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Noise Analysis for the Montiel Road Office Project San Marcos, California

Prepared for
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August 21, 2019

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Acronyms

ADT	average daily traffic
CALGreen	California Green Building Standards
Caltrans	California Department of Transportation
City	City of San Marcos
CNEL	community noise equivalent level
dB	decibel
dB(A)	A-weighted decibel
FHWA	Federal Highway Administration
HVAC	heating, ventilating, and air conditioning
L_{90}	noise level exceeded 90 percent of the time
L_{eq}	one-hour equivalent noise level
L_{max}	maximum noise level
LOS	Level of Service
L_{pw}	sound power level
SR-78	State Route 78

Executive Summary

The Montiel Road Office Project (project) site is located at 2355 and 2375 Montiel Road within the Richland Community Plan area of San Marcos, California. The approximately 2.6-acre project site is currently developed with two single-family dwelling units. The proposed project would demolish the existing on-site uses and construct a 32,971-square-foot two-story office building and parking.

This report discusses potential noise impacts from the construction and operation of the project. As part of this assessment, noise levels due to vehicle traffic were calculated and evaluated against City of San Marcos (City) noise and land use compatibility guidelines. In addition to compatibility, the potential for noise to impact adjacent uses from future on-site sources and construction activity was assessed. A summary of the findings is provided below.

Construction Noise

Construction activity is regulated by the City Municipal Code, which limits noise by restricting construction activities to hours unlikely to impact the community. Noise associated with the grading, building, and paving for the project would potentially result in short-term impacts to surrounding residential properties. Construction noise levels would range from 60 to 75 A-weighted decibels equivalent noise level [dB(A) L_{eq}] at the adjacent properties. Construction activities would generally occur over the period between 7:00 a.m. and 6:00 p.m. on weekdays. Although the existing adjacent uses would be exposed to construction noise levels that may be heard above ambient conditions, the exposure would be temporary and would not exceed 75 dB(A) L_{eq}. As construction activities associated with the project would comply with Section 10.24.020 (b)(9) of the City Municipal Code, temporary increases in noise levels from construction activities would be less than significant.

Traffic Noise

The additional vehicle trips associated with the project would increase noise levels on nearby roadways. A noise increase of 3 dB or more would be considered significant because 3 dB is the level at which an increase in noise is perceptible to a person. However, the project would not generate enough trips to result in a direct or cumulative noise increase of more than 3 dB. Therefore, the project would result in less than significant direct and cumulative impacts related to traffic noise.

The main source of noise at the project site is vehicle traffic on State Route 78 and Montiel Road. Exterior noise levels were modeled at the project site to determine compatibility with City standards. The applicable standards for office uses are an exterior noise level of 65 community noise equivalent level (CNEL) and an interior noise level of 50 CNEL. The project's exterior useable spaces include the outdoor seating area at the northeast corner of the proposed building and the second-floor deck located above the building entrance. As calculated in this analysis, noise levels at the exterior seating area (Receivers 1 through 3)

would range from 54 to 63 CNEL and noise levels at the second-floor deck above the building entrance (Receiver 12) would be 58 CNEL. These noise levels at the exterior use areas would be compatible with the City's standard of 65 CNEL.

Exterior noise levels at the building façade are projected to range from 54 to 77 CNEL. The interior noise level standard is 50 CNEL. According to the Federal Highway Administration, masonry and concrete buildings with double-pane windows, which are typically required to meet Title 24 energy code requirements, provide a 35 dB(A) reduction at interior locations from exterior noise sources (Federal Highway Administration 2011). Based on these standards, interior noise levels would be reduced to 50 CNEL or less.

On-site Generated Noise

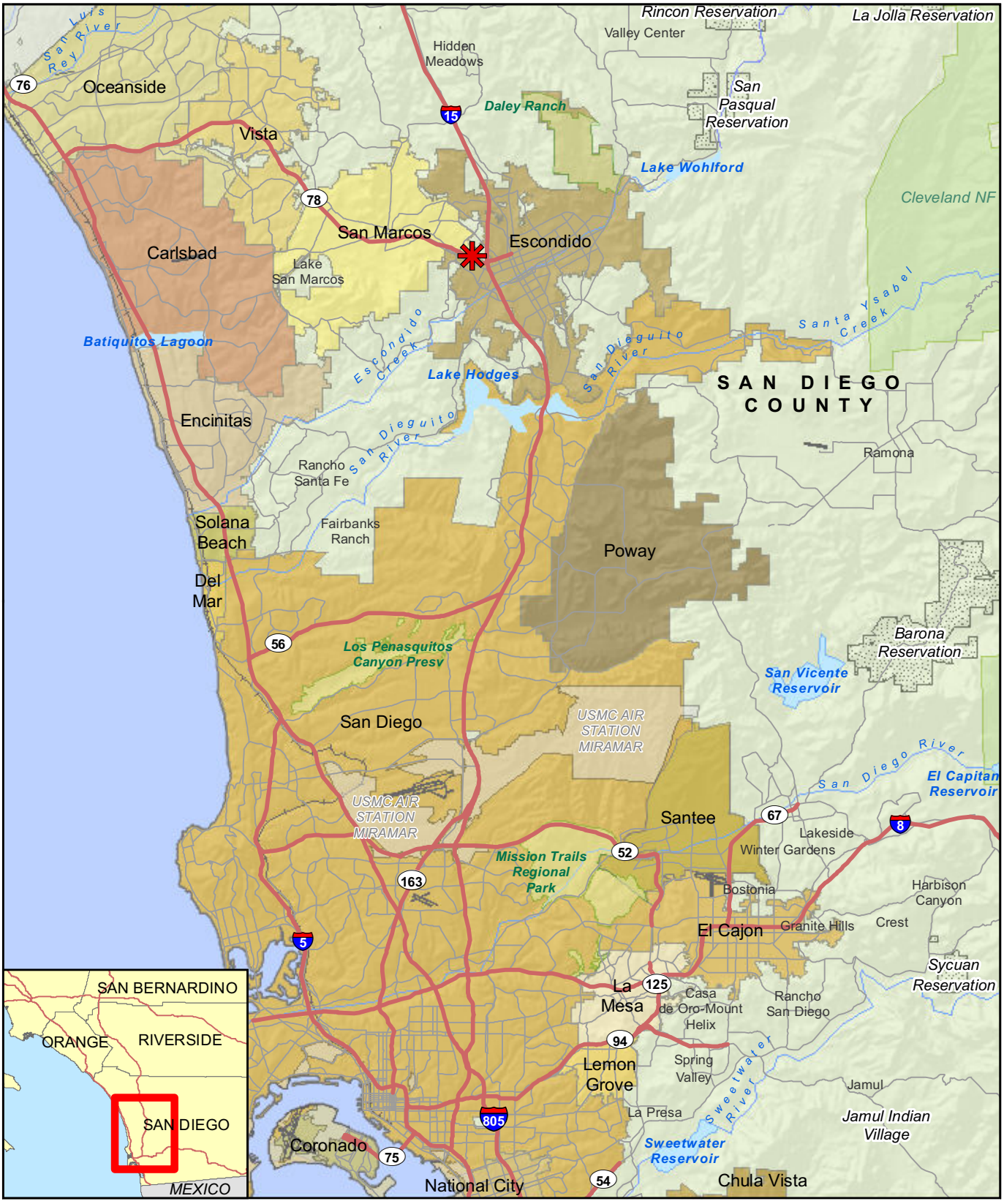
The noise sources on the project site after completion of construction are anticipated to be those that would be typical of any office use, such as vehicles arriving and leaving and landscape maintenance machinery. None of these noise sources are anticipated to violate the Municipal Code. Rooftop heating, ventilating, and air conditioning noise levels were modeled at the property line adjacent properties. As shown, on-site generated noise levels would range from 32 to 40 dB(A) L_{eq} at the adjacent properties. Noise levels would not exceed the applicable Noise Ordinance limits at the property lines.

1.0 Introduction

1.1 Project Description

The Montiel Road Office project (project) is located in the city of San Marcos, California, north of SR-78 along Montiel Road at 2355 and 2375 Montiel Road on Assessor's Parcel Numbers 228-370-2000 and 228-370-3900. The project site is bounded by existing development to the east and west, and by Montiel Road to the north and SR-78 to the south. The approximately 2.6-acre project site is currently developed with two single-family dwelling units. Single-family residential uses are located north and northeast of the project site, and commercial uses are located west/northwest and east/southeast of the project site. Figure 1 shows the regional location of the project. Figure 2 shows an aerial photograph of the project and vicinity.

The proposed project would demolish the existing on-site uses and construct a 32,971-square-foot two-story office building and parking. Figure 3 shows the proposed site plan. The first floor would consist of 15,712 square feet, complete with a lobby, a "café" area with outdoor seating, bathrooms, mechanical and elevator areas, and three individual office areas available for lease. The second floor would consist of 17,252 square feet, complete with four individual office areas available for lease, bathroom, and mechanical and elevator areas. The second floor would also contain an outdoor deck area above the main entrance to the building.



Project Location

FIGURE 1
Regional Location

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Image Source: Nearmap (flown June 2019)

0 Feet 100

Project Boundary

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FIGURE 2

Project Location on Aerial Photograph

Image Source: Nearmap (flown June 2019)

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Project Boundary

Site Plan Line

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FIGURE 3

Site Plan

On-site surface parking would be configured in order to accommodate the proposed buildings, resulting in a total of 185 parking stalls, for a ratio of 5.6 spaces per 1,000 square feet of office space, which would be consistent with the requirements set forth in the San Marcos Code Chapter 20.340, Off-Street Parking and Loading requirements.

1.2 Fundamentals of Noise

Sound levels are described in units called the decibel (dB). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3 dB decrease. However, human perception of noise has no simple correlation with acoustical energy. A change in noise levels is generally perceived as follows: 3 A-weighted dB [dB(A)] barely perceptible, 5 dB(A) readily perceptible, and 10 dB(A) perceived as a doubling or halving of noise (California Department of Transportation 2013).

In technical terms, sound levels are described as either a "sound power level" or a "sound pressure level," which while commonly confused, are two distinct characteristics of sound. Both share the same unit of measure, the dB. However, sound power, expressed as L_{pw}, is the energy converted into sound by the source. As sound energy travels through the air, it creates a sound wave that exerts pressure on receivers such as an eardrum or microphone, the sound pressure level. Sound measurement instruments only measure sound pressure, and limits used in standards are generally sound pressure levels.

The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this phenomenon, the A-scale, which approximates the frequency response of the average young ear when listening to most ordinary everyday sounds, was devised. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Therefore, the "A-weighted" noise scale is used for measurements and standards involving the human perception of noise. Noise levels using A-weighted measurements are designated with the notation dB(A).

1.2.1 Descriptors

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important. In addition, most noise that lasts for more than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors has been developed. The noise descriptors used for this study are the equivalent noise level (L_{eq}) and the community noise equivalent level (CNEL).

The L_{eq} is the equivalent steady-state noise level in a stated period of time that is calculated by averaging the acoustic energy over a time period; when no period is specified, a 1-hour period is assumed.

The CNEL is a 24-hour equivalent sound level. The CNEL calculation applies an additional 5 dB(A) penalty to noise occurring during evening hours, between 7:00 p.m. and 10:00 p.m., and a 10 dB(A) penalty is added to noise occurring during the night, between 10:00 p.m. and 7:00 a.m. These increases for certain times are intended to account for the added sensitivity of humans to noise during the evening and night.

1.2.2 Propagation

Sound from a localized source (approximating a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern, known as geometric spreading. The sound level decreases or drops off at a rate of 6 dB(A) for each doubling of the distance.

Traffic noise is not a single, stationary point source of sound. The movement of vehicles makes the source of the sound appear to emanate from a line (line source) rather than a point when viewed over some time interval. The drop-off rate for a line source is 3 dB(A) for each doubling of distance.

The propagation of noise is also affected by the intervening ground, known as ground absorption. A hard site (such as parking lots or smooth bodies of water) receives no additional ground attenuation, and the changes in noise levels with distance (drop-off rate) are simply the geometric spreading of the source. A soft site (such as soft dirt, grass, or scattered bushes and trees) provides an additional ground attenuation value of 1.5 dB(A) per doubling of distance. Thus, a point source over a soft site would drop off at 7.5 dB(A) per doubling of distance.

2.0 Applicable Noise Standards

2.1 General Plan

The Noise Element of the City of San Marcos (City) General Plan provides land use compatibility guidelines to ensure that new developments are sited, designed, and constructed in such a manner that ambient noise levels would not create an unacceptable noise environment for the occupants and patrons of the new development. Table 1 provides the interior and exterior noise guidelines for various types of uses and developments.

The project proposes an office development. As shown in Table 1, the applicable standards for office uses are an exterior noise level of 65 CNEL and an interior noise level of 50 CNEL. The exterior noise level standard is applicable at the proposed exterior use areas. For the proposed project, this includes the outdoor seating area at the northeast corner of the proposed building and the second-floor deck located above the building entrance.

Table 1 Interior and Exterior Noise Guidelines		
Land Use	Maximum Noise Level (CNEL)	
	Interior[1]	Exterior[2,3]
Residential – single-family, mobile homes, or age-restricted housing	45	60
Residential – multi-family residences or mixed use	45	65
Lodging – hotels, motels	45	65
Schools, churches, hospitals, residential care facility, child-care facilities	50	65
Passive recreational parks, nature preserves, contemplative spaces, cemeteries	--	65
Active parks, golf courses, athletic fields, outdoor spectator sports, water recreation	--	65
Office/professional, government, medical/dental, commercial, retail, laboratories	50	65
Industrial, manufacturing, utilities, agriculture, mining, stables, ranching, warehouse, maintenance/repair	--	65

SOURCE: City of San Marcos General Plan Update, Noise Element 2013.
CNEL – community noise equivalent level.
[1]Applies only to interior habitable rooms.
[2]Exterior noise standard does not apply for land uses where no exterior use area is proposed or necessary, such as a library.
[3]For single-family detached dwelling units, "exterior noise level" is defined as the noise level measured at an outdoor living area that adjoins and is on the same lot as the dwelling.

2.2 Municipal Code

2.2.1 Title 10, Chapter 10.24 – Construction

Section 10.24.020 (b)(9) of the City Municipal Code identifies permissible hours for general construction activities. Excluding City holidays, construction may occur weekdays from 7:00 a.m. to 6:00 p.m. or Saturdays from 8:00 a.m. to 5:00 p.m. Grading is often the loudest phase of construction. Section 17.32.180 restricts grading and earthworks activities to between the hours of 7:00 a.m. and 4:30 p.m., Monday through Friday.

2.2.2 Title 20 – Zoning Ordinance

City Municipal Code Title 20 – Zoning Ordinance contains General Development Standards. Performance standards in Section 20.300.070 (f) set restrictions on noise levels by zoning. No person shall create or allow the creation of exterior noise that causes the noise level to exceed the noise standards shown in Table 2.

Table 2 Municipal Code Property Line Noise Standards		
Zone	Time	Allowable Property Line Noise Level [dB(A) L_{eq}]
Single-Family Residential (A, R-1, R-2)	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	60 50
Multi-Family Residential (R-3)	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	65 55
Commercial (C, O-P, SR)	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	60 55
Industrial	7:00 a.m. to 10:00 p.m. 10:00 p.m. to 7:00 a.m.	65 60
SOURCE: Section 20.300.070(f) Table 20.300-4, San Marcos Municipal Code Title 20 – Zoning Code dB(A) L_{eq} = A-weighted decibels equivalent noise level		

As discussed, the project site is bordered by single-family residential and commercial uses. The standards at the property line located between the project site and the adjacent single-family residential properties are 60 dB(A) L_{eq} from 7:00 a.m. to 10:00 p.m. and 50 dB(A) L_{eq} from 10:00 p.m. to 7:00 a.m. The standards at the property line located between the project site and the adjacent commercial properties are 60 dB(A) L_{eq} from 7:00 a.m. to 10:00 p.m. and 55 dB(A) L_{eq} from 10:00 p.m. to 7:00 a.m.

2.3 California Green Building Standards Code – Environmental Comfort

For nonresidential structures, Title 24, Chapter 12, Section 1207.5 refers to 2016 California Green Building Standards (CALGreen), Chapter 5 – Nonresidential Mandatory Measures, Division 5.5 – Environmental Quality, Section 5.507 – Environmental Comfort, Subsection 5.507.4 – Acoustical Control. Pursuant to these standards, all nonresidential building construction shall employ building assemblies and components that achieve a composite sound transmission class rating of at least 50 or shall otherwise demonstrate that exterior noise shall not result in interior noise environment where noise levels exceed 50 A-weighted equivalent decibels [dB(A) L_{eq}] in occupied areas during any hour of operation (24 California Code of Regulations [CCR] 1207.5 2016).

3.0 Existing Conditions

Existing noise levels in the vicinity of the project site were measured on January 9, 2019, using two Larson-Davis Model LxT, Type 1 Integrating Sound Level Meters, serial numbers 3827 and 3828. The following parameters were used:

Filter:	A-weighted
Response:	Slow
Interval Period	1 minute
Time History Period:	5 seconds

The meter was calibrated before and after each measurement. The meter was set 5 feet above the ground level for each measurement.

Noise measurements were taken to obtain typical ambient noise levels at the project site and in the vicinity. The weather was sunny and cool with a slight breeze, zero to five miles per hour on average. Two 15-minute measurements were taken, as described below. The primary sources of on-site noise were due to traffic on area roadways including SR-78 and Montiel Road. The measurement locations are shown on Figure 4, and detailed data is contained in Attachment 1.

Measurement 1 was located near the southern project boundary, 50 feet northeast of SR-78. Noise levels were measured for 15 minutes. The main noise source at this location was vehicle traffic on SR-78. Secondary sources of noise included occasional noise from the industrial park south of SR-78. Vehicle traffic on SR-78 was counted during the measurement period. The average measured noise level was 71.4 dB(A) L_{eq}.

Measurement 2 was located near the northern project boundary, approximately 50 feet southwest of Montiel Road. Noise levels were measured for 15 minutes. The main noise source at this location was vehicle traffic on Montiel Road. Secondary sources of noise included vehicle traffic on SR-78. Vehicle traffic on Montiel Road was counted during the measurement period. The average measured noise level was 60.3 dB(A) L_{eq}.

Noise measurements are summarized in Table 3. Traffic counts conducted during Measurements 1 and 2 are summarized in Table 4.

Table 3
Noise Measurements

Measurement	Location	Time	Noise Sources	L_{eq}	L_{90}
1	50 feet northeast of SR-78	11:12 a.m. – 11:27 a.m.	SR-78	71.4	69.0
2	50 feet southwest of Montiel Road	10:09 a.m. – 10:24 a.m.	Montiel Road and SR-78	60.3	56.8

L_{90} = Noise level exceeded 90 percent of the time.
Note: Noise measurement data is contained in Attachment 1.

Table 4
15-minute Traffic Counts

Measurement	Roadway	Direction	Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
1	SR-78	Westbound	1,032	42	35	2	0
		Eastbound	1,299	33	42	0	4
2	Montiel Road	Westbound	32	1	0	0	0
		Eastbound	27	0	0	0	2

Image Source: Nearmap (flown June 2019)

0 Feet 100

Measurement Locations

Project Boundary

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FIGURE 4

Noise Measurement Locations

4.0 Analysis Methodology

4.1 Construction Noise Analysis

Project construction noise would be generated by diesel engine-driven construction equipment used for demolition, site preparation and grading, building construction, loading, unloading, and placing materials and paving. Diesel engine-driven trucks also would bring materials to the site and remove the soils from excavation.

Construction equipment with a diesel engine typically generates maximum noise levels from 70 and 95 dB(A) L_{max} at a distance of 50 feet (Federal Highway Administration [FHWA] 2006). Table 5 summarizes typical construction equipment noise levels.

Table 5
Typical Construction Equipment Noise Levels

Equipment	Noise Level at 50 Feet [dB(A) L_{eq}]	Typical Duty Cycle
Auger Drill Rig	85	20%
Backhoe	80	40%
Blasting	94	1%
Chain Saw	85	20%
Clam Shovel	93	20%
Compactor (ground)	80	20%
Compressor (air)	80	40%
Concrete Mixer Truck	85	40%
Concrete Pump	82	20%
Concrete Saw	90	20%
Crane (mobile or stationary)	85	20%
Dozer	85	40%
Dump Truck	84	40%
Excavator	85	40%
Front End Loader	80	40%
Generator (25 kilovolt amps or less)	70	50%
Generator (more than 25 kilovolt amps)	82	50%
Grader	85	40%
Hydra Break Ram	90	10%
Impact Pile Driver (diesel or drop)	95	20%
In situ Soil Sampling Rig	84	20%
Jackhammer	85	20%
Mounted Impact Hammer (hoe ram)	90	20%
Paver	85	50%
Pneumatic Tools	85	50%
Pumps	77	50%
Rock Drill	85	20%
Roller	74	40%
Scraper	85	40%
Tractor	84	40%
Vacuum Excavator (vac-truck)	85	40%
Vibratory Concrete Mixer	80	20%
Vibratory Pile Driver	95	20%

SOURCE: FHWA 2006.
dB(A) L_{eq} = A-weighted decibels average noise level

Construction equipment would generate maximum noise levels between 70 and 95 dB(A) L_{max} at 50 feet from the source when in operation. During excavation, grading, and paving operations, equipment moves to different locations and goes through varying load cycles, and there are breaks for the operators and for non-equipment tasks, such as measurement. Average construction noise levels were calculated for the simultaneous operation of three common pieces of construction equipment: backhoe, excavator, and loader. The usage factors were applied to the maximum noise level at 50 feet for each piece of equipment, and then noise levels were added logarithmically. Hourly average noise levels would be approximately 83 dB(A) L_{eq} at 50 feet from the center of construction activity when assessing three pieces of common construction equipment working simultaneously.

4.2 Traffic Noise Analysis

4.2.1 On-Site Traffic Noise

Noise generated by future traffic was modeled using SoundPLAN Essential, version 3.0. The SoundPLAN program (Navcon Engineering 2015) uses the FHWA Traffic Noise Model algorithms and reference levels to calculate noise levels at selected receiver locations. The model uses various input parameters, such as projected hourly average traffic rates; vehicle mix, distribution, and speed; roadway lengths and gradients; distances between sources, barriers, and receivers; and shielding provided by intervening terrain, barriers, and structures. Receivers, roadways, and barriers were input into the model using three-dimensional coordinates. The locations of future buildings were obtained from project plans and drawings.

The main source of noise at the project site is vehicle traffic on SR-78 and Montiel Road. For the purpose of traffic noise compatibility analysis, the noisiest condition is represented as the maximum level of service (LOS) C traffic volume. This condition represents a condition where the maximum number of vehicles are using the roadway at the maximum speed. LOS A and B categories allow full travel speed but do not have as many vehicles, while LOS E and F have a greater number of vehicles, but due to the traffic volume travel at reduced speeds, thus generating less noise. SR-78 is a 6-lane east-west freeway adjacent to the project site with a maximum LOS C capacity of 1,980 vehicles per hour per lane. Montiel Road is a 2-lane Local Collector with a maximum LOS C capacity of 13,000 average daily traffic (ADT; City of San Marcos 2012).

Traffic noise levels are calculated based on the peak-hour traffic volumes, which is approximately 10 percent of the ADT volume. Typically, the peak-hour noise level is equivalent to the CNEL. The vehicle classification mix for SR-78 is based on California Department of Transportation (Caltrans) truck counts. Caltrans does not count buses or motorcycles. To account for these classifications, 1 percent of the automobiles were modeled as buses and 1 percent were modeled as motorcycles. The vehicle classification mix for Montiel Road is based on field traffic counts. No heavy trucks or buses were observed during the measurement period; however, to be conservative, the vehicle mix was adjusted to include a small percentage of heavy trucks and buses.

Table 6 summarizes the traffic volumes and vehicle classification mixes for the modeled roadways.

Table 6
Traffic Parameters

Roadway	Maximum LOS C Volume	Peak Hour Volume	Speed	Vehicle Mix (percent)				
				Autos	Medium Trucks	Heavy Trucks	Buses	Motorcycles
SR-78	11,880 vehicles per hour	11,880	65	93.7	2.2	2.1	1.0	1.0
Montiel Road	13,000 ADT	1,300	40	95.2	1.6	0.5	0.5	3.2

SR-78 = State Route 78
LOS = level of service
ADT = average daily traffic

4.2.2 Off-site Traffic Noise

Off-site traffic noise was modeled using the FHWA Traffic Noise Prediction Model algorithms and reference levels. Traffic noise levels were calculated at 50 feet from the centerline of the affected roadways to determine the noise level increase associated with the project. The model uses various input parameters, such as traffic volumes; vehicle mix, distribution, and speed.

The roadways included in the traffic impact analysis are Montiel Road and Nordahl Road. Traffic noise levels were calculated based on the total average daily traffic volumes on each roadway segment. For modeling purposes, "hard" ground conditions were used for the analysis of future conditions, since a majority of the project area is paved and the hard site provides the most conservative impact assessment.

Existing and future (year 2035) traffic volumes with and without the project were obtained from the project traffic impact analysis (Linscott, Law, and Greenspan Engineers 2019). Table 7 summarizes the future traffic volumes for the area roadway segments. Modeled noise levels do not account for shielding provided by intervening barriers and structures.

Table 7
Future Vehicle Traffic Parameters

Roadway Segment	Average Daily Traffic				Speed (mph)
	Existing	Existing + Project	Year 2035	Year 2035 + Project	
Montiel Road					
Nordahl Road to Leora Lane	7,350	7,943	11,610	12,203	40
Leora Lane to Rock Springs Road	4,620	4,686	5,530	5,596	40
Nordahl Road					
Montiel Road to SR-78 Ramps	39,870	40,364	43,370	43,864	40

SOURCE: Linscott, Law and Greenspan Engineers, Inc. 2019.

4.3 On-site Generated Noise Analysis

On-site noise sources on the project site after completion of construction are anticipated to be those that would be typical of any office use, such as vehicles arriving and leaving, and landscape maintenance machinery. None of these noise sources are anticipated to violate the City Municipal Code or result in a substantial permanent increase in existing noise levels. However, the project would include rooftop heating, ventilation, and air conditioning (HVAC) equipment that would have the potential to produce noise in excess of City limits (see Table 2).

The rooftop mechanical equipment would be housed within a screened mechanical equipment enclosure. It is not known at this time which manufacturer, brand, or model of unit or units will be selected for use in the project. Typically, a capacity of 1-ton per 340 square feet would be required for large office buildings. Based on this ratio, the 32,971 square foot building would require ten 10-ton HVAC units. Based on review of manufacturer specifications for a sample unit (Trane Model T/YSCE120ED), a representative noise level for a 10-ton unit would be a sound power level of 79 dB. Noise specifications are contained in Attachment 2. The roof plan for the project includes six mechanical wells. As a conservative analysis, two 10-ton units were modeled at each mechanical well. All units were modeled at full capacity during the daytime and nighttime hours.

Noise levels due to on-site sources were modeled using SoundPLAN. The SoundPLAN program models noise propagation following the International Organization for Standardization method *ISO 9613-2 – Acoustics, Attenuation of Sound during Propagation Outdoors*. The model calculates noise levels at selected receiver locations using input parameter estimates such as total noise generated by each noise source; distances between sources, barriers, and receivers; and shielding provided by intervening structures.

5.0 Future Acoustical Environment and Impacts

5.1 Construction Noise

Noise associated with the grading, building, and paving for the project would potentially result in short-term impacts to surrounding residential properties. There are residential uses located north and northeast of the project site. A variety of noise-generating equipment would be used during the construction phase of the project, such as excavators, backhoes, front-end loaders, and concrete saws, along with others. The exact number and pieces of construction equipment required are not known at this time. As discussed, average construction noise levels were calculated. Based on this analysis, hourly average noise levels would be approximately 83 dB(A) L_{eq} at 50 feet from the center of construction activity when assessing three pieces of common construction equipment working simultaneously. Construction noise is considered a point source and would attenuate at

approximately 6 dB(A) for every doubling of distance. To reflect the nature of grading and construction activities, equipment was modeled as an area source distributed over the project footprint. Noise levels were modeled at a series of 12 receivers located at the adjacent uses. The results are summarized in Table 8. Modeled receiver locations and construction noise contours are shown in Figure 5. SoundPLAN data is contained in Attachment 3.

As shown, construction noise levels would range from 60 to 75 dB(A) L_{eq} at the adjacent uses. The City's Municipal Code does not place noise limit restrictions on construction activities, however, other jurisdictions commonly apply a noise level limit of 75 dB(A) L_{eq} at residential uses. Construction noise levels would not exceed 75 dB(A) L_{eq}. Construction activities would generally occur over the period between 7:00 a.m. and 6:00 p.m. on weekdays. Although the existing adjacent uses would be exposed to construction noise levels that may be heard above ambient conditions, the exposure would be temporary and would not exceed 75 dB(A) L_{eq}. As construction activities associated with the project would comply with the time limits established in Section 10.24.020 (b)(9) of the City Municipal Code, temporary increases in noise levels from construction activities would be less than significant.

Table 8
Construction Noise Levels

Receiver	Land Use	Noise Level [dB(A) L_{eq}]
1	Commercial	75
2	Commercial	75
3	Commercial	74
4	Park	63
5	Residential	67
6	Residential	71
7	Residential	68
8	Residential	65
9	Residential	62
10	Residential	60
11	Commercial	73
12	Commercial	73

5.2 Traffic Noise

5.2.1 On-site Traffic Noise

On-site traffic noise contours were developed using the SoundPLAN program. Noise level contours were modeled at the first-floor level. These contours take into account shielding provided by the proposed building and grading. Future vehicle traffic noise-level contours are shown in Figure 6. SoundPLAN data are contained in Attachment 4.

Image Source: Nearmap (flown June 2019)

Construction Noise Contours

- 60 dB(A) Leq
- 65 dB(A) Leq
- 70 dB(A) Leq
- 75 dB(A) Leq

Adjacent Receivers

Project Boundary

0 Feet 150

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FIGURE 5

Construction Noise Contours

As discussed in Section 2.1, the exterior noise level standard for office uses is 65 CNEL. This standard is applicable at exterior use areas which include the outdoor seating area at the northeast corner of the proposed building and the second-floor deck located above the building entrance. The interior noise level standard is 50 CNEL. To refine the noise analysis and determine noise levels at exterior use areas and the building façade, exterior noise levels were calculated at a series of first- and second-floor specific receiver locations at the seating area (Receivers 1 through 3), the second-floor deck above the building entrance (Receiver 12), and around the proposed building. Modeled receiver locations are shown in Figure 6. The modeled noise levels at the exterior use area (Receivers 1, 2, 3, and 12) were used to determine compatibility with the City's exterior noise standard of 65 CNEL. Modeled noise levels at the first- and second-floor building façade receivers were used to determine the compatibility with the City's interior noise standard of 50 CNEL. Table 9 summarizes the projected future noise levels at the 12 modeled receivers.

Table 9
Future Vehicle Traffic Noise Levels

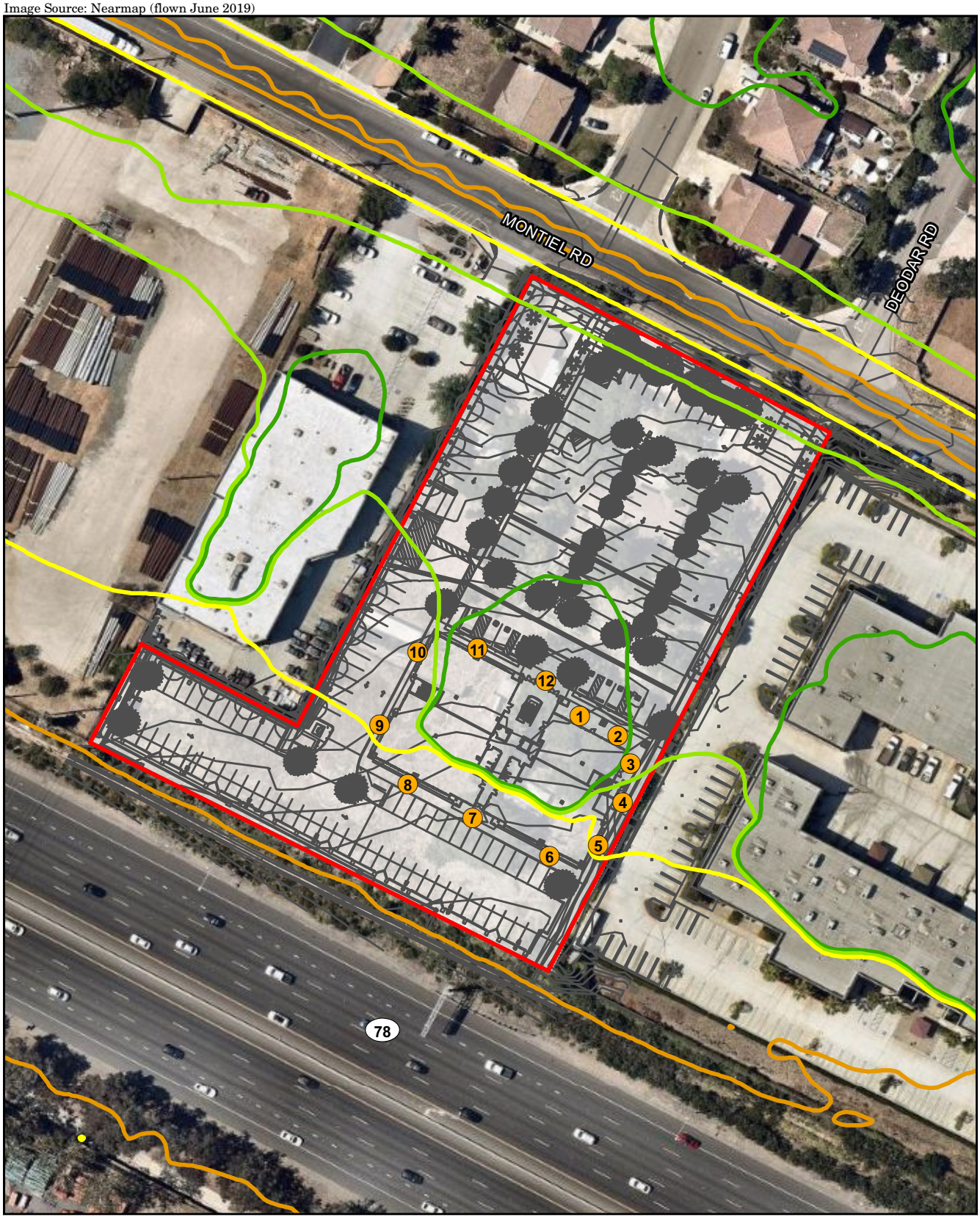
Receiver	Location	Exterior Noise Level (CNEL)	
		First-Floor	Second-Floor
1	Seating Area/Building Façade	54	56
2	Seating Area/Building Façade	55	56
3	Seating Area/Building Façade	63	67
4	Building Façade	67	71
5	Building Façade	69	73
6	Building Façade	73	76
7	Building Façade	73	77
8	Building Façade	73	77
9	Building Façade	70	73
10	Building Façade	67	71
11	Building Façade	56	59
12	Second-Floor Deck/Building Façade	56	58

CNEL = community noise equivalent level

As shown, noise levels at the exterior seating area (Receivers 1 through 3) would range from 54 to 63 CNEL and noise levels at the second-floor deck above the building entrance (Receiver 12) would be 58 CNEL. Noise levels at the exterior use areas would be compatible with the City's standard of 65 CNEL.

Exterior noise levels at the building façade are projected to range from 54 to 77 CNEL. The interior noise level standard is 50 CNEL. Interior noise levels can be reduced through standard construction techniques. When windows are closed, standard construction techniques provide various exterior-to-interior noise level reductions depending on the type of structure and window. According to the FHWA, masonry and concrete buildings with double-pane windows, which are typically required to meet Title 24 energy code requirements, provide a 35 dB(A) reduction at interior locations from exterior noise sources (FHWA 2011). Based on these standards, interior noise levels would be reduced to 50 CNEL or less. Therefore, significant impacts related to on-site traffic noise would be less than significant.

Image Source: Nearmap (flown June 2019)



Traffic Noise Contours

- 60 dB(A) Leq
- 65 dB(A) Leq
- 70 dB(A) Leq
- 75 dB(A) Leq

- Receivers
- Site Plan Line
- Project Boundary

0 Feet 100

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FIGURE 6

Traffic Noise Contours

5.2.2 Off-site Traffic Noise

The project would increase traffic volumes on local roadways. However, the project would not substantially alter the vehicle classifications mix on local or regional roadways, nor would the project alter the speed on an existing roadway or create a new roadway. Thus, the primary factor affecting off-site noise levels would be increased traffic volumes. While changes in noise levels would occur along any roadway where project-related traffic occurs, for noise assessment purposes, noise level increases are assumed to be greatest nearest the project site, as this location would represent the greatest concentration of project-related traffic. Traffic noise increases attributable to the project were assessed against a significance threshold of 3 dB, which is the level at which an increase in noise is considered to be barely perceptible (Caltrans 2013).

Table 10 presents a conservative assessment of traffic noise levels based on the existing, existing plus project, future, and future plus project noise levels generated by traffic. Table 10 also summarizes the direct and cumulative traffic noise level increases due to the project. Noise level calculations are contained in Attachment 5.

Table 10
Traffic Noise Level with and without Project and Ambient Noise Increases

Roadway Segment	Existing	Existing + Project	Direct Increase	Year 2035	Year 2035 + Project	Cumulative Increase Over Existing
Montiel Road						
Nordahl Road to Leora Lane	65.3	65.6	0.3	67.3	67.5	2.2
Leora Land to Rock Springs Road	63.3	63.4	0.1	64.1	64.1	0.8
Nordahl Road						
Montiel Road to SR-78 Ramps	73.9	73.9	0.0	74.3	74.3	0.4
Note: Increase calculations may vary due to independent rounding.						

As shown, the project would not result in a direct or cumulative noise increase of more than 3 dB. Therefore, the project would result in less than significant direct and cumulative impacts related to traffic noise.

5.3 On-site Generated Noise

The primary noise sources on-site would be HVAC equipment. Rooftop HVAC equipment that would have the potential to produce noise in excess of City limits (see Table 2). Using the on-site noise source parameters discussed in Section 4.3, noise levels were modeled at a series of 12 receivers located at the adjacent properties. The rooftop mechanical equipment would be housed within a screened mechanical equipment enclosure. Noise generated by HVAC equipment would occur on an intermittent basis, primarily during the day and evening hours and less frequently during the nighttime hours. For a worst-case analysis, it was assumed that the HVAC units would operate continuously, and noise reductions due to the enclosure were not taken into account.

Modeled receivers and the locations of the HVAC units are shown in Figure 7. Modeled data is included in Attachment 6. Future projected noise levels are summarized in Table 11.

As shown, on-site generated noise levels would range from 32 to 40 dB(A) L_{eq}. Noise levels would not exceed the applicable Noise Ordinance limits at the property lines and impacts related to on-site generated noise would be less than significant.

Table 11
HVAC Noise Levels at Adjacent Properties

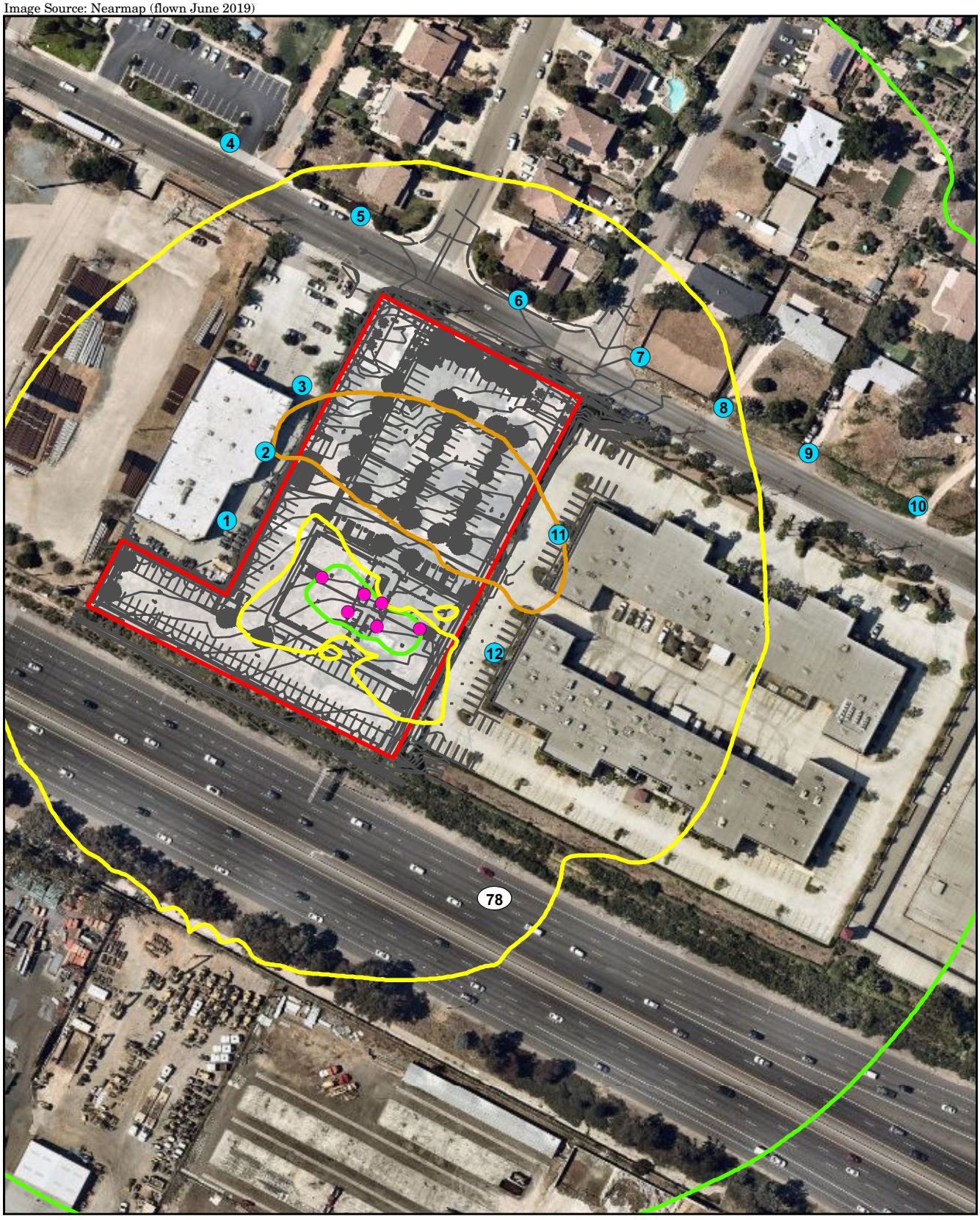
Receiver	Land Use	Noise Level [dB(A) L_{eq}]	Noise Ordinance Limit Daytime/Nighttime [dB(A) L_{eq}]
1	Commercial	40	60/55
2	Commercial	40	60/55
3	Commercial	40	60/55
4	Park	34	60/50
5	Residential	36	60/50
6	Residential	37	60/50
7	Residential	36	60/50
8	Residential	35	60/50
9	Residential	34	60/50
10	Residential	32	60/50
11	Commercial	40	60/55
12	Commercial	38	60/55

6.0 Conclusions

6.1 Construction Noise

As shown in Table 8, construction noise levels would range from 60 to 75 dB(A) L_{eq} at the adjacent property lines. The City's Municipal Code does not place noise limit restrictions on construction activities, however, other jurisdictions commonly apply a noise level limit of 75 dB(A) L_{eq} at residential uses. Construction activities would generally occur over the period between 7:00 a.m. and 6:00 p.m. on weekdays. Although the existing adjacent uses would be exposed to construction noise levels that may be heard above ambient conditions, the exposure would be temporary and would not exceed 75 dB(A) L_{eq}. As construction activities associated with the project would comply with the time limits established in Section 10.24.020 (b)(9) of the City Municipal Code, temporary increases in noise levels from construction activities would be less than significant.

Image Source: Nearmap (flown June 2019)



HVAC Noise Contours

- 30 dB(A) Leq
- 35 dB(A) Leq
- 40 dB(A) Leq

- Adjacent Receivers
- HVAC Locations
- Site Plan Line
- Project Boundary

0 Feet 150

FIGURE 7

HVAC Noise Contours

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6.2 Traffic Noise

6.2.1 On-site Traffic Noise

The main source of noise at the project site is vehicle traffic on SR-78 and Montiel Road. The exterior noise level standard for office uses is 65 CNEL. This standard is applicable at exterior use areas which include the outdoor seating area at the northeast corner of the proposed building and the second-floor deck located above the building entrance. As shown in Table 9, noise levels at the exterior seating area (Receivers 1 through 3) would range from 54 to 63 CNEL and noise levels at the second-floor deck above the building entrance (Receiver 12) would be 58 CNEL. Noise levels at the exterior use areas would be compatible with the City's standard of 65 CNEL.

Exterior noise levels at the building façade are projected to range from 54 to 77 CNEL. The interior noise level standard is 50 CNEL. According to the FHWA, masonry and concrete buildings with double-pane windows, which are typically required to meet Title 24 energy code requirements, provide a 35 dB(A) reduction at interior locations from exterior noise sources (FHWA 2011). Based on these standards, interior noise levels would be reduced to 50 CNEL or less.

6.2.2 Off-site Traffic Noise

The additional vehicle trips associated with the project would increase noise levels on nearby roadways. A noise increase of 3 dB or more would be considered significant because 3 dB is the level at which an increase in noise is perceptible to a person. As shown in Table 10, the project would not result in a direct or cumulative noise increase of more than 3 dB. Therefore, the project would result in less than significant direct and cumulative impact related to traffic noise.

6.3 On-site Generated Noise

The noise sources on the project site after completion of construction are anticipated to be those that would be typical of any office use, such as vehicles arriving and leaving and landscape maintenance machinery. None of these noise sources are anticipated to violate the City Municipal Code. Rooftop HVAC noise levels were modeled at the adjacent properties. As shown in Table 11, on-site generated noise levels would range from 32 to 40 dB(A) L_{eq}. Noise levels would not exceed the applicable Noise Ordinance limits at the property lines.

7.0 References Cited

California Code of Regulations

2016 2016 *California Building Code, California Code of Regulations, Title 24, Chapter 12 Interior Environment, Section 1207, Sound Transmission*, accessed at http://www.bsc.ca.gov/codes.aspx.

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2013 City of San Marcos General Plan Update, Noise Element.

ATTACHMENTS

ATTACHMENT 1

Noise Measurement Data

Summary						
Filename	LxT_Data.034					
Serial Number	3827					
Model	SoundExpert™ LxT					
Firmware Version	2.301					
User						
Location	9257 Montiel Road Office					
Job Description						
Note						
Measurement Description						
Start	2019/01/09 11:12:24					
Stop	2019/01/09 11:27:25					
Duration	0:15:00.6					
Run Time	0:09:59.6					
Pause	0:05:01.0					
Pre Calibration	2019/01/09 11:09:45					
Post Calibration	2019/01/09 11:30:56					
Calibration Deviation	-0.05 dB					
Overall Settings						
RMS Weight	A Weighting					
Peak Weight	A Weighting					
Detector	Slow					
Preamp	PRMLxT1L					
Microphone Correction	Off					
Integration Method	Linear					
OBA Range	Normal					
OBA Bandwidth	1/1 and 1/3					
OBA Freq. Weighting	A Weighting					
OBA Max Spectrum	At Lmax					
Overload	121.8 dB					

	A	C	Z	
Under Range Peak	**78.0**	75.0	80.0	dB
Under Range Limit	**26.0**	25.2	32.0	dB
Noise Floor	16.3	16.1	22.0	dB

Results						
LAeq	71.4 dB					
LAE	99.2 dB					
EA	915.302 µPa²h					
LApeak (max)	2019/01/09 11:23:18		90.2 dB			
LASmax	2019/01/09 11:23:18		76.5 dB			
LASmin	2019/01/09 11:21:17		66.3 dB			
SEA	-99.9 dB					
LAS > 85.0 dB (Exceedence Counts / Duration)	0	0.0 s				
LAS > 115.0 dB (Exceedence Counts / Duration)	0	0.0 s				
LApeak > 135.0 dB (Exceedence Counts / Duration)	0	0.0 s				
LApeak > 137.0 dB (Exceedence Counts / Duration)	0	0.0 s				
LApeak > 140.0 dB (Exceedence Counts / Duration)	0	0.0 s				

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**
	71.4	71.4	-99.9	71.4	71.4	-99.9	-99.9

LCeq	77.6	dB
LAeq	71.4	dB
LCeq - LAeq	6.3	dB
LAleq	72.1	dB
LAeq	71.4	dB
LAleq - LAeq	0.7	dB
# Overloads	0	
Overload Duration	0.0	s
# OBA Overloads	0	
OBA Overload Duration	0.0	s

Statistics		
LAS5.00	73.3	dB
LAS10.00	72.8	dB
LAS33.30	71.8	dB
LAS50.00	71.3	dB
LAS66.60	70.8	dB
LAS90.00	69.0	dB

Summary						
Filename	LxT_Data.001					
Serial Number	3828					
Model	SoundExpert™ LxT					
Firmware Version	2.302					
User						
Location						
Job Description	9257 Montiel Road Office					
Note						
Measurement Description						
Start	2019/01/09 10:09:17					
Stop	2019/01/09 10:24:17					
Duration	0:15:00.3					
Run Time	0:15:00.3					
Pause	0:00:00.0					
Pre Calibration	2019/01/09 10:05:37					
Post Calibration	None					
Calibration Deviation	---					
Overall Settings						
RMS Weight	A Weighting					
Peak Weight	A Weighting					
Detector	Slow					
Preamp	PRMLxT1L					
Microphone Correction	Off					
Integration Method	Linear					
OBA Range	Normal					
OBA Bandwidth	1/1 and 1/3					
OBA Freq. Weighting	A Weighting					
OBA Max Spectrum	At Lmax					
Overload	121.8 dB					

	A	C	Z	
Under Range Peak	**78.1**	75.1	80.1	dB
Under Range Limit	**27.1**	25.8	33.1	dB
Noise Floor	16.8	16.7	22.9	dB

Results				
LAeq	60.3	dB		
LAE	89.8	dB		
EA	107.120	µPa²h		
LApeak (max)	2019/01/09 10:09:21	89.8	dB	
LASmax	2019/01/09 10:12:33	68.9	dB	
LASmin	2019/01/09 10:09:20	54.7	dB	
SEA	-99.9	dB		
LAS > 85.0 dB (Exceedence Counts / Duration)	0	0.0	s	
LAS > 115.0 dB (Exceedence Counts / Duration)	0	0.0	s	
LApeak > 135.0 dB (Exceedence Counts / Duration)	0	0.0	s	
LApeak > 137.0 dB (Exceedence Counts / Duration)	0	0.0	s	
LApeak > 140.0 dB (Exceedence Counts / Duration)	0	0.0	s	

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**
	60.3	60.3	-99.9	60.3	60.3	-99.9	-99.9

LCeq	69.7	dB
LAeq	60.3	dB
LCeq - LAeq	9.4	dB
LAleq	62.0	dB
LAeq	60.3	dB
LAleq - LAeq	1.7	dB
# Overloads	0	
Overload Duration	0.0	s
# OBA Overloads	0	
OBA Overload Duration	0.0	s

Statistics		
LAS5.00	63.9	dB
LAS10.00	62.9	dB
LAS33.30	60.3	dB
LAS50.00	59.2	dB
LAS66.60	58.4	dB
LAS90.00	56.8	dB

ATTACHMENT 2

Tran Model T/YSCE120ED Specifications

Fan Performance

Table 6. Standard motor & low static drive accessory sheave/fan speed (rpm)

Tons	Unit Model Number	Fan Sheave	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Closed
5	WSC060ED	AK44x3/4"	N/A	720	791	861	931	1002	1072
6	WSC072ED	AK56x1"	N/A	558	612	665	718	772	825
7½	WSC090ED	AK57x1"	N/A	688	737	787	837	887	N/A
10	WSC120ED	AK105X1"	N/A	724	776	828	880	932	984

Note: Factory set at 3 turns open.

Table 7. Standard motor & high static drive accessory sheave/fan speed (rpm)

Tons	Unit Model Number	Fan Sheave	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Closed
6	WSC072ED	AK56x1"	N/A	968	1018	1068	1118	1169	1219
7½	WSC090ED	AK57x1"	1053	1091	1129	1166	1204	1242	N/A
10	WSC120ED	AK105X1"	1110	1159	1209	1258	1308	1357	N/A

Note: Factory set at 3 turns open.

Table 8. Oversized motor & high static drive accessory sheave/fan speed (rpm)

Tons	Unit Model Number	Fan Sheave	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Closed
7½	WSC090ED	AK85x1"	1186	1249	1311	1373	1436	N/A	N/A

Note: Factory set at 3 turns open.

Table 9. Outdoor sound power level—dB (ref. 10—2 W)

Tons	Unit Model Number	Octave Center Frequency								Overall dBA
		63	125	250	500	1000	2000	4000	8000	
5	T/YSC060ED	84	91	79	77	74	71	68	63	80
6	T/YSC072ED	83	90	86	82	79	75	70	63	85
7½	T/YSC090ED	83	90	86	83	80	75	71	64	85
8.5	T/YSC102ED	83	89	84	81	77	72	69	62	83
10	T/YSC120ED	83	86	80	77	73	69	66	60	79

Note: Tests follow ARI270-95.

Table 10. Outdoor sound power level—dB (ref. 10—12 W)

Tons	Unit Model Number	Octave Center Frequency								Overall dBA
		63	125	250	500	1000	2000	4000	8000	
5	WSC060ED	84	91	79	77	74	71	68	63	80
6	WSC072ED	83	90	86	82	79	75	70	63	85
7½	WSC090ED	83	90	86	83	80	75	71	64	85
10	WSC120ED	83	86	80	77	73	69	66	60	79

Note: Tests follow ARI270-95.

ATTACHMENT 3

SoundPLAN Data – Construction Noise

Source name	Reference	Level Leq1 dB(A)		Corrections Kwall dB(A)	CI dB(A)	CT dB(A)
Construction	Unit		117	-	-	-

9257 Montiel Road Office
SoundPLAN Data - Construction

No.	Coordinates X	Coordinates Y	Floor	Height	Limit Leq1	Level w/o NP Leq1	Level w. NP Leq1	Difference Leq1	Conflict Leq1
	in meter			m	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1	489371.06	3665673.58	1.Fl	208.02	-	74.6	0	-74.6	-
2	489383.43	3665695.87	1.Fl	209.49	-	74.5	0	-74.5	-
3	489395.34	3665717.34	1.Fl	209.98	-	74.3	0	-74.3	-
4	489371.38	3665795.91	1.Fl	213.18	-	62.5	0	-62.5	-
5	489413.86	3665772.59	1.Fl	212.93	-	67.0	0	-67.0	-
6	489465.29	3665745.76	1.Fl	211.81	-	71.1	0	-71.1	-
7	489504.90	3665727.56	1.Fl	211.46	-	67.7	0	-67.7	-
8	489532.05	3665711.27	1.Fl	210.55	-	64.5	0	-64.5	-
9	489559.83	3665696.89	1.Fl	209.93	-	62.1	0	-62.1	-
10	489595.29	3665679.96	1.Fl	208.36	-	59.7	0	-59.7	-
11	489478.70	3665669.74	1.Fl	207.54	-	73.1	0	-73.1	-
12	489458.26	3665631.09	1.Fl	207.54	-	73.4	0	-73.4	-

Receivers

ATTACHMENT 4

SoundPLAN Data – On-site Traffic Noise

Stationing km	ADT Veh/24h	Traffic values Vehicles type	Vehicle nai	day Veh/h		Speed km/h	Control device	Constr. Speed km/h	Affect. veh. %	Road surface	Gradient Min / Max %
Montiel Road	Traffic direction:	In entry direction									
0+000	31536	Total	-	1314	-		none	-	-	Average (of DGAC and PCC)	0
0+000	31536	Automobiles	-	1237		64	none	-	-	Average (of DGAC and PCC)	0
0+000	31536	Medium trucks	-	21		64	none	-	-	Average (of DGAC and PCC)	0
0+000	31536	Heavy trucks	-	7		64	none	-	-	Average (of DGAC and PCC)	0
0+000	31536	Buses	-	7		64	none	-	-	Average (of DGAC and PCC)	0
0+000	31536	Motorcycles	-	42		64	none	-	-	Average (of DGAC and PCC)	0
0+000	31536	Auxiliary Vehicle	-	-	-		none	-	-	Average (of DGAC and PCC)	0
0+678	-						-	-	-	-	-
SR-78 EB	Traffic direction:	In entry direction									
0+000	142512	Total	-	5938	-		none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Automobiles	-	5565		105	none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Medium trucks	-	132		105	none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Heavy trucks	-	123		105	none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Buses	-	59		105	none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Motorcycles	-	59		105	none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Auxiliary Vehicle	-	-	-		none	-	-	Average (of DGAC and PCC)	0
1+141	-						-	-	-	-	-
SR-78 EB Ramp	Traffic direction:	In entry direction									
0+000	95040	Total	-	3960	-		none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Automobiles	-	3710		105	none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Medium trucks	-	88		105	none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Heavy trucks	-	82		105	none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Buses	-	40		105	none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Motorcycles	-	40		105	none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Auxiliary Vehicle	-	-	-		none	-	-	Average (of DGAC and PCC)	0
0+437	-						-	-	-	-	-
SR-78 WB	Traffic direction:	In entry direction									
0+000	142512	Total	-	5938	-		none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Automobiles	-	5565		105	none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Medium trucks	-	132		105	none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Heavy trucks	-	123		105	none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Buses	-	59		105	none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Motorcycles	-	59		105	none	-	-	Average (of DGAC and PCC)	0
0+000	142512	Auxiliary Vehicle	-	-	-		none	-	-	Average (of DGAC and PCC)	0
1+107	-						-	-	-	-	-
SR-78 WB Ramp	Traffic direction:	In entry direction									
0+000	95040	Total	-	3960	-		none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Automobiles	-	3710		105	none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Medium trucks	-	88		105	none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Heavy trucks	-	82		105	none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Buses	-	40		105	none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Motorcycles	-	40		105	none	-	-	Average (of DGAC and PCC)	0
0+000	95040	Auxiliary Vehicle	-	-	-		none	-	-	Average (of DGAC and PCC)	0
0+397	-						-	-	-	-	-

9257 Montiel Road Office
SoundPLAN Data - Traffic

No.	Coordinates X	Y	Floor	Height	Limit L(Aeq1h)	Level w/o NP L(Aeq1h)	Level w. NP L(Aeq1h)	Difference L(Aeq1h)	Conflict L(Aeq1h)
	in meter			m	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1	489432.03	3665652.04	1.Fl	207.27	-	54.1	0	-54.1	-
1	489432.03	3665652.04	2.Fl	211.57	-	55.9	0	-55.9	-
2	489440.34	3665647.84	1.Fl	207.11	-	54.5	0	-54.5	-
2	489440.34	3665647.84	2.Fl	211.41	-	56.4	0	-56.4	-
3	489443.11	3665641.75	1.Fl	207.02	-	63.2	0	-63.2	-
3	489443.11	3665641.75	2.Fl	211.32	-	66.9	0	-66.9	-
4	489441.45	3665633.44	1.Fl	207.00	-	67.1	0	-67.1	-
4	489441.45	3665633.44	2.Fl	211.30	-	70.8	0	-70.8	-
5	489436.24	3665624.03	1.Fl	206.38	-	68.8	0	-68.8	-
5	489436.24	3665624.03	2.Fl	210.68	-	73.1	0	-73.1	-
6	489425.72	3665621.70	1.Fl	206.41	-	73.1	0	-73.1	-
6	489425.72	3665621.70	2.Fl	210.71	-	76.4	0	-76.4	-
7	489409.00	3665629.90	1.Fl	206.70	-	73.3	0	-73.3	-
7	489409.00	3665629.90	2.Fl	211.00	-	76.5	0	-76.5	-
8	489394.94	3665636.98	1.Fl	206.96	-	73.4	0	-73.4	-
8	489394.94	3665636.98	2.Fl	211.26	-	76.5	0	-76.5	-
9	489388.74	3665649.72	1.Fl	207.49	-	69.5	0	-69.5	-
9	489388.74	3665649.72	2.Fl	211.79	-	72.6	0	-72.6	-
10	489396.93	3665665.55	1.Fl	207.86	-	67.3	0	-67.3	-
10	489396.93	3665665.55	2.Fl	212.16	-	70.6	0	-70.6	-
11	489409.89	3665666.33	1.Fl	207.72	-	55.6	0	-55.6	-
11	489409.89	3665666.33	2.Fl	212.02	-	59.0	0	-59.0	-
12	489424.61	3665659.68	1.Fl	207.47	-	55.6	0	-55.6	-
12	489424.61	3665659.68	2.Fl	211.77	-	58.3	0	-58.3	-

Receivers

Source name		Lane		Level w/o NP L(Aeq1h) dB(A)	Level w. NP L(Aeq1h) dB(A)
1	1.Fl	54.1	0.0		
Montiel Road				53.6	0
SR-78 EB				39.9	0
SR-78 EB Ramp				34.4	0
SR-78 WB				40.2	0
SR-78 WB Ramp				34.9	0
1	2.Fl	55.9	0.0		
Montiel Road				55.5	0
SR-78 EB				41.6	0
SR-78 EB Ramp				35.9	0
SR-78 WB				42.2	0
SR-78 WB Ramp				36.7	0
2	1.Fl	54.5	0.0		
Montiel Road				53.7	0
SR-78 EB				42.5	0
SR-78 EB Ramp				36.7	0
SR-78 WB				43.1	0
SR-78 WB Ramp				36.6	0
2	2.Fl	56.4	0.0		
Montiel Road				55.8	0
SR-78 EB				43.0	0
SR-78 EB Ramp				36.4	0
SR-78 WB				43.9	0
SR-78 WB Ramp				36.7	0
3	1.Fl	63.2	0.0		
Montiel Road				51.3	0
SR-78 EB				58.8	0
SR-78 EB Ramp				37.7	0
SR-78 WB				60.0	0
SR-78 WB Ramp				52.4	0
3	2.Fl	66.9	0.0		
Montiel Road				53.4	0
SR-78 EB				62.5	0
SR-78 EB Ramp				36.8	0
SR-78 WB				63.8	0
SR-78 WB Ramp				57.2	0
4	1.Fl	67.1	0.0		
Montiel Road				48.9	0
SR-78 EB				62.7	0
SR-78 EB Ramp				48.6	0
SR-78 WB				64.2	0
SR-78 WB Ramp				56.4	0
4	2.Fl	70.8	0.0		
Montiel Road				51.0	0
SR-78 EB				66.4	0
SR-78 EB Ramp				54.5	0
SR-78 WB				67.8	0
SR-78 WB Ramp				61.1	0
5	1.Fl	68.8	0.0		
Montiel Road				47.0	0
SR-78 EB				64.3	0
SR-78 EB Ramp				53.6	0

SR-78 WB				66.1	0
SR-78 WB Ramp				57.4	0
5	2.Fl	73.1	0.0		
Montiel Road				49.0	0
SR-78 EB				68.4	0
SR-78 EB Ramp				59.1	0
SR-78 WB				70.2	0
SR-78 WB Ramp				63.1	0
6	1.Fl	73.1	0.0		
Montiel Road				26.6	0
SR-78 EB				68.5	0
SR-78 EB Ramp				54.4	0
SR-78 WB				70.9	0
SR-78 WB Ramp				57.8	0
6	2.Fl	76.4	0.0		
Montiel Road				29.6	0
SR-78 EB				71.9	0
SR-78 EB Ramp				58.6	0
SR-78 WB				74.1	0
SR-78 WB Ramp				62.9	0
7	1.Fl	73.3	0.0		
Montiel Road				26.6	0
SR-78 EB				68.8	0
SR-78 EB Ramp				54.3	0
SR-78 WB				71.2	0
SR-78 WB Ramp				57.3	0
7	2.Fl	76.5	0.0		
Montiel Road				28.9	0
SR-78 EB				72.0	0
SR-78 EB Ramp				58.3	0
SR-78 WB				74.2	0
SR-78 WB Ramp				61.9	0
8	1.Fl	73.4	0.0		
Montiel Road				27.1	0
SR-78 EB				68.8	0
SR-78 EB Ramp				53.9	0
SR-78 WB				71.3	0
SR-78 WB Ramp				57.2	0
8	2.Fl	76.5	0.0		
Montiel Road				29.4	0
SR-78 EB				72.0	0
SR-78 EB Ramp				57.8	0
SR-78 WB				74.2	0
SR-78 WB Ramp				61.1	0
9	1.Fl	69.5	0.0		
Montiel Road				47.9	0
SR-78 EB				65.2	0
SR-78 EB Ramp				27.3	0
SR-78 WB				67.4	0
SR-78 WB Ramp				30.6	0
9	2.Fl	72.6	0.0		
Montiel Road				50.0	0
SR-78 EB				68.5	0
SR-78 EB Ramp				32.0	0
SR-78 WB				70.4	0

SR-78 WB Ramp				33.5	0
10	1.Fl	67.3	0.0		
Montiel Road				50.0	0
SR-78 EB				63.2	0
SR-78 EB Ramp				33.9	0
SR-78 WB				65.0	0
SR-78 WB Ramp				41.7	0
10	2.Fl	70.6	0.0		
Montiel Road				52.1	0
SR-78 EB				66.8	0
SR-78 EB Ramp				36.1	0
SR-78 WB				68.1	0
SR-78 WB Ramp				46.0	0
11	1.Fl	55.6	0.0		
Montiel Road				53.9	0
SR-78 EB				47.0	0
SR-78 EB Ramp				31.1	0
SR-78 WB				48.2	0
SR-78 WB Ramp				32.7	0
11	2.Fl	59.0	0.0		
Montiel Road				56.3	0
SR-78 EB				52.1	0
SR-78 EB Ramp				33.5	0
SR-78 WB				53.1	0
SR-78 WB Ramp				35.6	0
12	1.Fl	55.6	0.0		
Montiel Road				54.6	0
SR-78 EB				44.4	0
SR-78 EB Ramp				32.9	0
SR-78 WB				45.6	0
SR-78 WB Ramp				34.5	0
12	2.Fl	58.3	0.0		
Montiel Road				56.4	0
SR-78 EB				50.0	0
SR-78 EB Ramp				34.2	0
SR-78 WB				50.9	0
SR-78 WB Ramp				35.6	0

ATTACHMENT 5

FHWA RD-77-108 – Off-site Traffic Noise

9257 Montiel Road Office
FHWA RD-77-108 - Off-Site Traffic Noise

	Roadway	Segment	Existing	Existing + Project	Difference	Existing + Cumulative	Existing + Cumulative + Project	Difference	Year 2035	Year 2035 + Project	Difference	Increase Over Existing
1	Montiel Road	Nordahl Road to Leora Lane	65.3	65.6	0.3	67.3	67.5	0.2	67.3	67.5	0.2	2.2
2	Montiel Road	Leora Lane to Rock Springs Road	63.3	63.4	0.1	63.6	63.6	0.0	64.1	64.1	0.0	0.8
3	Nordahl Road	Montiel Road to SR-78 Ramps	73.9	73.9	0.0	73.9	74.0	0.1	74.3	74.3	0.0	0.4

Summary

FHWA RD-77-108

Traffic Noise Prediction Model

Data Input Sheet

Project Name : Montiel Road Office
Project Number : 9257
Modeled Condition : Existing, Existing + Project

Surface Refelction: CNEL
Assessment Metric: Hard
Peak ratio to ADT: 10.00
Traffic Desc. (Peak or ADT) : ADT

Segment	Roadway	Segment	Traffic Vol.	Speed (Mph)	Distance to CL	% Autos	%MT	% HT	Day %	Eve %	Night %	K-Factor
EXISTING												
1	Montiel Road	Nordahl Road to Leora Lane	7,350	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
2	Montiel Road	Leora Lane to Rock Springs Road	4,620	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
3	Nordahl Road	Montiel Road to SR-78 Ramps	39,870	40	50	95.70	2.20	2.10	80.00	10.00	10.00	
EXISTING + PROJECT												
1	Montiel Road	Nordahl Road to Leora Lane	7,943	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
2	Montiel Road	Leora Lane to Rock Springs Road	4,686	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
3	Nordahl Road	Montiel Road to SR-78 Ramps	40,364	40	50	95.70	2.20	2.10	80.00	10.00	10.00	

FHWA RD-77-108

Traffic Noise Prediction Model

Predicted Noise Levels

Project Name : Montiel Road Office
Project Number : 9257
Modeled Condition : Existing, Existing + Project
Assessment Metric: Hard

			Noise Levels, dBA Hard				Distance to Traffic Noise Level Contours, Feet					
Segment	Roadway	Segment	Auto	MT	HT	Total	75 dB	70 dB	65 dB	60 dB	55 dB	50 dB
EXISTING												
1	Montiel Road	Nordahl Road to Leora Lane	64.3	55.4	55.2	65.3	5	17	54	169	536	1,694
2	Montiel Road	Leora Lane to Rock Springs Road	62.3	53.4	53.2	63.3	3	11	34	107	338	1,069
3	Nordahl Road	Montiel Road to SR-78 Ramps	71.6	64.1	68.8	73.9	39	123	388	1,227	3,881	12,274
EXISTING + PROJECT												
1	Montiel Road	Nordahl Road to Leora Lane	64.7	55.7	55.5	65.6	6	18	57	182	574	1,815
2	Montiel Road	Leora Lane to Rock Springs Road	62.4	53.5	53.2	63.4	3	11	35	109	346	1,094
3	Nordahl Road	Montiel Road to SR-78 Ramps	71.6	64.2	68.8	73.9	39	123	388	1,227	3,881	12,274

FHWA RD-77-108

Traffic Noise Prediction Model

Data Input Sheet

Project Name : Montiel Road Office
Project Number : 9257
Modeled Condition : Existing + Cumulative, Existing + Cumulative + Project

Surface Refelction: CNEL
Assessment Metric: Hard
Peak ratio to ADT: 10.00
Traffic Desc. (Peak or ADT) : ADT

Segment	Roadway	Segment	Traffic Vol.	Speed (Mph)	Distance to CL	% Autos	%MT	% HT	Day %	Eve %	Night %	K-Factor
EXISTING + CUMULATIVE												
1	Montiel Road	Nordahl Road to Leora Lane	11,600	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
2	Montiel Road	Leora Lane to Rock Springs Road	4,930	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
3	Nordahl Road	Montiel Road to SR-78 Ramps	40,370	40	50	95.70	2.20	2.10	80.00	10.00	10.00	
EXISTING + CUMULATIVE + PROJECT												
1	Montiel Road	Nordahl Road to Leora Lane	12,193	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
2	Montiel Road	Leora Lane to Rock Springs Road	4,996	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
3	Nordahl Road	Montiel Road to SR-78 Ramps	40,864	40	50	95.70	2.20	2.10	80.00	10.00	10.00	

FHWA RD-77-108

Traffic Noise Prediction Model

Predicted Noise Levels

Project Name : Montiel Road Office
Project Number : 9257
Modeled Condition : Existing + Cumulative, Existing + Cumulative + Project
Assessment Metric: Hard

			Noise Levels, dBA Hard				Distance to Traffic Noise Level Contours, Feet					
Segment	Roadway	Segment	Auto	MT	HT	Total	75 dB	70 dB	65 dB	60 dB	55 dB	50 dB
EXISTING + CUMULATIVE												
1	Montiel Road	Nordahl Road to Leora Lane	66.3	57.4	57.2	67.3	8	27	85	269	849	2,685
2	Montiel Road	Leora Lane to Rock Springs Road	62.6	53.7	53.4	63.6	4	11	36	115	362	1,145
3	Nordahl Road	Montiel Road to SR-78 Ramps	71.6	64.2	68.8	73.9	39	123	388	1,227	3,881	12,274
EXISTING + CUMULATIVE + PROJECT												
1	Montiel Road	Nordahl Road to Leora Lane	66.5	57.6	57.4	67.5	9	28	89	281	889	2,812
2	Montiel Road	Leora Lane to Rock Springs Road	62.7	53.7	53.5	63.6	4	11	36	115	362	1,145
3	Nordahl Road	Montiel Road to SR-78 Ramps	71.7	64.2	68.9	74.0	40	126	397	1,256	3,972	12,559

FHWA RD-77-108

Traffic Noise Prediction Model

Data Input Sheet

Project Name : Montiel Road Office
Project Number : 9257
Modeled Condition : Year 2035, Year 2035 + Project

Surface Refelction: CNEL
Assessment Metric: Hard
Peak ratio to ADT: 10.00
Traffic Desc. (Peak or ADT) : ADT

Segment	Roadway	Segment	Traffic Vol.	Speed (Mph)	Distance to CL	% Autos	%MT	% HT	Day %	Eve %	Night %	K-Factor
YEAR 2035												
1	Montiel Road	Nordahl Road to Leora Lane	11,610	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
2	Montiel Road	Leora Lane to Rock Springs Road	5,530	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
3	Nordahl Road	Montiel Road to SR-78 Ramps	43,370	40	50	95.70	2.20	2.10	80.00	10.00	10.00	
YEAR 2035 + PROJECT												
1	Montiel Road	Nordahl Road to Leora Lane	12,203	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
2	Montiel Road	Leora Lane to Rock Springs Road	5,596	40	50	97.90	1.60	0.50	80.00	10.00	10.00	
3	Nordahl Road	Montiel Road to SR-78 Ramps	43,864	40	50	95.70	2.20	2.10	80.00	10.00	10.00	

FHWA RD-77-108

Traffic Noise Prediction Model

Predicted Noise Levels

Project Name : Montiel Road Office
Project Number : 9257
Modeled Condition : Year 2035, Year 2035 + Project
Assessment Metric: Hard

			Noise Levels, dBA Hard				Distance to Traffic Noise Level Contours, Feet					
Segment	Roadway	Segment	Auto	MT	HT	Total	75 dB	70 dB	65 dB	60 dB	55 dB	50 dB
YEAR 2035												
1	Montiel Road	Nordahl Road to Leora Lane	66.3	57.4	57.2	67.3	8	27	85	269	849	2,685
2	Montiel Road	Leora Lane to Rock Springs Road	63.1	54.2	53.9	64.1	4	13	41	129	406	1,285
3	Nordahl Road	Montiel Road to SR-78 Ramps	72.0	64.5	69.1	74.3	43	135	426	1,346	4,256	13,458
YEAR 2035 + PROJECT												
1	Montiel Road	Nordahl Road to Leora Lane	66.5	57.6	57.4	67.5	9	28	89	281	889	2,812
2	Montiel Road	Leora Lane to Rock Springs Road	63.2	54.2	54.0	64.1	4	13	41	129	406	1,285
3	Nordahl Road	Montiel Road to SR-78 Ramps	72.0	64.5	69.2	74.3	43	135	426	1,346	4,256	13,458

ATTACHMENT 6

SoundPLAN Data – On-site Generated Noise

9257 Montiel Road Office
SoundPLAN Data - HVAC

Source name	Reference	Level	Corrections		
		Leq1	Kwall	CI	CT
		dB(A)	dB(A)	dB(A)	dB(A)
HVAC1	Unit	82	-	-	-
HVAC2	Unit	82	-	-	-
HVAC3	Unit	82	-	-	-
HVAC4	Unit	82	-	-	-
HVAC5	Unit	82	-	-	-
HVAC6	Unit	82	-	-	-

9257 Montiel Road Office
SoundPLAN Data - HVAC

No.	Coordinates X	Coordinates Y	Floor	Height	Limit Leq1	Level w/o NP Leq1	Level w. NP Leq1	Difference Leq1	Conflict Leq1
	in meter			m	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1	489371.06	3665673.58	1.Fl	208.05	-	39.6	0	-39.6	-
2	489383.43	3665695.87	1.Fl	209.49	-	40.0	0	-40.0	-
3	489395.34	3665717.34	1.Fl	209.98	-	39.5	0	-39.5	-
4	489371.38	3665795.91	1.Fl	213.18	-	33.9	0	-33.9	-
5	489413.86	3665772.59	1.Fl	212.93	-	36.1	0	-36.1	-
6	489465.29	3665745.76	1.Fl	211.81	-	37.1	0	-37.1	-
7	489504.90	3665727.56	1.Fl	211.46	-	36.3	0	-36.3	-
8	489532.05	3665711.27	1.Fl	210.55	-	35.3	0	-35.3	-
9	489559.83	3665696.89	1.Fl	209.93	-	34.0	0	-34.0	-
10	489595.29	3665679.96	1.Fl	208.36	-	32.3	0	-32.3	-
11	489478.70	3665669.74	1.Fl	207.54	-	40.1	0	-40.1	-
12	489458.26	3665631.09	1.Fl	207.44	-	38.4	0	-38.4	-

Source name			Level w/o NP Leq1 dB(A)	Level w. NP Leq1 dB(A)
1	1.Fl	39.6	0.0	
HVAC1			37.3	0
HVAC2			30.5	0
HVAC3			30.3	0
HVAC4			28.5	0
HVAC5			27.5	0
HVAC6			25.1	0
2	1.Fl	40.0	0.0	
HVAC1			36.3	0
HVAC2			31.0	0
HVAC3			31.8	0
HVAC4			31.4	0
HVAC5			28.6	0
HVAC6			29.2	0
3	1.Fl	39.5	0.0	
HVAC1			33.2	0
HVAC2			31.2	0
HVAC3			32.5	0
HVAC4			31.7	0
HVAC5			30.5	0
HVAC6			30.2	0
4	1.Fl	33.9	0.0	
HVAC1			27.4	0
HVAC2			25.6	0
HVAC3			26.8	0
HVAC4			26.5	0
HVAC5			25.0	0
HVAC6			24.9	0
5	1.Fl	36.1	0.0	
HVAC1			29.7	0
HVAC2			27.4	0
HVAC3			29.2	0
HVAC4			28.6	0
HVAC5			26.8	0
HVAC6			27.7	0
6	1.Fl	37.1	0.0	
HVAC1			30.3	0
HVAC2			28.0	0
HVAC3			30.1	0
HVAC4			29.7	0
HVAC5			27.9	0
HVAC6			29.3	0
7	1.Fl	36.3	0.0	
HVAC1			28.7	0
HVAC2			27.2	0
HVAC3			29.0	0
HVAC4			29.1	0
HVAC5			27.6	0
HVAC6			29.0	0
8	1.Fl	35.3	0.0	
HVAC1			27.0	0
HVAC2			26.2	0
HVAC3			27.5	0
HVAC4			28.9	0
HVAC5			26.6	0
HVAC6			28.0	0
9	1.Fl	34.0	0.0	
HVAC1			25.3	0
HVAC2			25.1	0
HVAC3			26.2	0
HVAC4			27.4	0
HVAC5			25.4	0
HVAC6			27.3	0
10	1.Fl	32.3	0.0	
HVAC1			23.3	0
HVAC2			23.4	0
HVAC3			24.9	0
HVAC4			25.0	0
HVAC5			23.8	0
HVAC6			25.8	0
11	1.Fl	40.1	0.0	
HVAC1			30.7	0
HVAC2			30.6	0
HVAC3			32.4	0
HVAC4			33.6	0
HVAC5			31.4	0
HVAC6			34.1	0
12	1.Fl	38.4	0.0	
HVAC1			24.2	0
HVAC2			25.9	0
HVAC3			27.5	0
HVAC4			29.7	0
HVAC5			28.7	0
HVAC6			36.1	0