APPENDIX G- ENVIRONMENTAL NOISE ASSESSMENT

SSA Acoustics, LLP. - November 26, 2018

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MONROVIA TOD APARTMENTS
ENVIRONMENTAL NOISE ASSESSMENT REPORT
MONROVIA, CA

Submit To:

Fifield Co.
Attn: Greg Vance
600 W. Jackson Blvd. Suite 600
Chicago, IL 60661
Tel: 312.855.1600
gvance@fifieldco.com

Prepared By:

SSA Acoustics, LLP.
222 Etruria Street, Suite 100
Seattle, WA 98109
206.839.0819
joel@ssaacoustics.com

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PROJECT #: 18-6893

PREPARED BY: Joel Esselstrom, Acoustical Consultant
SSA Acoustics, LLP

SIGNED: 

DATE: November 26, 2018

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I. INTRODUCTION

This report presents the environmental noise assessment for the new apartment project located at 123 W. Pomona Avenue, Monrovia, California. The proposed project consists of a 7-story, 306 unit, wood-frame building consisting of 6 levels of apartment units as well as retail, parking, amenities, and leasing space on the ground level. There will be a 3 underground levels of parking accessible from the north side of the site. The project will require the demolition of 2 existing commercial buildings located on the site.

This noise assessment has been completed per the regulatory criteria as provided by the California Environmental Quality Act Guidelines (CEQA) and City of Monrovia General Plan, which has been summarized in section II of this report.

CEQA requires the following impact assessments be included in this report:

1. Noise and Land Use Compatibility
2. Project Generated Traffic Noise
3. Cumulative Traffic Noise
4. Operational Noise
5. Construction Noise
6. Construction Vibration

II. REGULATORY CRITERIA

The applicable regulatory criteria for this project includes the State CEQA guidelines, the Monrovia Municipal Code, and the City of Monrovia General Plan, which is summarized in this section.

State CEQA Guidelines

CEQA evaluates new site development based on the following criteria with regard to the significance of impact. For new projects, the following questions must be asked.

Would the project result in:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

Municipal Code: Monrovia Code of Ordinances (Chapter 9.44)

<u>9.44.040 Allowable Noise Levels</u>

a) The noise standards imposed by this section shall apply to all properties in the city occupied for residential purposes, without regard to zoning classification. Except as otherwise allowed in this chapter, no person shall create or allow the creation of noise on any such residential property which causes the noise level to exceed the actual measured median ambient noise level, or the following presumed ambient noise level, whichever is greater:

Time	***Allowable Noise Level—dBA***
7:00 a.m. to 9:00 p.m.	55
9:00 p.m. to 7:00 a.m.	50

b) If the intruding noise source is continuous and cannot be reasonably discontinued for sufficient time in which the ambient noise level can be determined, the presumed ambient noise level shall be used.
(`83 Code, § 9.44.040) (Ord. 85-5 § 1 (part), 1985)

9.44.050 Noise Level Measurements
Utilizing the "A" weighting scale of the sound level meter-and the "slow" meter response ("fast" response for impulsive-type sounds), the noise level shall be measured at the street or any point on the property where the noise is received. In general, the microphone shall be located four feet above the ground and five feet from the nearest structure or wall. In those cases where another elevation is deemed appropriate, it shall be utilized.
(`83 Code, § 9.44.050) (Ord. 85-5 § 1 (part), 1985)

9.44.060 Permitted Increases in Noise Levels
Increases in noise levels prescribed in 9.44.040 are permitted in accordance with the following:

Permitted Increase dBA	***Duration of Increase Permitted (in minutes/per hour)***
5	15
10	5
15	1
20	less than one minute

9.44.070 Impulsive Sound
Noise standards set in this chapter shall be decreased by five dBA for any noise source which emits an impulsive sound.

9.44.080 Exemptions
The following activities shall be exempt from the provisions of this chapter:

a) The emission of sound for the purpose of alerting persons to the existence of an emergency or the emission of sound in the performance of emergency work;

b) Activities of the federal, state or local jurisdiction while performing governmental duties;

c) Activities conducted on public playgrounds and public or private school grounds, including but not limited to school athletic and school entertainment events;

d) The handling of boxes, crates, containers, garbage cans or other similar objects between the hours of 7:00 a.m. and 7:00 p.m.;

e) The operation of any mechanically powered saw, sander, drill, grinder, lawn or garden tool or similar tool between 7:00 a.m. and 7:00 p.m. on weekdays and the hours of 10:00 a.m. and 10:00 p.m. on weekends and holidays;

f) Construction or demolition work conducted between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and the hours of 9:00 a.m. and 6:00 p.m. on weekends and holidays;

g) Any activity to the extent regulation thereof has been preempted by state or federal law.

9.44.090 Radios, TVs,and Similar Devices**.**

a) It shall be unlawful for any person within any residential zone of the city to use or operate any radio receiving set, musical instrument, stereo system, entertainment system, television set, or other machine or device for the producing or reproducing of sound or any device by which voice, music, or any other sound is generated, between the hours of 10:00 p.m. and 7:00 a.m. of the following day, in such a manner as to disturb the peace, quiet, and comfort of neighboring residents or any reasonable person of normal sensitiveness residing in the area.

b) Any noise exceeding the ambient noise level at the property line of any property, or, if a condominium or apartment house, within any adjoining unit by more than five decibels shall be deemed to be prima facie evidence, although not the exclusive evidence, of a violation of the provisions of this section.

City of Monrovia General Plan

II. Evaluating Noise Impacts:

a) Defining Noise Exposure

Noise is often defined as unwanted sound. Sound is easily measured with instruments, but the human variability in subjective and physical responses to sound complicates the understanding of its impact on people. People judge the relative magnitude of sound by subjective terms such as “loudness” or “noisiness.”

Physically, sound-pressure magnitude is measured and quantified in terms of a logarithmic scale in decibels (dB). Research on human hearing sensitivity has shown that a 3 dB increase in the sound is barely noticeable and a 10 dB increase would be perceived as twice as loud. The table below presents the subjective effect of changes in sound pressure level. The human hearing system, however, is not equally sensitive to sound at all frequencies. Therefore, a frequency-dependent adjustment called “A-weighting” has been devised so that sound may be measured similar to the way the human hearing system responds. The A-weighted sound level is often abbreviated “dBA” or “dB(A).” Figure 1 provides typical A-weighted sound levels of various noise sources and the responses people usually have to such sound levels.

Change in Sound Level (dB)	Change in Power		Change in Apparent Loudness
	Decrease	Increase	
3	1/2	2	Just perceptible
5	1/3	3	Clearly noticeable
10	1/10	10	Half or twice as loud
20	1/100	100	Much quieter or louder

Source: Parsons Engineering Science

c) Land Use Criteria for Noise Exposure:
Guidelines for noise compatible land use, extracted from the State of California Guidelines for the Preparation and Content of the Noise Element of the General Plan, are presented in Figure 1. The guidelines provide land use compatibility with different ranges of CNEL or Ldn values, in terms of four categories of acceptability. The compatibility guidelines given in Figure 1 are based on consideration of the type of activity that would normally take place for a particular land use. These include the requirements of that activity for speech communication, the typical sound insulation characteristics of buildings that might be found in these areas, and additional requirements for freedom from noise intrusions that might be imposed on other activities, such as sleep. The noise exposure is such that the activities associated with the land use may be carried out with essentially no interference, e.g., for residential areas: both indoor and outdoor noise environments are pleasant.

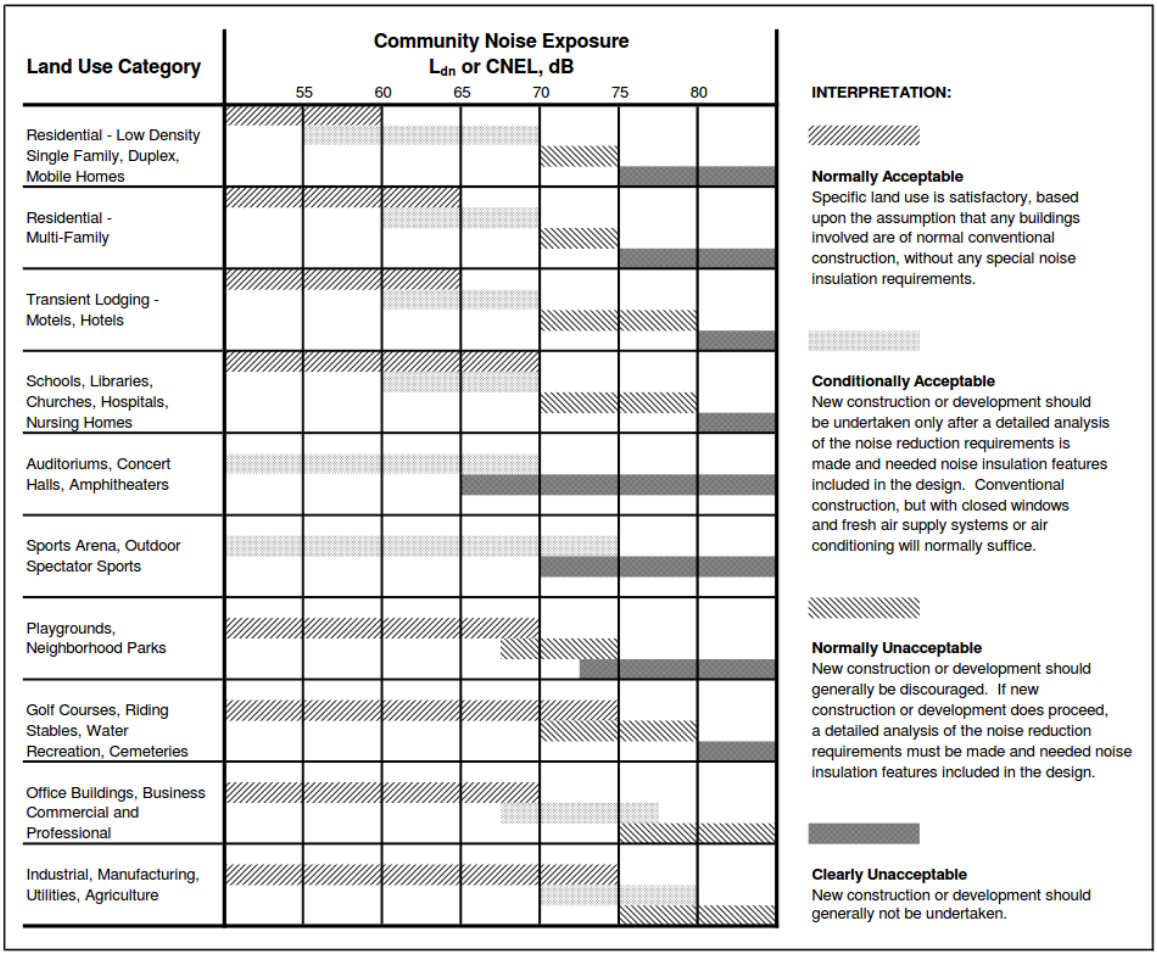
d) Acceptable Interior Noise Exposure
Section 1208A of the 1998 California Building Code (Title 24, Part 2, California Code of Regulations) establishes uniform minimum noise insulation performance standards to protect persons within new hotels, motels, dormitories, apartment houses and dwelling other than detached single-family dwellings from the effects of excessive noise. The regulations state that, "Interior noise levels attributable to exterior sources shall not exceed 45 dB in any habitable room. The noise metric shall be either … Ldn or … CNEL, consistent with the noise element of the general plan." Additionally, it is stated that residential buildings or structures to be located where the Ldn or CNEL exceeds 60 dB shall require an acoustical analysis showing that the proposed building design will limit the intruding exterior noise to an interior CNEL (Ldn) of 45 dB.

III. Sources for Noise:

d) Neighborhood Noise Sources
Noise exposures allowable at a citizen's property line due to sources such as radio, television, recreational and social activities, air conditioning equipment, swimming pool pumps, animals, sound amplification systems, etc., vary in level, time of day, day of week, and duration. These noise intrusions, as well as intrusion from industrial or commercial zones, are regulated by the City of Monrovia's current noise ordinance. Citizen understanding, participation and cooperation are essential for effectiveness.

e) Construction Activity
Short-term, temporary, and intermittent noise impacts associated with construction activities may be considered minimal during daytime hours. However, late evening and weekend disturbances related to construction activities experienced at nearby sensitive receptor locations may cause significant impacts.

Figure 1: Land Use Compatibility Guidelines



Source: *State of California General Plan Guidelines.* Governor's Office of Planning and Research, 1998.

III. EXISTING NOISE ENVIRONMENT

The primary source of noise exposure to the project site is from the I-210 freeway running east and west to the north of the site, and from S Myrtle Ave, which runs north and south along the east of the site. The site is also bordered by W Evergreen Ave to the north, W Pomona Ave to the south, and S Primrose Ave to the west. These roads present a less significant source of the noise to the site. Other sources include commercial activity from the Chevron gas station which boarders the east site boundary.

There is a railroad for Foothill Gold Line light rail transit system approximately 480 feet south of the site; however, this is not a significant noise source to the project site, given that these light rail cars are much quieter than typical trains. The nearest airport is the El Monte Airport, which is approximately 3.5 miles south of the site. This airport only serves smaller aircraft and is not considered a significant source for noise exposure to the project site.

Long-term (LT) noise measurements were conducted at the site from Monday, June 11, 2018 to Wednesday June 13, 2018, as summarized in Table 1. These measurements were used to calculate the Community Noise Exposure Level (CNEL), which is a descriptor used to calculate the average hourly noise levels over a 24-hour period, with a 5 dBA penalty between the evening hours of 7:00pm and 10:00pm and a 10 dBA penalty between the nighttime hours of 10:00pm and 7:00am. Hourly averages can be seen in the measurement charts located in Appendix II at the end of this report.

Long-Term Measurement Results

LT-1 was positioned in the middle of the east façade approximately 186 feet from from the first lane of traffic on S Myrtle Ave and 240 feet from the first lane of traffic on I-205. The measurement was taken at a height of 10 feet above grade; therefore, the roadway on I-205 was not in line of sight to the monitor. We calculate that the CNEL would be approximately 4 points higher for the residential levels above ground level from increased exposure to I-205. The predicted noise exposure at LT-1 is a CNEL 73.

LT-2 was positioned along the north side of the site, approximately 130 feet from the first lane of traffic on I-205 and 14 feet from the first lane of traffic on W Evergreen Ave. The measurement was also taken at a height of 10 feet above grade; therefore, the roadway on I-205 was not in line of sight to the monitor. We calculate that the CNEL would be approximately 5 points higher for the residential levels above ground level from increased exposure to I-205. The predicted noise exposure at LT-1 is a CNEL 75.

Table 1: Long Term Measurement Results

Location	CNEL	Duration	Date	Measurement Description
LT-1	72	24 Hours	6/12/18	Microphone was 10’ above grade on east side of site.
LT-2	75	24 Hours	6/12/18	Microphone was 10’ above grade on north side of site.

Short-Term Measurement Results

Short-term (ST) measurements were taken to obtain spectral noise data near various areas of the proposed façade. This data is used when designing façade elements such as windows and wall assemblies. The measurements results are summarized in Table 2:

Table 2: Short Term Measurement Results

Location	dBA	Time	Duration	Date	Measurement Description
ST-1	67.8	9:35 am	5 min	6/11/18	Primary noise from I-205. 10 cars passed on W Evergreen Ave. Reduced speed from traffic signal stopping cars most of the time.
ST-2	64.6	9:43 am	5 min	6/11/18	72 cars passing and 12 medium sized trucks at an average speed of 25 mph, at a distance of 186 feet from the first lane of traffic on S Myrtle Ave.
ST-3	59	9:50 am	5 min	6/11/18	6 cars passing at an average speed of 20 mph, at a distance of 14 feet from the first lane of traffic on W Pomona Ave.
ST-4	59.3	9:58 am	5 min	6/11/18	4 cars passing at an average speed of 20 mph at a distance of 14 feet from the first lane of traffic on S Primrose Ave.

The project site location and noise sources are shown in Figure 2. Figure 3 shows the proposed building façade locations around the site.

Figure 2: Site Location and Noise Measurement Locations

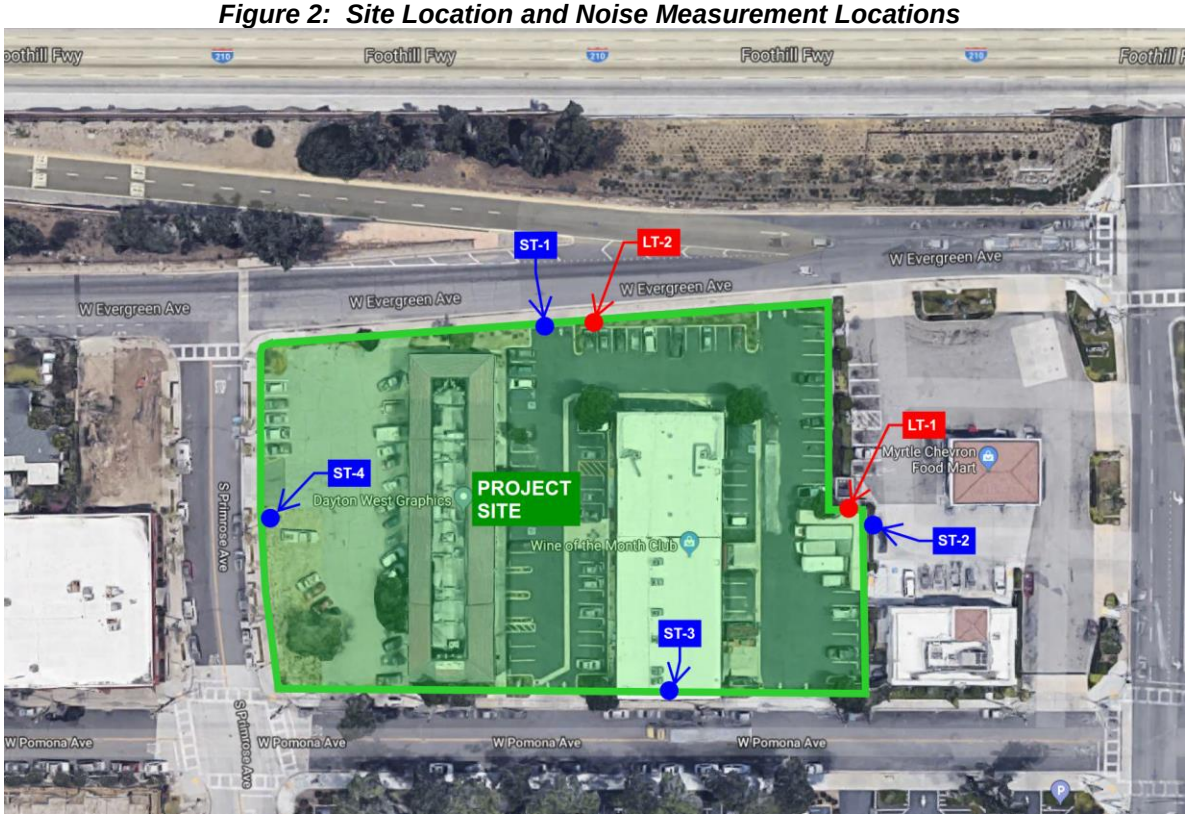


***Figure 3*: Project Site Plan and Retail Level**

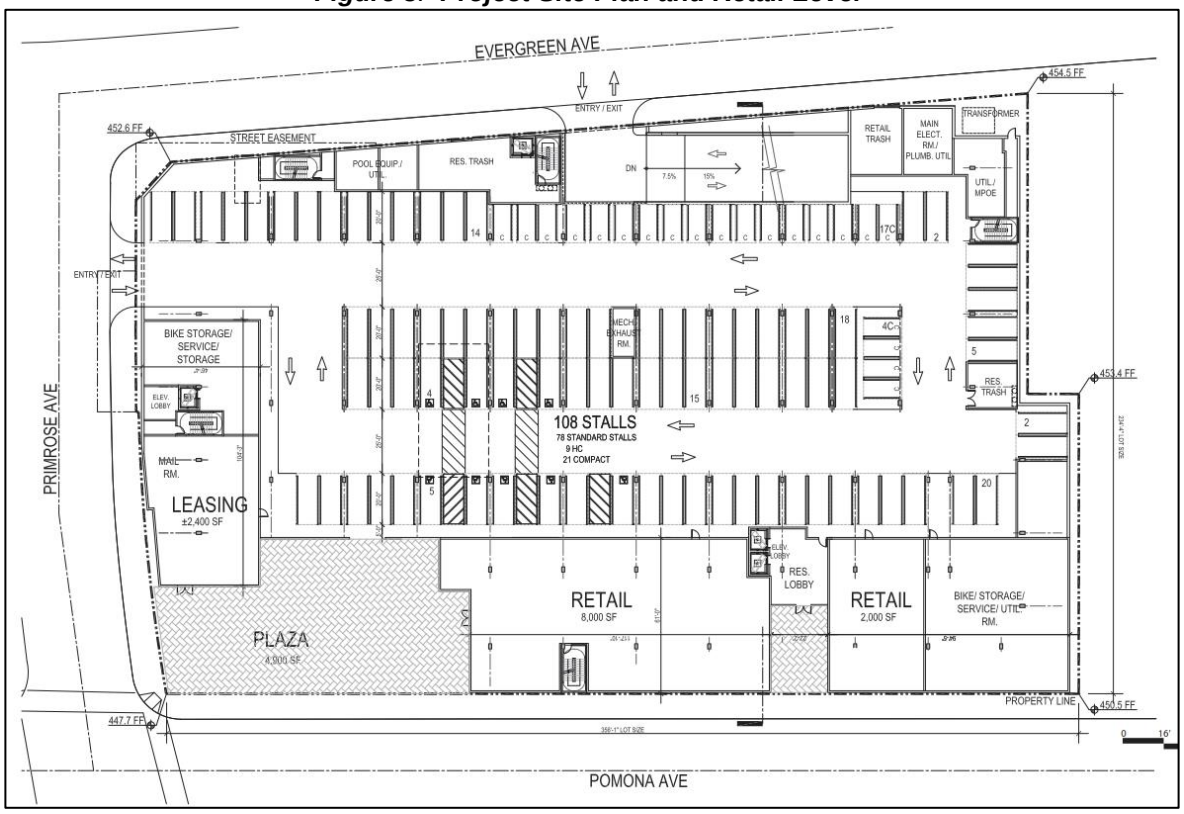
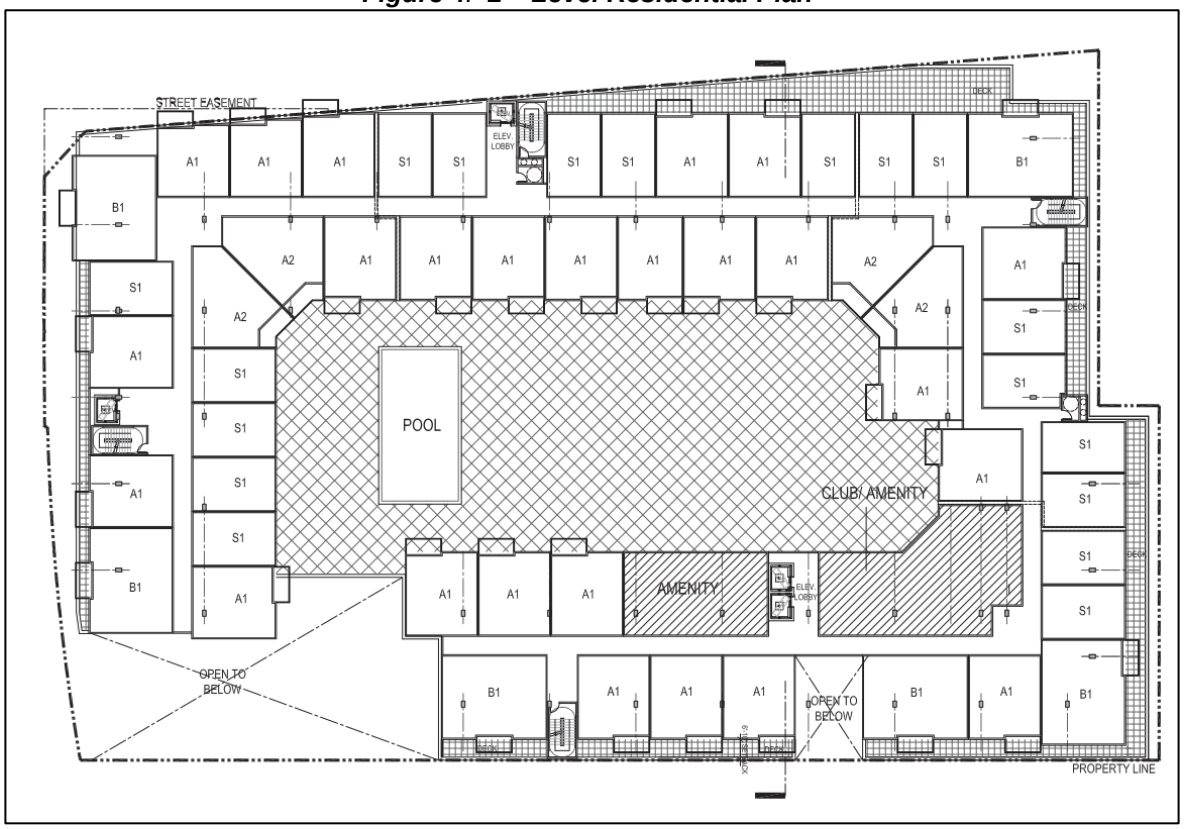


***Figure 4*: 2nd Level Residential Plan**



IV. NOISE IMPACT ASSESSMENT

Significance Criteria

The purpose of the noise impact assessment is to identify significant noise impact to or from the project site as defined by CEQA Guidelines. We have provided the following criteria of significance for this Noise Impact Assessment, which is based on the CEQA guidelines and the noise codes specific to the Monrovia General Plan and Monrovia Municipal Code. A significant noise impact would be identified if:

a. The project would expose persons utilizing the project to or cause noise levels that exceed the noise standards per the General plan or Municipal code for new residential construction. Sites at or below a CNEL 65 are considered "Normally Acceptable" for residential use. Interior noise levels within a residential unit shall not exceed a CNEL 45 in any habitable room.

b. The construction of the project would expose persons to excessive vibration levels. The regulatory code does not define "excessive vibration"; however, this can generally be defined by a level of 0.3 in/sec PPV or more, or if the vibration levels have potential to cause damage to buildings adjacent to the site.

c. Permanent noise such as operational noise generated by the project has a significant impact to the sensitive receivers. Per the General Plan, a 3 dBA CNEL increase is noticeable increase, which is considered significant when you consider this increase from a single project. Furthermore, the municipal code states that noise to the residential receiving properties should not exceed 55 dBA during the day and 50 dBA during the night, or exceed the ambient noise environment, which ever is higher.

d. Permanent noise such as traffic noise increases due to the project has a significant impact to the sensitive receivers. Per the General Plan, a 3 dBA CNEL increase is a noticeable increase, which is considered significant when you consider this increase from a single project.

e. Temporary or periodic noise generated by the project would have a significant impact to the sensitive receivers if it exceeds the ambient noise level by 5 dBA. The General Plan defines a 5 dBA increase as "clearly noticeable". This would generally apply to temporary noise during construction. Per the municipal code, construction noise is exempt from the noise regulations within the allowable construction hours.

1. NOISE AND LAND USE COMPATIBILITY

Based on the measurement results and our calculations the maximum noise exposure to the site will be a CNEL 75 from I-205 to the north, which falls within the "Normally Unacceptable" range for new multi-family residential construction and development, based on the City of Monrovia General Plan (see page 9).

Additionally, it is stated in the general plan that residential buildings or structures to be located in the CNEL 70 - 75 range must have detailed acoustical analysis to provide

requirements for improving the building envelope to achieve the interior CNEL 45 in any habitable room within the unit.

Interior Noise Exposure:

In order for the interior noise levels to achieve a CNEL 45, the building envelope must provide at least 30 dB of noise reduction at the north facade. This will require an improved building envelope. Due to the complexity of these recommendations, we have provided them in a supplemental document separate from this evaluation.

Exterior Noise Exposure:

The project includes a central courtyard as the primary exterior area serving the residents of the building. Exterior noise levels to the central courtyard will be shielded by the building, which wraps around the courtyard. We predict that noise within the courtyard will be a CNEL 60 or lower from, primarily from I-205 and S Myrtle Ave.

2. PROJECT GENERATED TRAFFIC NOISE

Traffic volume data for the project has been projected by Linscott, Law and Greenspan Engineers, who provided traffic volume data for “Existing Traffic Volumes” and “Existing with Project Traffic Volumes”.

The proposed project is estimated to generate a net of 1,390 trips per day when excluding the trips currently generated by the existing site uses. This includes a net of 73 AM peak hour trips and 111 PM peak hour trips.

LLG provided traffic volume estimates for 11 different intersections within close proximity to the proposed project site. We took the nearest intersection to the project (W. Pomona Ave and S. Myrtle Ave), which is predicted to be the most impacted intersection, and summed the total AM and PM peak hour trips for the existing and existing with the project. There were 1,441 peak hour trips in the AM and 1,845 peak hour trips in the PM based on existing traffic volumes. The existing with project traffic volumes will increase the count to 1,465 peak hour trips in the AM and 1,911 peak hour trips in the PM. According to LLG, this increase is considered to be an insignificant impact on existing traffic volumes.

In general, it takes a doubling of traffic volume (100% increase) to create a 3 dBA increase in noise levels to the sensitive receivers, using the basic methods of summing noise sources. Traffic volumes are estimated to increase by only 2% during peak AM hours and 4% during peak PM hours. Therefore, traffic noise levels are estimated to increase by less than 1 dBA CNEL. Per the significance criteria, project generated traffic noise is considered a significant impact if it increases the site CNEL levels by 3 dBA. Therefore, the increase in noise due to project generated traffic is not considered a significant impact on sensitive receivers.

3. CUMULATIVE TRAFFIC NOISE

Linscott, Law and Greenspan Engineers provided “Future without Project Traffic Volumes” and “Future with Project Traffic Volumes” figures for 2022. Traffic volume estimates for 11

different intersections were provided within close proximity to the proposed project site. We took the nearest intersection to the project (W. Pomona Ave and S. Myrtle Ave), which is predicted to be the most impacted intersection, and summed the total AM and PM peak hour trips. There were 1,698 peak hour trips in the AM and 1,722 peak hour trips in the PM based on the predicted future figures without project traffic volumes. The future with the project traffic volumes would increase the count to 2,222 peak hour trips in the AM and 2,298 peak hour trips in the PM. According to LLG, this increase is considered to be an insignificant impact on the future traffic volumes.

The project would be considered to have a significant impact if it raises the cumulative CNEL noise levels by 3 dBA or more, which would take a doubling (100% increase) of traffic volume. Future traffic volumes are estimated to increase by less than 2% during peak AM hours and by less than 4% during peak PM hours with the inclusion of future project generated traffic. Based on the predicted increase in volume, the cumulative noise plus project generated noise is estimated to be less than 1 dBA CNEL increase. Therefore, this is considered to have a less than significant impact on sensitive receivers.

4. OPERATIONAL NOISE

The predominant operational noise sources likely to emanate from the project to the surrounding neighborhood include the pool and courtyard, and potentially the retail spaces. Other sources would include outdoor HVAC equipment or ductwork serving the building that is exhausted to the exterior.

Sensitive receivers include the apartment building to the southwest of the site, and the single-family residence to the west of the site along W Evergreen Ave. Ambient noise from I-205 is predicted to be 63 dBA during nighttime hours and 66 dBA during daytime hours, which will generally dominate over any new noise sources generated by future use of the project.

Courtyard and Pool:

The courtyard and pool is located on Level 2 and is enclosed by the building, except for at the SW corner of the courtyard. This area will likely have noise from children playing. Based on our experiences with measuring playgrounds and other similar sources for noise, children will produce noise levels between 65 and 75 dBA Leq when measured at an average distance of 25 feet from the play area. Noise from these sources will be reduced to the sensitive receivers, given the location inside the courtyard. Furthermore, noise from children playing is generally limited to daytime hours and will not impact either of the sensitive receivers during nighttime hours. Noise will not create a significant impact to the sensitive receivers.

Amenities:

There are two amenity spaces located on Level 2 adjacent to the courtyard. Noise from these spaces will mostly be confined within the interior of the building and will also be masked by ambient noise from I-205. Noise will not create a significant impact to the sensitive receivers.

Retail 1 and 2:

These spaces are located at ground level on the south side of the site along W Pomona Ave. Given that noise sources from typical retail spaces will be much lower than traffic noise on S Myrtle Ave or I-205, these spaces are not expected to have a significant impact on the surrounding environment. Furthermore, noise from these spaces will mostly be confined within the interior of the building. Noise will not create a significant impact to the sensitive receivers.

Parking Garage:

The parking garage is confined within the building and will not be a source of noise to the sensitive receivers. The parking garage entrances will be on the west side of the site off of S Primrose Ave and on the north side of the site on W Evergreen Ave. Noise will not create a significant impact to the sensitive receivers.

HVAC Noise:

There will be HVAC equipment serving the building. Per the municipal code, this equipment will be limited to 55 dBA during the hours of 7:00 a.m. – 9:00 p.m. and 50 dBA during the hours of 9:00 p.m. – 7:00 a.m., or the average measured ambient noise level at the residential receivers, whichever is higher.

Given the distance of the residential receivers from the proposed building, standard HVAC equipment will produce noise levels that are within these limits. Typically, rooftop equipment for low and mid-rise apartment projects do not exceed a sound power level of 90 dBA. Based on the distance of the sensitive residential properties, this level will be reduced to less than 50 dBA at these properties.

Ambient noise at the west residential receiver is 66 dBA during daytime hours and 63 dBA during nighttime hours, which will likely dominate any equipment noise. Ambient noise at the southwest residential receiver is predicted to be 59 dBA during daytime hours and approximately 56 dBA during nighttime hours, which will not likely be increased by HVAC noise. Therefore, standard HVAC equipment noise will likely have a less than significant impact.

5. CONSTRUCTION NOISE

The construction schedule for this project is expected to last for approximately 18 months. The major noise generating equipment is from excavation at the beginning of the project and from finishing at the end of the project. Cumulatively, these sources are expected to last no more than a year.

Construction noise is predicted based on the typical noise levels for various types of construction activity for domestic housing projects, as provided by the U.S. Environmental Protection Agency in Table 3.

Table 3: Typical Ranges of Noise Levels at 50 Feet from Construction Sites (dBA Leq)

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial, Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads, & Highways, Sewers, and Trenches	
Type of Work	**I**	**II**	**I**	**II**	**I**	**II**	**I**	**II**
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	78
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

I – All Pertinent equipment at site.
II – Minimum required equipment present at site.
Source: United States Environmental Protection Agency, 1973, Legal Compilation on Noise, Vol. 1 p. 2-104

Based on the data provided in Table 3, construction noise is expected to impact the ambient noise levels between 81 and 88 dBA on an hourly average during construction activity at a distance of 50 feet. The nearest sensitive receivers are residential buildings to the west and southwest of the site.

Noise to West Sensitive Receiver:

The single-family residence to the west is approximately 288 feet from the center of the site, 115 feet from the nearest site boundary, and 480 feet from the farthest site boundary. These increased distances beyond 50 feet will provide approximately 7 dBA of reduction from nearest point on the site and 20 dBA of reduction from the farthest point on the site, given that attenuation increases by 6 dBA for every doubling of distance. Therefore, construction noise will range between 61 dBA and 81 dBA throughout the construction process depending on what equipment is being used and on what portion of the site.

The ambient noise levels at this receiver are estimated to be 66 dBA during construction hours, based on data collected for the short-term and long term noise measurements. Construction noise is predicted to exceed 60 dBA and the ambient by 5 dBA. This is considered a significant impact.

Noise to Southwest Sensitive Receiver:

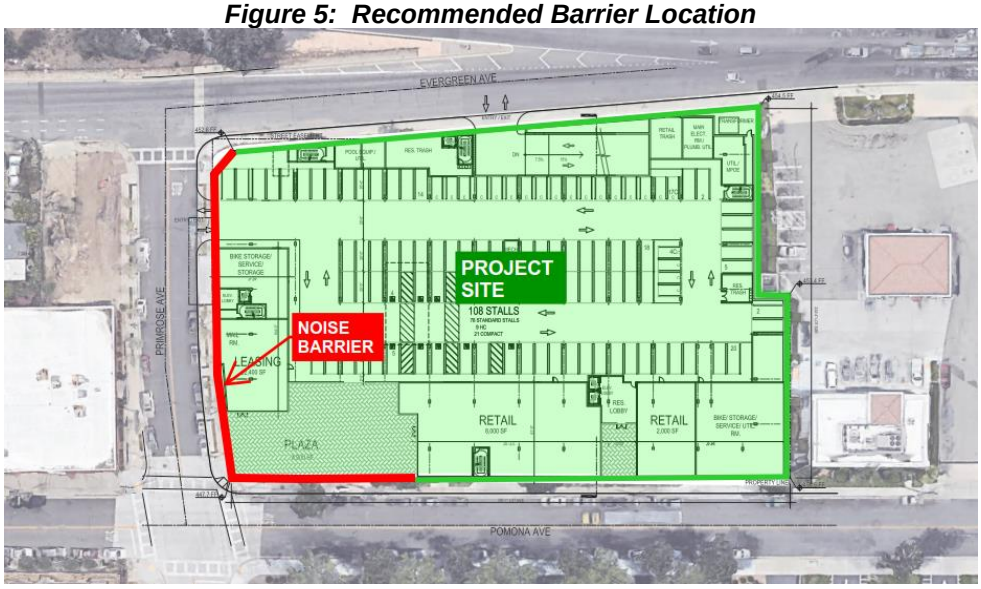
The multi-family residential building to the southwest is approximately 290 feet from the center of the site, 100 feet from the nearest site boundary, and 500 feet from the farthest site boundary. These increased distances beyond 50 feet will provide approximately 6 dBA of reduction from nearest point on the site and 20 dBA of reduction from the farthest point on the site, given that attenuation increases by 6 dBA for every doubling of distance. Therefore, construction noise will range between 61 dBA and 82 dBA throughout the construction process depending on what equipment is being used and on what part of the site.

The ambient noise levels at this receiver are estimated to be 59 dBA during construction hours, based on our short-term noise measurements. Construction noise is predicted to exceed 60 dBA and the ambient by 5 dBA. This is considered a significant impact. We recommend the following mitigation:

Noise Mitigation:

1. Incorporate an 8' tall noise barrier into the site boundaries to reduce line-of-sight noise to the sensitive receivers. A barrier will provide as much as 5 dB of noise reduction where it blocks the line-of-site between the source and receiver. Noise attenuation from a barrier varies drastically depending on the location of the source and receiver in relation to the barrier. The barrier will be most effective during demolition and initial site work. It will be less effective at reducing noise during framing of the upper floors of the building; however, it will reduce noise from ground level equipment throughout the duration of the project. See Figure 5 for an approximate location of the barrier.
    a. Construct a continuous barrier from 3/4" plywood, or a continuous mass having a weight of 2lb/sf or more.
    b. Seal all joints in the barrier with acoustical sealant or overlap plywood seams by 3" and screw tightly together to create a continuous mass barrier.
    c. Avoid large air gaps under the barrier. Soil shall be mounded up past the bottom of the barrier by 3-6" to sufficiently block this path for sound.

Figure 5: Recommended Barrier Location



2. Locate loud stationary equipment such as generators, compressors, etc. along the north or east sides of the site.

3. Locate large dumpsters, recycling containers, or demolition debris containers toward the north or east sides of the site. These can be loud when materials are dropped into them during the demolition phase of construction.

4. Locate the site entrance and exit on the north or south sides of the site, but as far east as possible. This will locate heavy truck traffic away from sensitive receivers.

5. Utilize exhaust and intake mufflers on machinery on machinery with combustion engines.

6. Limit construction activity between the hours of 7:00 a.m. and 7:00 p.m. on weekdays and between the hours of 9:00 a.m. and 6:00 p.m. on the weekends and holidays.

7. Devise a construction plan that we can review prior to start of construction. We can provide feedback for any potential issues not considered in this evaluation.

6. CONSTRUCTION VIBRATION

The State of California DOT recommends a vibration limit of no more than 0.5 in/sec PPV for modern and structurally sound buildings, 0.3 in/sec PPV for structurally sound buildings where damage may be a concern, and 0.08 in/sec PPV for ancient or structurally weakened buildings adjacent to the project site. Per the significance criteria, ground vibration levels exceeding 0.3 in/sec PPV would result in a significant impact.

Vibration levels from construction activity will occasionally be perceptible at neighboring properties during daytime hours. Construction activities will include demolition, excavation, site preparation, foundation work, concrete pouring, framing, and finishing. Table 4 below describes vibration levels from typical construction equipment.

Table 4: Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft	Approximate Lv* at 25 ft
Pile Driver (Impact)	upper range	1.518	112
	typical	0.644	104
Pile Driver (Sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory roller		0.210	94
Hoe ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

* RMS velocity in decibels (VdB) re 1 micro-inch/second
Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Admin., May 2006

As shown in Table 4, the most significant sources of vibration during construction are from pile driving equipment; however, this project will not be using this type of equipment. Most other equipment is around 0.2 in/sec PPV or less at a distance of 25 ft.

All adjacent building are at least 50 feet or more from the site, except for the Chevron Food Mart to the east. This may result in perceptible vibration levels at this receiver for a short duration of time. This is a modern building and should not be at risk for damage from vibration.

Furthermore, there are no ancient buildings or buildings known to be structurally weakened adjacent to the site.

Table 5: Summary of Construction Equipment Vibration Levels and Effects on Humans and Buildings

Effects	Peak Particle Velocity (PPV in/sec)	
	Transient Sources or Isolated Event	Continuous/Frequent Intermittent Sources
Potentially Damaged Structure Type		
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5
Human Response		
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.1
Severe	2.0	0.4

Source: Caltrans 2004

We expect that vibration levels will be less than 0.2 in/sec PPV at all receivers with standard construction equipment, which is considered a less than significant impact.

V. SUMMARY

This concludes our environmental noise assessment report of the Monrovia TOD Apartments project. We have provided notes were necessary to reduce noise or vibration. The significance of impact for each portion of the evaluation can be summarized per the following:

1. Noise and Land Use Compatibility: Normally Unacceptable. Building construction methods that reduce noise are required and provided in a separate report.

2. Project Generated Traffic Noise: Less than significant impact.

3. Cumulative Traffic Noise: Less than significant impact.

4. Operational Noise: Less than significant impact.

5. Construction Noise: Significant impact at sensitive receivers to the west and southwest. Notes have been provided to reduce noise.

6. Construction Vibration: No significant impact at sensitive receivers with standard construction equipment.

APPENDIX I: DESCRIPTORS

Sound Pressure Level (SPL)
Sound can be described by small vibrations traveling through the air that are sensed by the human ear. The ear perceives these vibrations as changes in pressure and as a result sound levels are often referred to as Sound Pressure Levels (SPL)

Decibel (dB)
Sound levels are expressed in units of decibels. The term decibel implies a logarithmic ratio of the measured pressure to a reference pressure. The reference pressure refers to the lower threshold of perceptibility by the human ear.

Frequency (Hz)
The number of complete pressure fluctuations per second above and below atmospheric pressure. This number dictates how "high" or "low" a sound is perceived by a listener. Typically, humans can perceive frequencies as low as 20 Hz and as high as 20,000 Hz.

A-Weighted Decibel (dBA)
The human ear responds differently to sounds at different frequencies. This is demonstrated by the fact that we hear higher pitched sounds more easily than lower ones of the same magnitude. To compensate for the different "loudness" as perceived by humans, a standard weighting curve is applied to measured sound levels. The weighting curve represents the frequency response of the human ear and is labeled as dBA ("A" weighted decibels).

Community Noise Exposure Level (CNEL)
CNEL is a descriptor used to calculate the average hourly noise levels over a 24-hour period, with a 5 dBA penalty between the evening hours of 7:00pm and 10:00pm and a 10 dBA penalty between the nighttime hours of 10:00pm and 7:00am. The value derived is used to describe noise exposure for both the exterior and interior spaces in a multi-family residential building from sources such as vehicle traffic, aircraft, or railways.

Ambient Noise
This describes the noise levels from a cumulation of sources in a given setting. This is often used to describe the noise levels from traffic for both indoor and outdoor spaces.

Peak Particle Velocity (PPV)
PPV is used to quantify ground vibration, measured in terms of with units in in/sec. PPV refers to the maximum molecular movement within the ground and not surface on the surface. The displacement value in inches describes to the surface movement. The frequency range for ground vibration is typically between 1 Hz and 200 Hz.

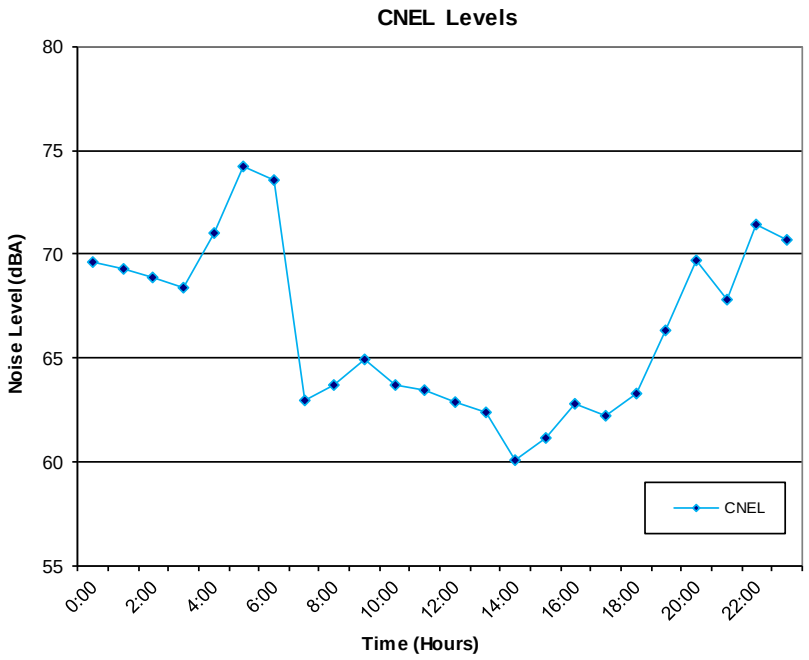
APPENDIX II: CNEL CALCULATIONS

Table 6: CNEL Calculation for Measurement LT-1

CNEL Calculation for Monrovia TOD Apartments

LT-1 (East Side of Site) **CNEL: 68**

Date / Time	Leq	CNEL
6/12/2018 0:00	59.6	70
6/12/2018 1:00	59.3	69
6/12/2018 2:00	58.9	69
6/12/2018 3:00	58.4	68
6/12/2018 4:00	61	71
6/12/2018 5:00	64.2	74
6/12/2018 6:00	63.6	74
6/12/2018 7:00	63	63
6/12/2018 8:00	63.7	64
6/12/2018 9:00	64.9	65
6/12/2018 10:00	63.7	64
6/12/2018 11:00	63.5	64
6/12/2018 12:00	62.9	63
6/12/2018 13:00	62.4	62
6/12/2018 14:00	60.1	60
6/12/2018 15:00	61.2	61
6/12/2018 16:00	62.8	63
6/12/2018 17:00	62.2	62
6/12/2018 18:00	63.3	63
6/12/2018 19:00	61.3	66
6/12/2018 20:00	64.7	70
6/12/2018 21:00	62.8	68
6/12/2018 22:00	61.4	71
6/12/2018 23:00	60.7	71



CNEL Definition: From Average Leq over 24-hour period with a 5 dBA penalty from 7:00pm to 10:00pm and a 10 dBA penalty 10:00pm to 7:00am. The Calc was derived from a single 24-hour period from the total duration.

Measurement: A Svantek 971 Sound Level Meter was placed near the proposed location of the east façade, approx. 186 feet from the first lane of on S Myrtle Ave, and approx. 250 feet from the first lane on I-205 to the north.

Duration: The measurement began at 3:00pm on Monday 6/11/18 and ended at 9:00am on Wednesday 6/13/18. A single 24-hour period was taken from data collected on Tuesday 6/12/18.

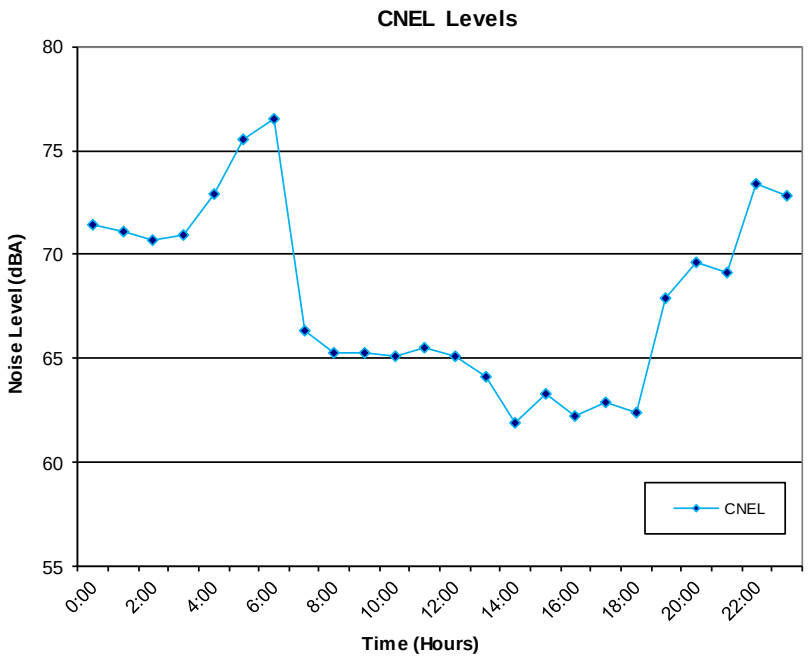
Observations: Major noise sources were from traffic moving at an approximate speed of 65 mph along I-205, and from traffic moving at 30 mph on S Myrtle Ave. Other side streets had very little traffic.

Table 7: Ldn Calculation for Measurement LT-2

CNEL Calculation for Monrovia TOD Apartments

LT-2 (North Side of Site) **CNEL: 70**

Date / Time	Leq	CNEL
6/12/2018 0:00	61.4	71
6/12/2018 1:00	61.1	71
6/12/2018 2:00	60.7	71
6/12/2018 3:00	60.9	71
6/12/2018 4:00	62.9	73
6/12/2018 5:00	65.5	76
6/12/2018 6:00	66.5	77
6/12/2018 7:00	66.3	66
6/12/2018 8:00	65.3	65
6/12/2018 9:00	65.3	65
6/12/2018 10:00	65.1	65
6/12/2018 11:00	65.5	66
6/12/2018 12:00	65.1	65
6/12/2018 13:00	64.1	64
6/12/2018 14:00	61.9	62
6/12/2018 15:00	63.3	63
6/12/2018 16:00	62.2	62
6/12/2018 17:00	62.9	63
6/12/2018 18:00	62.4	62
6/12/2018 19:00	62.9	68
6/12/2018 20:00	64.6	70
6/12/2018 21:00	64.1	69
6/12/2018 22:00	63.4	73
6/12/2018 23:00	62.8	73



CNEL Definition: From Average Leq over 24-hour period with a 5 dBA penalty from 7:00pm to 10:00pm and a 10 dBA penalty 10:00pm to 7:00am. The Calc was derived from a single 24-hour period from the total duration.

Measurement: A Svantek 971 Sound Level Meter was placed near the proposed location of the north façade, approx. 130 feet from the first lane of on I-205, and approx. 16 feet from the first lane on W Evergreen Ave.

Duration: The measurement began at 3:00pm on Monday 6/11/18 and ended at 9:00am on Wednesday 6/13/18. A single 24-hour period was taken from data collected on Tuesday 6/12/18.

Observations: Major noise sources were from traffic moving at an approximate speed of 65 mph along I-205, and from traffic moving at 30 mph on S Myrtle Ave. Other side streets had very little traffic.