 miles/3.22 km)
Ball−Bearing Fan Motor	Yes†	No	No
Compressor Start Assist Capacitor and Relay	Yes	Yes	No
Crankcase Heater	Yes	Yes	No
Evaporator Freeze Thermostat	Yes	No	No
Liquid−Line Solenoid Valve	No	See Long Line Guideline	No
Motor Master® Control or Low−Ambient Pressure Switch	Yes	No	No
Support Feet	Recommended	No	Recommended
Thermostatic Expansion Valve (TXV) Hard Shut−Off	Yes	Yes	Yes
Winter Start Control	Yes	No	No

* For tubing line sets between 80 and 200 ft. (24.38 and 60.96 m) and/or 20 ft. (6.09 m) vertical differential, refer to Residential Split−System Longline Application Guideline.

† Additional requirement for Low−Ambient Controller (full modulation feature) MotorMaster® Control.

Accessory Description and Usage (Listed Alphabetically)

1. Ball-Bearing Fan Motor

A fan motor with ball bearings which permits speed reduction while maintaining bearing lubrication.

Usage Guideline:

Required on all units when MotorMaster® is used.

2. Compressor Start Assist - Capacitor and Relay

Start capacitor and relay gives a ”hard” boost to compressor motor at each start up.

Usage Guideline:

Required for reciprocating compressors in the following applications:

- Long line
- Low-ambient cooling
- Hard shutoff expansion valve on indoor coil
- Liquid line solenoid on indoor coil

Required for single-phase scroll compressors in the following applications:

- Long line
- Low-ambient cooling

Suggested for all compressors in areas with a history of low voltage problems.

3. Compressor Start Assist — PTC Type

Solid state electrical device which gives a ”soft” boost to the compressor at each start-up.

Usage Guideline:

Suggested in installations with marginal power supply.

4. Crankcase Heater

An electric resistance heater which mounts to the base of the compressor to keep the lubricant warm during off cycles. Improves compressor lubrication on restart and minimizes the chance of liquid slugging.

Usage Guideline:

Required in Low-ambient cooling applications.

Required in long line applications.

Suggested in all commercial applications.

5. Cycle Protector

The cycle protector is designed to prevent compressor short cycling. This control provides an approximate 5-minute delay after power to the compressor has been interrupted for any reason, including power outage, protector control trip, thermostat jiggling, or normal cycling.

6. Evaporator Freeze Thermostat

An SPST temperature-actuated switch that stops unit operation when evaporator reaches freeze-up conditions.

Usage Guideline:

Required when low-ambient kit has been added.

7. Low-Ambient Pressure Switch Kit

A long life pressure switch which is mounted to outdoor unit service valve. It is designed to cycle the outdoor fan motor in order to maintain head pressure within normal operating limits (approximately 100 psig to 225 psig). The control will maintain working head pressure at low-ambient temperatures down to 0°F (-17.8°C) when properly installed.

Usage Guideline:

A Low-Ambient Pressure Switch or MotorMaster® Low-Ambient Controller must be used when cooling operation is used at outdoor temperatures below 55°F (12.8°C) to a minimum of 0°F (-17.8°C).

8. MotorMaster® Low-Ambient Controller

A fan-speed control device activated by a temperature sensor, designed to control condenser fan motor speed in response to the saturated, condensing temperature during operation in cooling mode only. For outdoor temperatures down to -20°F (-28.9°C), it maintains condensing temperature at 100°F ±10°F (37.8°C ± 6.5°C).

Usage Guideline:

A MotorMaster® Low-Ambient Controller or Low-Ambient Pressure Switch must be used when cooling operation is used at outdoor temperatures below 55°F (12.8°C) to a minimum of -20°F (-29.8°C). .

Suggested for all commercial applications.

Accessory Description and Usage (Listed Alphabetically) (Continued)

9. Outdoor Air Temperature Sensor

Designed for use with Carrier Thermostats listed in this publication. This device enables the thermostat to display the outdoor temperature. This device also

is required to enable special thermostat features such as auxiliary heat lock out.

Usage Guideline:

Suggested for all Carrier thermostats listed in this publication.

10. Support Feet

Four stick-on plastic feet that raise the unit 4 in. above the mounting pad. This allows sand, dirt, and other debris to be flushed from the unit base, minimizing corrosion.

Usage Guideline:

Suggested in the following applications:

Coastal installations.

Windy areas or where debris is normally circulating.

Rooftop installations.

For improved sound ratings.

11. Thermostatic Expansion Valve (TXV)

A modulating flow-control valve which meters refrigerant liquid flow rate into the evaporator in response to the superheat of the refrigerant gas leaving the evaporator.

Kit includes valve, adapter tubes, and external equalizer tube. Hard shutoff types are available.

NOTE: When using a hard shutoff TXV with single phase reciprocating compressors, a Compressor Start Assist Capacitor and Relay is required.

Usage Guideline:

Accessory required to meet ARI rating and system reliability, where indoor not equipped.

Hard shutoff TXV or LLS required in air conditioner long line applications.

Required for use on all zoning systems.

12. Time-Delay Relay

An SPST delay relay which briefly continues operation of indoor blower motor to provide additional cooling after the compressor cycles off.

NOTE: Most indoor unit controls include this feature. For those that do not, use the guideline below.

Usage Guideline:

Accessory required to meet ARI rating, where indoor not equipped.

13. Winter Start Control

This control is designed to alleviate nuisance opening of the low-pressure switch by bypassing it for the first 3 minutes of operation.

ELECTRICAL DATA

UNIT SIZE – VOLTAGE, SERIES	V/PH	OPER VOLTS*		COMPR		FAN	MCA	MIN WIRE SIZE†	MIN WIRE SIZE†	MAX LENGTH ft (m)‡	MAX LENGTH ft (m)‡	MAX FUSE** or CKT BRK AMPS
		MAX	MIN	LRA	RLA	FLA		60° C	75° C	60° C	75° C	
18–30	208/230/1	253	197	40.3	7.7	0.5	10.1	14	14	76 (23.2)	73 (22.3)	15
24–30				54.0	10.4	0.75	13.8	14	14	57 (17.4)	54 (16.5)	20
30–30				68.0	14.1	1.2	18.8	14	14	42 (12.8)	40 (12.2)	30
36–30				77.0	14.4	1.2	19.2	12	12	65 (19.8)	62 (18.9)	30
42–30				104.0	19.2	1.2	25.2	10	10	79 (24.1)	75 (22.9)	40
48–30				137.0	20.2	1.2	26.4	10	10	76 (23.2)	72 (21.9)	40
60–30				141.0	25.3	1.2	32.9	8	8	96 (29.3)	91 (27.7)	50
60–31				150.0	25.0	1.2	32.5	8	8	96 (29.3)	91 (27.7)	50

* Permissible limits of the voltage range at which the unit will operate satisfactorily.

† If wire is applied at ambient greater than 30° C, consult table 310–16 of the NEC (ANSI/NFPA 70). The ampacity of non–metallic–sheathed cable (NM), trade name ROMEX, shall be that of 60° C conditions, per the NEC (ANSI/NFPA 70) Article 336–26. If other than uncoated (no–plated), 60 or 75° C insulation, copper wire (solid wire for 10 AWG or smaller, stranded wire for larger than 10 AWG) is used, consult applicable tables of the NEC (ANSI/NFPA 70).

‡ Length shown is as measured 1 way along wire path between unit and service panel for voltage drop not to exceed 2%.

** Time–Delay fuse.

NOTE: Control circuit is 24–V on all units and requires external power source. Copper wire must be used from service disconnect to unit. All motors/compressors contain internal overload protection.

FLA – Full Load Amps

LRA – Locked Rotor Amps

MCA– Minimum Circuit Amps

RLA – Rated Load Amps

Complies with 2001 requirements of ASHRAE Standards 90.1

A-WEIGHTED SOUND POWER LEVEL (dBA)

UNIT SIZE – VOLTAGE, SERIES	STANDARD RATING	TYPICAL OCTAVE BAND SPECTRUM (dBA, without tone adjustment)						
		125	250	500	1000	2000	4000	8000
18–30	73	49.5	59.5	64.5	65.5	64.0	60.0	54.0
24–30	75	52.5	60.5	67.0	70.0	65.5	61.5	58.5
30–30	74	56.0	62.5	67.5	70.0	65.5	60.5	56.5
36–30	75	55.0	60.5	68.5	72.0	66.0	62.5	56.0
42–30	75	59.5	60.5	66.5	70.5	66.5	62.0	63.0
48–30	74	53.5	61.0	65.0	69.5	64.5	61.5	60.0
60–30	74	56.0	64.0	68.0	70.0	65.0	61.5	60.5
60–31	74	59.5	63.0	67.0	69.5	66.5	62.0	56.0

NOTE: Tested in accordance with ARI Standard 270–95 (not listed in ARI).

CHARGING SUBCOOLING (TXV-TYPE EXPANSION DEVICE)

UNIT SIZE– VOLTAGE, SERIES	REQUIRED SUBCOOLING °F (°C)
18–30	14 (7.8)
24–30	7 (3.9)
30–30	9 (5.0)
36–30	8 (4.4)
42–30	11 (6.1)
48–30	9 (5.0)
60–30	12 (6.7)
60–31	13 (7.2)

ATTACHMENT C

FRESNEL BARRIER REDUCTION
CALCULATIONS

ANZA

Point Source
Source to Receiver Horizontal Distance (ft) =   27.00
Source to Barrier Horizontal Distance (ft) =   22.00
Barrier to Receiver Horizontal Distance (ft) =   5.00
Source Height (ft)   =   3.00
Receiver Height (ft) =   5.00
Barrier Height (ft) =   6.00
Distance Source to Receptor (ft)   d =   27.07
Distance Source to Barrier top (ft)   d1 =   22.20
Distance Barrier top to Receiver (ft) d2 =   5.10

Frequency (Hz) = 8000 Attenuation (db) = 18.0   Fresnel N = 3.246
Frequency (Hz) = 4000 Attenuation (db) = 15.1   Fresnel N = 1.623
Frequency (Hz) = 2000 Attenuation (db) = 12.7   Fresnel N = 0.812
Frequency (Hz) = 1000 Attenuation (db) = 10.7   Fresnel N = 0.406
Frequency (Hz) = 500 Attenuation (db) =   9.0   Fresnel N = 0.203
Frequency (Hz) = 250 Attenuation (db) =   7.6   Fresnel N = 0.101
Frequency (Hz) = 125 Attenuation (db) =   6.5   Fresnel N = 0.051
Frequency (Hz) =   63 Attenuation (db) =   5.5   Fresnel N = 0.025