Tentative Parcel Map No. 37231 – Rancho Estudillo Plaza

Noise Impact Study

City of San Jacinto, CA

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Date: 5/1/2018

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

This noise assessment was prepared to evaluate the potential noise impacts for the project study area and to recommend noise mitigation measures, if necessary, to minimize the potential noise impacts. The assessment was conducted and compared to the noise standards set-forth by the Federal, State and Local agencies. Consistent with the City's Noise Guidelines, the project must demonstrate compliance to the applicable noise criterion as outlined within the City's Noise Element and Municipal Code.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- A description of the local noise guidelines and standards
- An analysis of traffic noise impacts to and from the project site
- An analysis of stationary noise impacts to and from the project site
- An analysis of construction noise impacts

1.2 Site Location and Study Area

The project site is located at the northeast corner of Sanderson Avenue and 7th Street, in the City of San Jacinto, California, as shown in Exhibit A. The site is currently zoned as Low Density Residential with a proposed rezoning to General Commercial. Land uses surrounding the site include residential to the north, south and west, with vacant residential land use to the east.

1.3 Proposed Project Description

The Project proposes to develop 3,200 square feet fast food restaurant with drive-thru, 5,100 square feet of fast food restaurant with drive-thru, a gas station with 12 vehicle fueling positions and a 2,940 square convenience store and 42,800 square feet of retail uses with approximately 341 parking spaces on approximately 8.84 acres.

This study assesses both the traffic and stationary noise to and from the project site and compares the results to the applicable City noise limits. The primary source of traffic noise propagates from Sanderson Avenue and 7th Street. The primary source of stationary noise propagates from on-site parking, drive-thru speakerphones and loading and unloading activities. The site plan used for this is illustrated in Exhibit B.

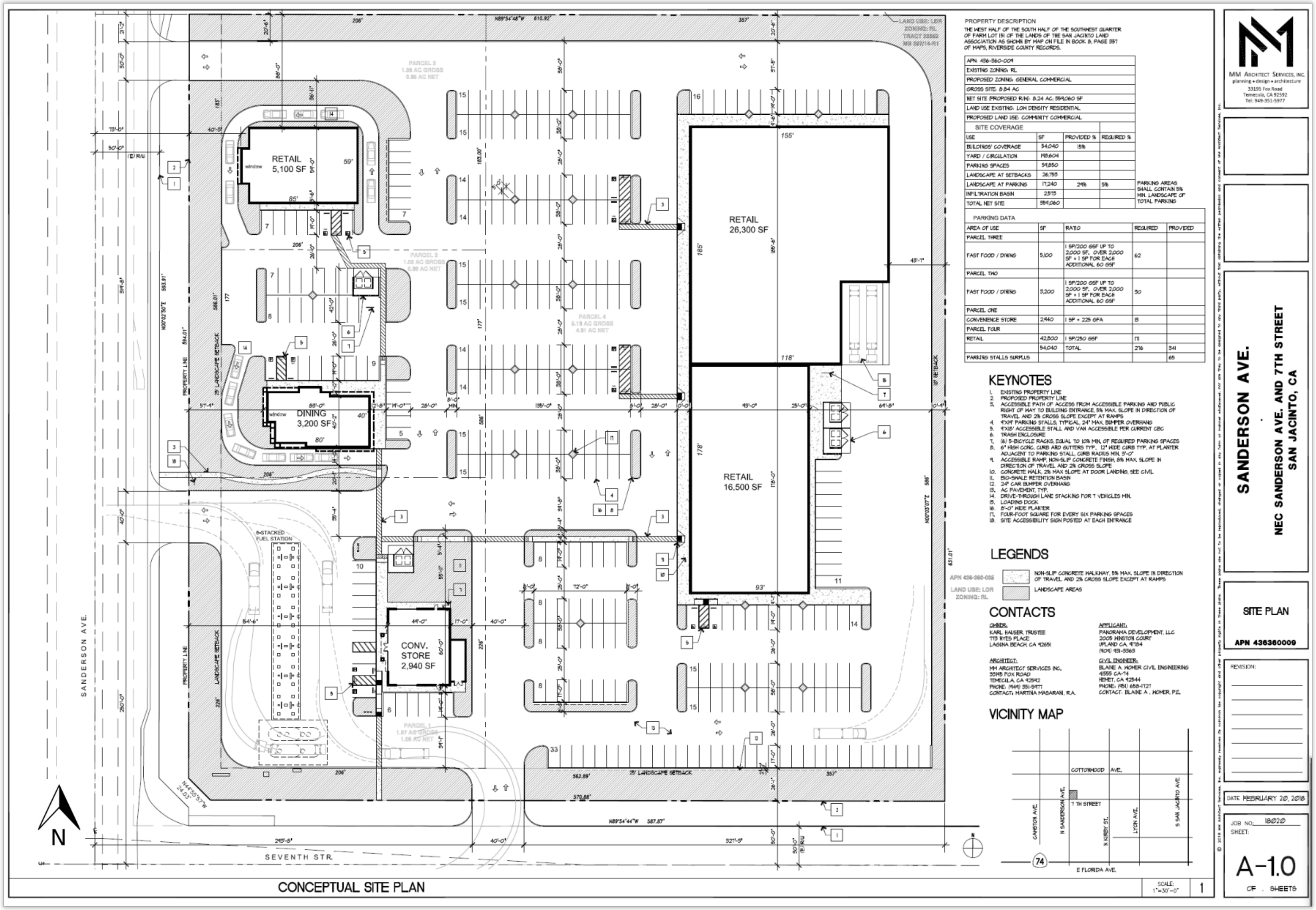
Construction activities within the Project area will consist of demo, on-site grading, building, paving, and architectural coating.

Exhibit A

Location Map

Exhibit B

Site Plan



2.0 Fundamentals of Noise

This section of the report provides basic information about noise and presents some of the terms used within the report.

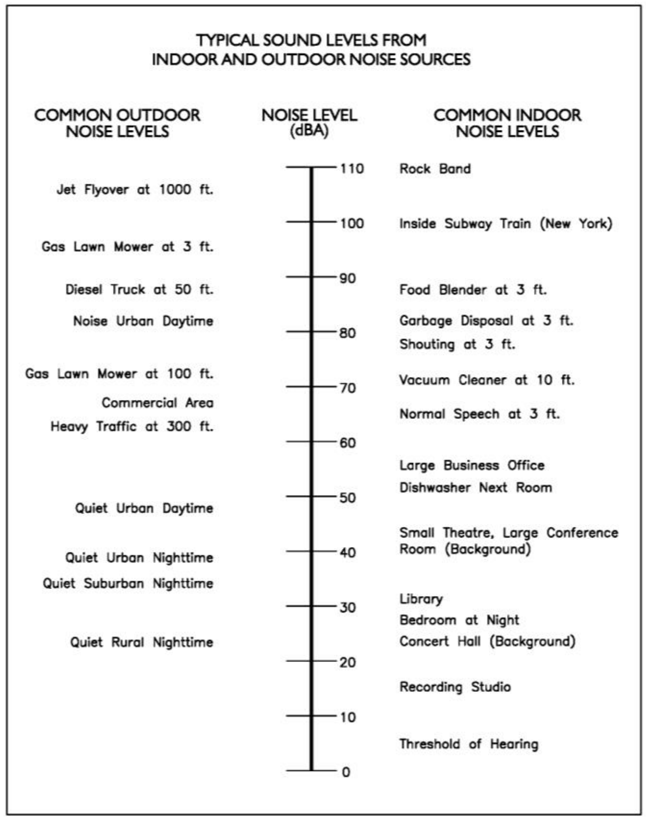
2.1 Sound, Noise and Acoustics

Sound is a disturbance created by a moving or vibrating source and is capable of being detected by the hearing organs. Sound may be thought of as mechanical energy of a moving object transmitted by pressure waves through a medium to a human ear. For traffic, or stationary noise, the medium of concern is air. *Noise* is defined as sound that is loud, unpleasant, unexpected, or unwanted.

2.2 Frequency and Hertz

A continuous sound is described by its *frequency* (pitch) and its *amplitude* (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch (bass sounding) and high-frequency sounds are high in pitch (squeak). These oscillations per second (cycles) are commonly referred to as Hertz (Hz). The human ear can hear from the bass pitch starting out at 20 Hz all the way to the high pitch of 20,000 Hz.

Exhibit C: Typical A-Weighted Noise Levels



2.3 Sound Pressure Levels and Decibels

The *amplitude* of a sound determines it loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measure in units of micro-Newton per square inch meter (N/m2), also called micro-Pascal (µPa). One µPa is approximately one hundred billionths (0.00000000001) of normal atmospheric pressure. Sound pressure level (SPL or L_p) is used to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called decibels abbreviated dB. Exhibit C illustrates references sound levels for different noise sources.

2.4 Addition of Decibels

Because decibels are on a logarithmic scale, sound pressure levels cannot be added or subtracted by simple plus or minus addition. When two sounds or equal SPL are combined, they will produce an SPL 3 dB greater than the original single SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two sounds differ by approximately 10 dB, the higher sound level is the predominant sound.

2.5 Human Response to Changes in Noise Levels

In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, (A-weighted scale) and it perceives a sound within that range as being more intense than a sound with a higher or lower frequency with the same magnitude. For purposes of this report as well as with most environmental documents, the A-scale weighting is typically reported in terms of A-weighted decibel (dBA). Typically, the human ear can barely perceive the change in noise level of 3 dB. A change in 5 dB is readily perceptible, and a change in 10 dB is perceived as being twice or half as loud. As previously discussed, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g. doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

2.6 Noise Descriptors

Noise in our daily environment fluctuates over time. Some noise levels occur in regular patterns, others are random. Some noise levels are constant while others are sporadic. Noise descriptors were created to describe the different time-varying noise levels.

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

Ambient Noise Level: The composite of noise from all sources, near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB): A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

dB(A): A-weighted sound level (see definition above).

Equivalent Sound Level (LEQ): The sound level corresponding to a steady noise level over a given sample period with the same amount of acoustic energy as the actual time varying noise level. The energy average noise level during the sample period.

Habitable Room: Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.

L(n): The A-weighted sound level exceeded during a certain percentage of the sample time. For example, L10 in the sound level exceeded 10 percent of the sample time. Similarly L50, L90 and L99, etc.

Noise: *A*ny unwanted sound or sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying. The State Noise Control Act defines noise as "...excessive undesirable sound...".

Outdoor Living Area: Outdoor spaces that are associated with residential land uses typically used for passive recreational activities or other noise-sensitive uses. Such spaces include patio areas, barbecue areas, jacuzzi areas, etc. associated with residential uses; outdoor patient recovery or resting areas associated with hospitals, convalescent hospitals, or rest homes; outdoor areas associated with places of worship which have a significant role in services or other noise-sensitive activities; and outdoor school facilities routinely used for educational purposes which may be adversely impacted by noise. Outdoor areas usually not included in this definition are: front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses; exterior areas at hospitals that are not used for patient activities; outdoor areas associated with places of worship and principally used for short-term social gatherings; and, outdoor areas associated with school facilities that are not typically associated with educational uses prone to adverse noise impacts (for example, school play yard areas).

Percent Noise Levels: See L(n).

Sound Level (Noise Level): The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

Sound Level Meter: An instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement and determination of noise and sound levels.

Single Event Noise Exposure Level (SENEL): The dB(A) level which, if it lasted for one second, would produce the same A-weighted sound energy as the actual event.

2.7 Traffic Noise Prediction

Noise levels associated with traffic depends on a variety of factors: (1) volume of traffic, (2) speed of traffic, (3) auto, medium truck (2–3 axle) and heavy truck percentage (4 axle and greater), and sound propagation. The greater the volume of traffic, higher speeds and truck percentages equate to a louder volume in noise. A doubling of the Average Daily Traffic (ADT) along a roadway will increase noise levels by approximately 3 dB; reasons for this are discussed in the sections above.

2.8 Sound Propagation

As sound propagates from a source it spreads geometrically. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates at a rate of 6 dB per doubling of distance. The movement of vehicles down a roadway makes the source of the sound appear to propagate from a line (i.e., line source) rather than a point source. This line source results in the noise propagating from a roadway in a cylindrical spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

As noise propagates from the source, it is affected by the ground and atmosphere. Noise models use hard site (reflective surfaces) and soft site (absorptive surfaces) to help calculate predicted noise levels. Hard site conditions assume no excessive ground absorption between the noise source and the receiver. Soft site conditions such as grass, soft dirt or landscaping attenuate noise at a rate of 1.5 dB per doubling of distance. When added to the geometric spreading, the excess ground attenuation results in an overall noise attenuation of 4.5 dB per doubling of distance for a line source and 7.5 dB per doubling of distance for a point source.

Research has demonstrated that atmospheric conditions can have a significant effect on noise levels when noise receivers are located 200 feet from a noise source. Wind, temperature, air humidity and turbulence can further impact have far sound can travel.

3.0 Ground-Bourne Vibration Fundamentals

3.1 Vibration Descriptors

Ground-borne vibrations consist of rapidly fluctuating motions within the ground that have an average motion of zero. The effects of ground-borne vibrations typically only cause a nuisance to people, but at extreme vibration levels, damage to buildings may occur. Although ground-borne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Ground-borne noise is an effect of ground-borne vibration and only exists indoors, since it is produced from noise radiated from the motion of the walls and floors of a room and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude.

PPV – Known as the peak particle velocity (PPV) which is the maximum instantaneous peak in vibration velocity, typically given in inches per second.

RMS – Known as root mean squared (RMS) can be used to denote vibration amplitude

VdB – A commonly used abbreviation to describe the vibration level (VdB) for a vibration source.

3.2 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage.

3.3 Vibration Perception

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground’s surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a “push-pull” fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests.

4.0 Regulatory Setting

The proposed project is located in the City of San Jacinto and noise regulations are addressed through the efforts of various federal, state and local government agencies. The agencies responsible for regulating noise are discussed below.

4.1 Federal Regulations

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

- Publicize noise emission standards for interstate commerce
- Assist state and local abatement efforts
- Promote noise education and research

The Federal Office of Noise Abatement and Control (ONAC) originally was tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible to regulate noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible to regulate noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers.

The federal government advocates that local jurisdiction use their land use regulatory authority to arrange new development in such a way that "noise sensitive" uses are either prohibited from being constructed adjacent to a highway or, or alternatively that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation source, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

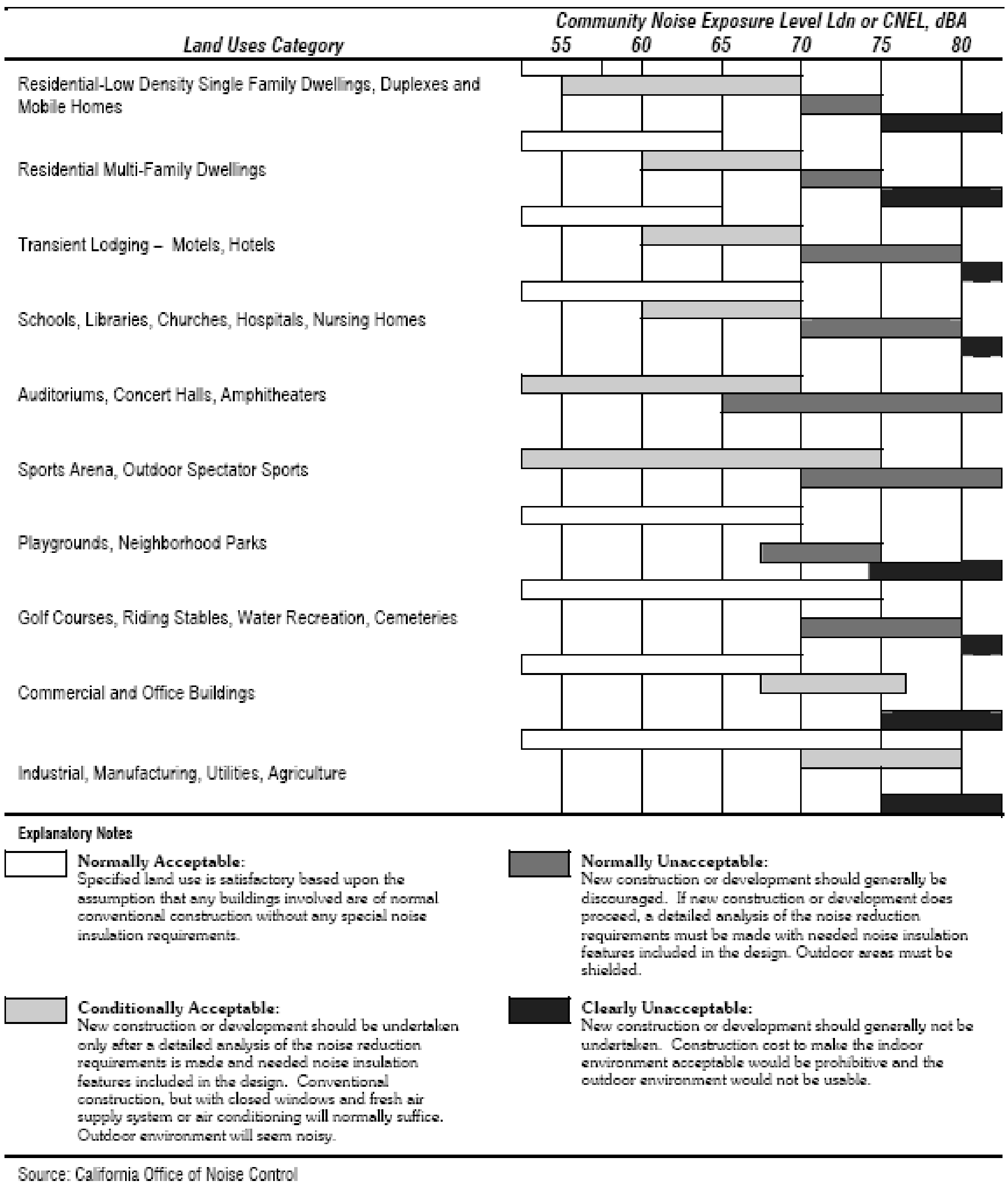
4.2 State Regulations

Established in 1973, the California Department of Health Services Office of Noise Control (ONC) was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the "Land Use Compatibility for Community Noise Environments Matrix." The matrix allows the local jurisdiction to clearly delineate compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan.

The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable as illustrated in Exhibit D.

Exhibit D: Land Use Compatibility Guidelines



4.3 City of San Jacinto Noise Regulations

The City of San Jacinto outlines their noise regulations and standards within the Noise Element from the General Plan and the Noise Ordinance from the Municipal Code.

City of Jacinto General Plan

Applicable policies and standards governing environmental noise in the City are set forth in the General Noise Element. Table N-1 from the Noise Element outlines the acceptable exterior/interior noise standards as 65 dBA CNEL / 45 dBA CNEL, respectively, for general commercial, restaurants and retail. Therefore, the project must demonstrate compliance to the City's exterior/interior noise standards.

In addition to the noise standards, the City has outlined goals, policies and implementation measures to reduce potential noise impacts and are presented below:

Goals, Policies, and Implementation Measures

Policies, goals and implementation program measures from the Noise Element that would mitigate potential impacts on noise include the following.

Noise Goal 1: Minimize the effects of noise through proper land use planning and development techniques.

Policy 1.1: Use the City's adopted noise/land use compatibility standards as a guide for future planning and development decisions.

Policy 1.2: Require noise control measures, such as berms, walls, and sound attenuating construction in areas of new development or rehabilitation.

Policy 1.3: When necessary, require buffer areas between noise sources and sensitive receptors.

Policy 1.4: Use creative techniques to mitigate potential noise incompatibilities, particularly in areas with a mixture of uses.

Policy 1.5: Discourage development that will create unmitigated nuisances associated with noise.

Noise Goal 2: Minimize the effects of transportation-related noise.

Policy 2.1: Reduce transportation-related noise impacts to sensitive land uses through the use of noise control measures.

Policy 2.2: Require sound-reduction design in development projects impacted by transportation-related noise, particularly along highways and major arterials.

Policy 2.3: Control truck traffic routing to reduce transportation-related noise impacts to sensitive land uses.

Noise Goal 3: Minimize the effects of non-transportation-related noise.

Policy 3.1: Reduce the impacts of noise-producing land uses and activities on noise-sensitive land uses.

Policy 3.2: Require sound-reduction design techniques in new construction or rehabilitation projects impacted by non-transportation noise.

Policy 3.3: Provide a means for the public to report non-transportation related nuisance noises.

N-1 Review Development Projects: Review discretionary development proposals for potential on- and off-site stationary and vehicular noise impacts per the California Environmental Quality Act (CEQA). Any proposed development located within a 60 dB or higher noise contour (per Figures N-1 and N-2) shall be reviewed for potential noise impacts and compliance with the noise and land use compatibility standards. The thresholds established in the Noise Element, Noise Ordinance, the Noise Contours Maps (Figure N-2), and Tables N-2 and N-3 of the Noise Element will be used to determine the significance of impacts. If potential impacts are identified, mitigation in the form of noise reduction designs/structures (e.g., landscaped berms, barriers, walls, enhanced parkways, increased setbacks) will be required to reduce the impact to a level less than significant, where feasible.

N-2 Minimize Commercial/Industrial Noise: Review the locations of proposed projects with the potential to generate stationary noise in relation to sensitive receptors through the discretionary project review process. Limit delivery or service hours for stores and businesses with loading areas, docks, or trash bins that front, side, border, or gain access on driveways next to residential and other noise sensitive areas. Only approve exceptions if full compliance with the nighttime limits of the noise regulations is achieved.

N-3 Minimize Construction Noise: Require all construction activity to comply with the limits (maximum noise levels, hours and days of allowed activity) established in the City noise regulations (Title 24 California Code of Regulations, Noise Ordinance) in order to reduce impacts associated with temporary construction noise to the extent feasible. Trucks associated with construction activities shall follow the designated truck routes described in Implementation Program C-3.

N-4 Noise Ordinance: Actively enforce the standards identified within the City's Noise Ordinance and Noise Plan in order to reduce impacts to the extent feasible. Update and amend the Noise Ordinance and Plan as appropriate. Provide a link on the City's website for those to file complaints against activities and uses that may be violating the Noise Ordinance.

City of San Jacinto – Noise Ordinance

Section 8.40.040(A-E) from the noise ordinance outlines the City’s exterior noise limits as it relates to stationary noise sources.

(A) The following exterior noise standards, unless otherwise specifically indicated, shall apply to all properties within a designated noise zone: Table 1 outlines the allowable exterior noise level.

Table 1: Allowable Exterior Noise Level[1]

Noise Zone	Type of Land Use	Allowed Equivalent Noise Level, Leq[2]	
		7:00 am to 10:00 pm	10:00 pm to 7:00 am
I	Single-Family Residential	65 dBA	45 dBA
II	Multifamily Residential, Mobile Home Parks	65 dBA	50 dBA
III	Commercial Property	65 dBA	60 dBA
IV	Residential Portion of Mixed Use	70 dBA	70 dBA
V	Manufacturing and Industrial, Other Uses	70 dBA	70 dBA

Notes:
1. If the ambient noise exceeds the resulting standard, the ambient noise level shall be the standard.
2. Measurements for compliance are made on the affected property pursuant to Section 8.40.160.

(B) It is unlawful for any person at any location within the incorporated area of the city to create noise, or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which noise causes the noise level, when measured at any location on any other property to exceed either of the following:

1. The noise standard for the applicable zone for any fifteen (15) minute period;
2. A maximum instantaneous (single instance) noise level equal to the value of the noise standard plus twenty (20) dBA for any period of time.

(C) In the event the ambient noise level exceeds the noise standard, the maximum allowable noise level under such category shall be increased to reflect the maximum ambient noise level.

(D) The noise zone IV standard shall apply to that portion of residential property falling within one hundred (100) feet of a commercial property or use, if the noise originates from that commercial property use.

(E) If the measurement location is on a boundary between two different noise zones, the lower noise level standard applicable to the noise zone shall apply.

Construction Noise Regulations

Section 8.40.090 of the noise ordinance allows for construction to occur between the hours of 7:30 a.m. to 6:00 p.m. on weekdays. On the weekends construction must not create or produce loud noise that disrupts a person of normal sensitivity who works or resides in the vicinity, or a peace officer, on any weekend of federal holiday.

There are exceptions to the regulation however for emergency construction when authorized by the City manager or his/her designee or if the level complies with the allowable limits as outlined within Section 8.40.040 (see Table 1).

5.0 Study Method and Procedure

The following section describes the noise modeling procedures and assumptions used for this assessment.

5.1 Noise Measurement Procedure and Criteria

Noise measurements are taken to determine the existing noise levels. A noise receiver or receptor is any location in the noise analysis in which noise might produce an impact. The following criteria are used to select measurement locations and receptors:

- Locations expected to receive the highest noise impacts, such as first row of houses
- Locations that are acoustically representative and equivalent of the area of concern
- Human land usage
- Sites clear of major obstruction and contamination

MD conducted the sound level measurements in accordance to CalTrans technical noise specifications. All measurements equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). The following gives a brief description of the Caltrans Technical Noise Supplement procedures for sound level measurements:

- Microphones for sound level meters were placed 5-feet above the ground for all measurements
- Sound level meters were calibrated (Larson Davis CAL 200) before and after each measurement
- Following the calibration of equipment, a wind screen was placed over the microphone
- Frequency weighting was set on “A” and slow response
- Results of the long-term noise measurements were recorded on field data sheets
- During any short-term noise measurements any noise contaminations such as barking dogs, local traffic, lawn mowers, or aircraft fly-overs were noted
- Temperature and sky conditions were observed and documented

5.2 Short-Term Noise Measurement Locations

Noise monitoring locations were selected based on the distance of the project’s stationary noise sources to the nearest sensitive on-site receptors. Short-term noise measurements were conducted near the northeastern and southeastern corners of the project site and represent ambient levels at the site. Appendix A includes photos, field sheet, and measured noise data. Exhibit E (next page) illustrates the location of the measurements.

5.3 FHWA Traffic Noise Prediction Model

Traffic noise from vehicular traffic was projected using a computer program that replicates the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA model arrives at the predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Roadway volumes and percentages correspond to the Level of Service C (LOS C) conditions, or about 75% of buildout capacity and roadway classification. The referenced traffic data was applied to the model and

Exhibit D

Measurement Location

X = Measurement location

= boundary

is in Appendix B. The following outlines the key adjustments made to the REMEL for the roadway inputs:

- Roadway classification – (e.g. freeway, major arterial, arterial, secondary, collector, etc),
- Roadway Active Width – (distance between the center of the outer most travel lanes on each side of the roadway)
- Average Daily Traffic Volumes (ADT), Travel Speeds, Percentages of automobiles, medium trucks and heavy trucks
- Roadway grade and angle of view
- Site Conditions (e.g. soft vs. hard)
- Percentage of total ADT which flows each hour through-out a 24-hour period

Table 2 indicates the roadway parameters and vehicle distribution utilized for this study.

Table 2: Roadway Parameters and Vehicle Distribution

Roadway	Segment	Existing ADT	Existing Plus Project ADT	Speed (MPH)	Site Conditions
Sanderson Avenue	North of 7th Street	24,268	25,199	40	Soft
7th Street	East of Sanderson Avenue	7,082	9,565	40	Soft

Major Arterial Vehicle Distribution (Truck Mix)[2]				
Motor-Vehicle Type	**Daytime % (7AM to 7 PM)**	**Evening % (7 PM to 10 PM)**	**Night % (10 PM to 7 AM)**	**Total % of Traffic Flow**
Automobiles	75.5	14.0	10.4	92.00
Medium Trucks	48.0	2.0	50.0	3.00
Heavy Trucks	48.0	2.0	50.0	5.00

Secondary and Collector Vehicle Distribution (Truck Mix)[2]				
Motor-Vehicle Type	**Daytime % (7AM to 7 PM)**	**Evening % (7 PM to 10 PM)**	**Night % (10 PM to 7 AM)**	**Total % of Traffic Flow**
Automobiles	75.5	14.0	10.5	97.42
Medium Trucks	48.9	2.2	48.9	1.84
Heavy Trucks	47.3	5.4	47.3	0.74

Notes:
[1] Maximum two-way traffic volume (ADT) with Level of Service C (LOS C) conditions of a major arterial roadways as outlined in the Riverside County Office of Industrial Hygiene Acoustical Modeling Parameters.
[2] Vehicle distribution data is based on Riverside County Mix data for collectors and secondary roadways.

The following outlines key adjustments to the REMEL for project site parameter inputs:

- Vertical and horizontal distances (Sensitive receptor distance from noise source)
- Noise barrier vertical and horizontal distances (Noise barrier distance from sound source and receptor).
- Traffic noise source spectra

- Topography

MD projected the traffic noise levels to the on-site receptors. The project noise calculation worksheet outputs are located in Appendix B.

5.4 SoundPLAN Model

SoundPLAN (SP) acoustical modeling software was utilized to model traffic noise level projections and future worst-case project operational noise impacts (stationary noise sources) to the on-site and nearest off-site sensitive receptors.

SP is capable of evaluating multiple stationary noise sources and transportation noise impacts at various receiver locations. SP's software utilizes algorithms (based on the inverse square law and FHWA calculations) to calculate noise level projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations.

The future worst-case noise level projections were modeled using reference sound level data for the proposed loading and unloading area and peak hour trip generation data for the proposed parking lots. Noise associated with loading/unloading include but not limited to idling trucks, exhaust and engine noise, starting engine noise, back-up alarms, breaking and rolling doors. Noise associated with loading/unloading can reach peak levels of 70 dBA at 50 feet from the source. Noise associated with parking lots include but are not limited to idling cars, doors closing, and starting engine noise. Noise levels associated with parking lots can reach peak levels of 80 dBA at 3 feet from the source. Modeling input and output assumptions are indicated in Appendix C.

5.5 FHWA Roadway Construction Noise Model

The construction noise analysis utilizes the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RNCM), together with several key construction parameters. Key inputs include distance to the sensitive receiver, equipment usage, % usage factor, and baseline parameters for the project site.

The project was analyzed based on the different construction phases. Construction noise is expected to be loudest during the grading, concrete and building phases of construction. The construction noise calculation output worksheet is located in Appendix D. The following assumptions relevant to short-term construction noise impacts were used:

- It is estimated that construction will occur over a 1 year time period. Construction noise is expected to be the loudest during the grading, concrete, and building phases.

6.0 Existing Noise Environment

An ambient noise measurement was conducted at the site to determine the existing baseline levels. Noise measurement data indicates that traffic noise propagating from San Jacinto Avenue and Seventh Avenue are the primary sources of noise impacting the site and surrounding areas.

6.1 Short-Term Noise Measurement Results

The results of the short-term noise data is presented in Table 3.

Table 3: Short-Term Noise Measurement Data (dBA)

Location	Date	Start Time	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)
Location 1	4/13/2018	2:30 PM	64.0	81.0	40.0	71.0	67.0	64.0	52.0
Location 2	4/13/2018	2:47 PM	61.1	71.6	42.0	68.8	66.5	61.9	54.7
Location 3	4/13/2018	3:22 PM	47.0	55.9	38.6	51.8	50.2	48.1	45.9

Notes:
1. Measurements were taken over a ten-minute interval. Measurement locations are indicated in Exhibit E.

The existing ambient levels ranged from 47.0 to 64.0 dBA Leq with maximum levels reaching 81.0 dBA.

7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts to and from the project compares the results to the City's Noise Standards. The analysis details the estimated exterior noise levels associated with traffic from adjacent roadways and from on-site stationary noise sources.

7.1 Future Exterior Noise

The following outlines the exterior noise levels associated with the proposed project.

7.1.1 Noise Impacts to On/Off-Site Receptors Due to Project Generated Traffic

A worst-case project generated traffic noise level was modeled utilizing the FHWA Traffic Noise Prediction Model - FHWA-RD-77-108. Traffic noise levels were calculated 50 feet from the centerline of the analyzed roadway. The modeling is theoretical and does not take into account any existing barriers, structures, and/or topographical features that may further reduce noise levels. Therefore, the levels are shown for comparative purposes only to show the difference in with and without project conditions. In addition, the noise contours for 60, 65 and 70 dBA CNEL were calculated. The potential off-site noise impacts caused by an increase of traffic from operation of the proposed project on the nearby roadways were calculated for the following scenarios:

Existing Year (without Project): This scenario refers to existing year traffic noise conditions.

Existing Year (Plus Project): This scenario refers to existing year + project traffic noise conditions.

Table 4 compares the without and with project scenario and shows the change in traffic noise levels as a result of the proposed project. It takes a change of 3 dB or more to hear a perceptible difference. As demonstrated in Table 4, the project is anticipated to change the noise 0.1 to 1.3 dBA CNEL. Although there is a nominal increase along these two roadways, the proposed increase would still be below the 65 dBA CNEL residential standard at any off-site receptors. As shown in Table 4, the Existing Plus Project 65 dBA contour would extend an additional 3 from the centerline for the Sanderson Avenue and 7 feet from the centerline of 7th Street. All existing residences are located behind existing barriers and/or are located outside the 65 dBA contour.

Although there is an increase in traffic noise levels the impact is considered less than significant as the noise levels at or near any existing proposed sensitive receptor would be 65 dBA CNEL or less and the change in noise level is less than 3 dBA. No further mitigation is required.

Table 4: Existing Scenario - Noise Levels Along Roadways (dBA CNEL)

Existing Without Project Exterior Noise Levels

Roadway	Segment	CNEL at 50 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Sanderson Avenue	North of 7th Street	76.6	137	295	635	1,368
7th Street	East of Sanderson Avenue	65.6	24	52	111	239

Existing With Project Exterior Noise Levels

Roadway	Segment	CNEL at 50 Ft (dBA)	Distance to Contour (Ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Sanderson Avenue	North of 7th Street	76.7	140	302	651	1,402
7th Street	East of Sanderson Avenue	66.9	31	67	144	310

Change in Existing Noise Levels as a Result of Project

Roadway[1]	Segment	CNEL at 50 Feet dBA[2]			
		Existing Without Project	Existing With Project	Change in Noise Level	Potential Significant Impact
Sanderson Avenue	North of 7th Street	76.6	76.7	0.1	No
7th Street	East of Sanderson Avenue	65.6	66.9	1.3	No

Notes:
[1] Exterior noise levels calculated at 5 feet above ground level.
[2] Noise levels calculated from centerline of subject roadway.

7.1.2 Noise Impacts to Off-Site Receptors Due to Stationary Sources

Sensitive receptors that may be affected by project operational noise include adjacent land uses to the north and west. The worst-case stationary noise was modeled using SoundPLAN acoustical modeling software. The majority of project operations are assumed to occur within the City's allowable daytime (7 a.m. to 10 p.m.) hours. Worst-case nighttime assumes only the gas station and fastfood restaurants with drive thrus will operate beyond 10 p.m.

A total of thirteen (13) sensitive receptors were modeled to accurately evaluate the proposed project's operational noise impact. A receptor is denoted by a green or yellow dot.

This study compares the project's operational noise levels to two (2) different scenarios: 1) Project Only operational noise level projections and, 2) Project plus ambient noise level projections.

Project Operational Noise Levels

Exhibit F and H show the project only daytime and nighttime operational noise levels at the property lines and/or sensitive receptor areas. Exhibit G and I illustrate the "project only" noise contours (daytime and nighttime) at the project site and illustrates how the noise will propagate at the site. Daytime operational noise levels are anticipated to range between 47.5 to 59.6 dBA Leq at the receptors R1 through R13. Nighttime operational noise levels are anticipated to range between 33.0 to 47.0 dBA Leq at the receptors R1 through R13.

The "project only" daytime noise projections to the residential and adjacently zoned residential land use are below the City's 65 dBA daytime limit as outlined within Table 1 of this report.

The "project only" nighttime noise projections to the residential units are below the City's 45 dBA nighttime residential limit with the exception at 2nd floor residential uses (R6 and R7). The noise exceeds the City's noise criterion due to fastfood restaurant operations and drive thru speakers and therefore said speakers and/or operations would require mitigation to lower the noise levels below the City's noise criterion during nighttime operations (see Section 7.2).

Project Plus Ambient Operational Noise Levels

Table 5 demonstrates the project plus ambient noise levels. Project plus ambient noise level projections are anticipated to range between 50.3 to 64.4 dBA Leq at the receptors R1 through R13. The noise projections to the adjacent residences are below the City's 65 dBA daytime limit.

Table 5: Worst-case Predicted Daytime (7AM – 10PM) Operational Noise Levels (dBA)

Receptor[1]	Floor	Existing Ambient Noise Level (dBA, Leq)[2]	Project Noise Level (dBA, Leq)[3]	Total Combined Noise Level (dBA, Leq)	Daytime (7AM - 10PM) Stationary Noise Limit (dBA, Leq)	Change in Noise Level as Result of Project
1	1	64.0	51.1	64.2	**65.0**	0.2
2	1		51.3	64.2		0.2
3	1		49.4	64.1		0.1
4	1		47.9	64.1		0.1
	2		51.9	64.3		0.3
5	1		49.8	64.2		0.2
	2		54.2	64.4		0.4
6	1	47.0	51.1	52.5		5.5
	2		57.0	57.4		10.4
7	1		51.3	52.7		5.7
	2		59.4	59.6		12.6
8	1		51.4	52.7		5.7
	2		58.0	58.3		11.3
9	1		50.5	52.1		5.1
	2		56.0	56.5		9.5
10	1		49.3	51.3		4.3
	2		54.6	55.3		8.3
11	1		47.5	50.3		3.3
	2		52.6	53.7		6.7
12	1		59.6	59.8		12.8
13	1	61.1	52.5	61.7		0.6

Notes:
1. Receptors 1 thru 13 represent residential uses or potential residential uses.
2. NM location 1 Baseline Ambient level was used for receptors 1-5 , NM location 2 was used for receptors 6-12, NM location 3 for receptors 13.
3. See Exhibit F for the operational noise level projections at said receptors.

In addition, Table 5 provides the anticipated change in noise level as a result of the proposed project during daytime operable conditions. As shown in Table 5, the daytime operational noise levels will results in a change of 0.1 to 12.6 dBA at the various sensitive receptors. Depending on the receptor location, the change in the noise level has the potential to be clearly noticeable. Although the change in noise level is may be clearly noticeable the project will be below the City's allowable daytime limit and therefore the impact would be considered less than significant with mitigation. To ensure compliance to the City's daytime noise standard, the project shall implement an 8-foot tall wall along the northern and eastern property line. In addition, drive thru speaker phones shall utilize automated volume control systems (AVC).

Table 6 demonstrates the project plus ambient average noise level during proposed nighttime operable hours. The project plus ambient noise level projections are anticipated to range between 42.5 to 59.2 at the receptors 1 through 13. In many cases (with the exception of receptors 6 though 12) the ambient condition exceeds the City's 45 dBA nighttime limit.

Table 6: Worst-case Predicted Daytime (10PM – 7AM) Operational Noise Levels (dBA)

Receptor[1]	Floor	Existing Ambient Noise Level (dBA, Leq)[2]	Project Noise Level (dBA, Leq)[3]	Total Combined Noise Level (dBA, Leq)	Nighttime (10PM - 7AM) Stationary Noise Limit (dBA, Leq)	Change in Noise Level as Result of Project
1	1	59.0	43.5	59.1	**45.0**	0.1
2	1		44.6	59.2		0.2
3	1		41.2	59.1		0.1
4	1		37.4	59.0		0.0
	2		42.0	59.1		0.1
5	1		39.5	59.0		0.0
	2		44.5	59.2		0.2
6	1	42.0	40.7	44.4		2.4
	2		46.9	48.1		6.1
7	1		39.3	43.9		1.9
	2		47.0	48.2		6.2
8	1		45.1	46.8		4.8
	2		39.1	43.8		1.8
9	1		38.2	43.5		1.5
	2		42.8	45.4		3.4
10	1		37.5	43.3		1.3
	2		41.5	44.8		2.8
11	1		36.5	43.1		1.1
	2		40.0	44.1		2.1
12	1		33.0	42.5		0.5
13	1	56.1	37.4	56.2		0.1

Notes:
1. Receptors 1 thru 13 represent residential uses or potential residential uses.
2. NM location 1 Baseline Ambient level was used for receptors 1-5 , NM location 2 was used for receptors 6-12, NM location 3 for receptors 13. A 5-dBA reduction was applied to the ambient noise readings to represent nighttime noise levels.
3. See Exhibit G for the operational noise level projections at said receptors.

Since the ambient condition already exceeds the City's 45 dBA nighttime limit the noise must not further increase the levels above the existing condition. Receptors 1 through 5 would experience a nominal change in the existing ambient condition (0.0 to 0.2 dBA). The change in noise level would be a negligible amount and the impact would be considered less than significant with mitigation. It takes a 3 dBA change in noise level to just perceive a difference.

Receptors 6 through 12 would experience an increase of clearly perceptible change in noise level (0.5 to 6.2 dBA) and the change would be significant and above the City's 45 dBA limit. The change would be most noticeable at 2nd story units. The main contributor to the noise exceedance at said receptors is as a result of potential fast-food drive thru operations and not the gas station/convenience store. Therefore, mitigation measures are required for the fast-food to ensure compliance to the City's nighttime noise ordinance (see Section 7.2)

Receptor 13 would experience a nominal change in the existing ambient condition (0.1 dBA). The change would be a negligible amount. The impact to receptor 13 would be less than significant with mitigation.

Summary of Operational Noise Levels

Project only operations would be below the City's daytime noise ordinance with mitigation measures implemented (see Section 7.2 for Mitigation Measures). Project only operations for the fastfood/drive thrus would exceed the City's nighttime noise ordinance at the receptors to the north and therefore mitigation measures are required to comply with the City's noise ordinance. Project only operations for the gas station/convenience store would not exceed the City's nighttime noise ordinance.

Project plus ambient would be below the City's daytime noise ordinance with mitigation measures implement (see Section 7.2 for Mitigation Measures) and therefore the impact is less than significant with mitigation. Project plus ambient would exceed the City's nighttime noise ordinance at the existing residences to the north of the project site due to fastfood operations and therefore mitigation measures are required to comply with the City's nighttime noise ordinance. The project would therefore be less than significant with mitigation.

7.2 Mitigation Measures

The following mitigation measures are provided:

MM-1: A minimum 8-ft wall is required along the northern and eastern property line to shield existing and future residences from onsite noise.

MM-2: Project shall incorporate an 8-ft wall along the loading/unloading area of the loading docks at the commercial/retail store.

MM-3: Ensure fast food speakerphones are positioned in a direction facing away from residence to the north. The project shall incorporate a speakerphone system that incorporates automatic volume control (ACS). The AVC will adjust the outbound volume based on the outdoor ambient noise level When ambient noise levels naturally decrease at night, the AVC will reduce the outbound volume on the system. HM Electronics has a speaker system that is capable of said technology.

During nighttime operation, speakerphones can be turned off and ordering can occur at the drive thru window which will further reduce noise.

MM-4: Trash collection shall occur during daytime hours.

MM-5: Truck deliveries should occur during daylight hours.

MM-6: Any rooftop or ground mounted HVAC units should be positioned at a physical distance as far as plausible from adjacent residences. In addition, the equipment should be shielded by a parapet wall with a height equal or greater than the equipment. The height of the wall must be taller than HVAC and be designed to completely shield any noise that may be able to flank around the wall.

Exhibit E

Future Daytime Operational Noise Level Projections

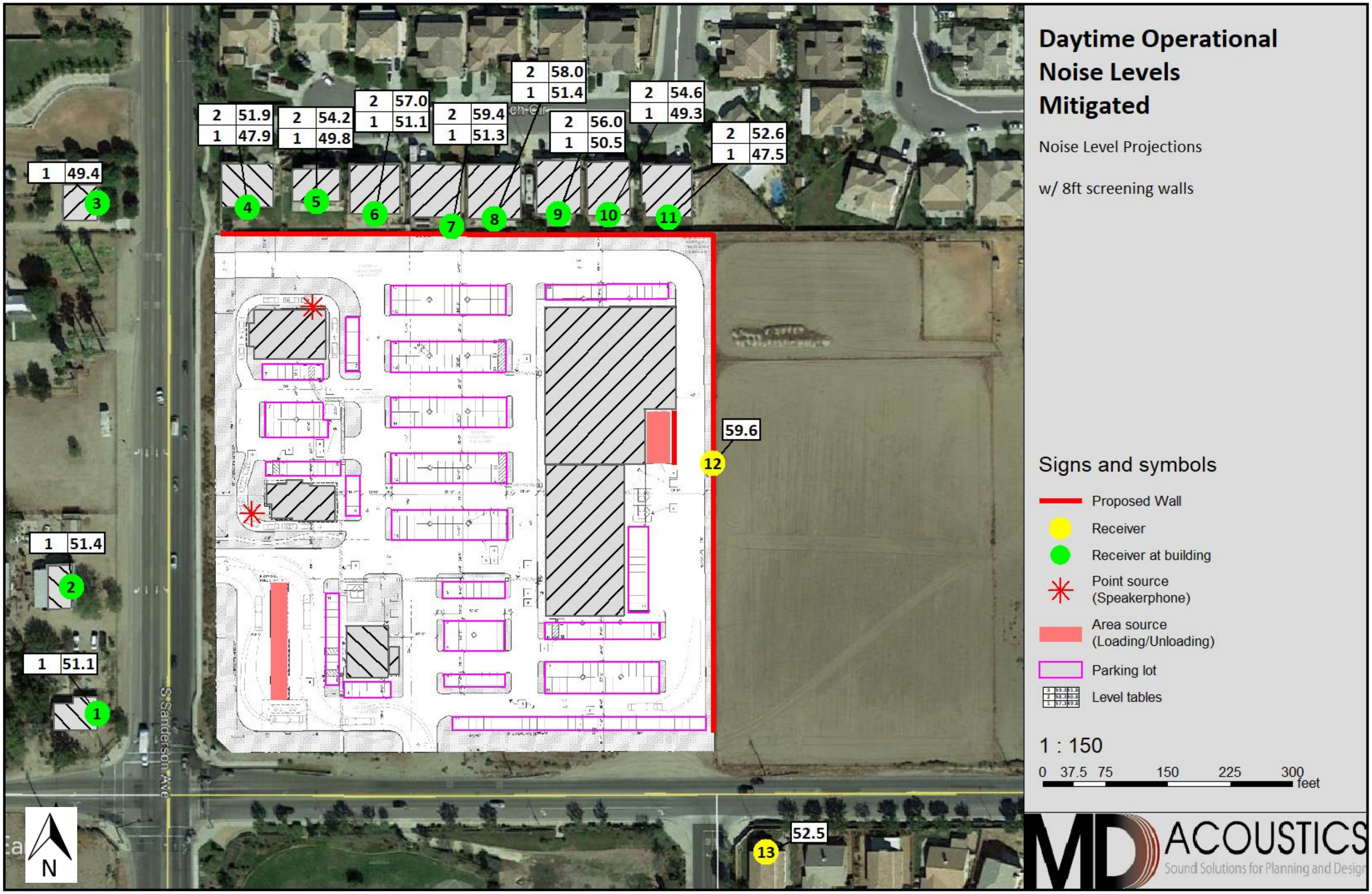


Exhibit F

Future Daytime Operational Noise Level Contours

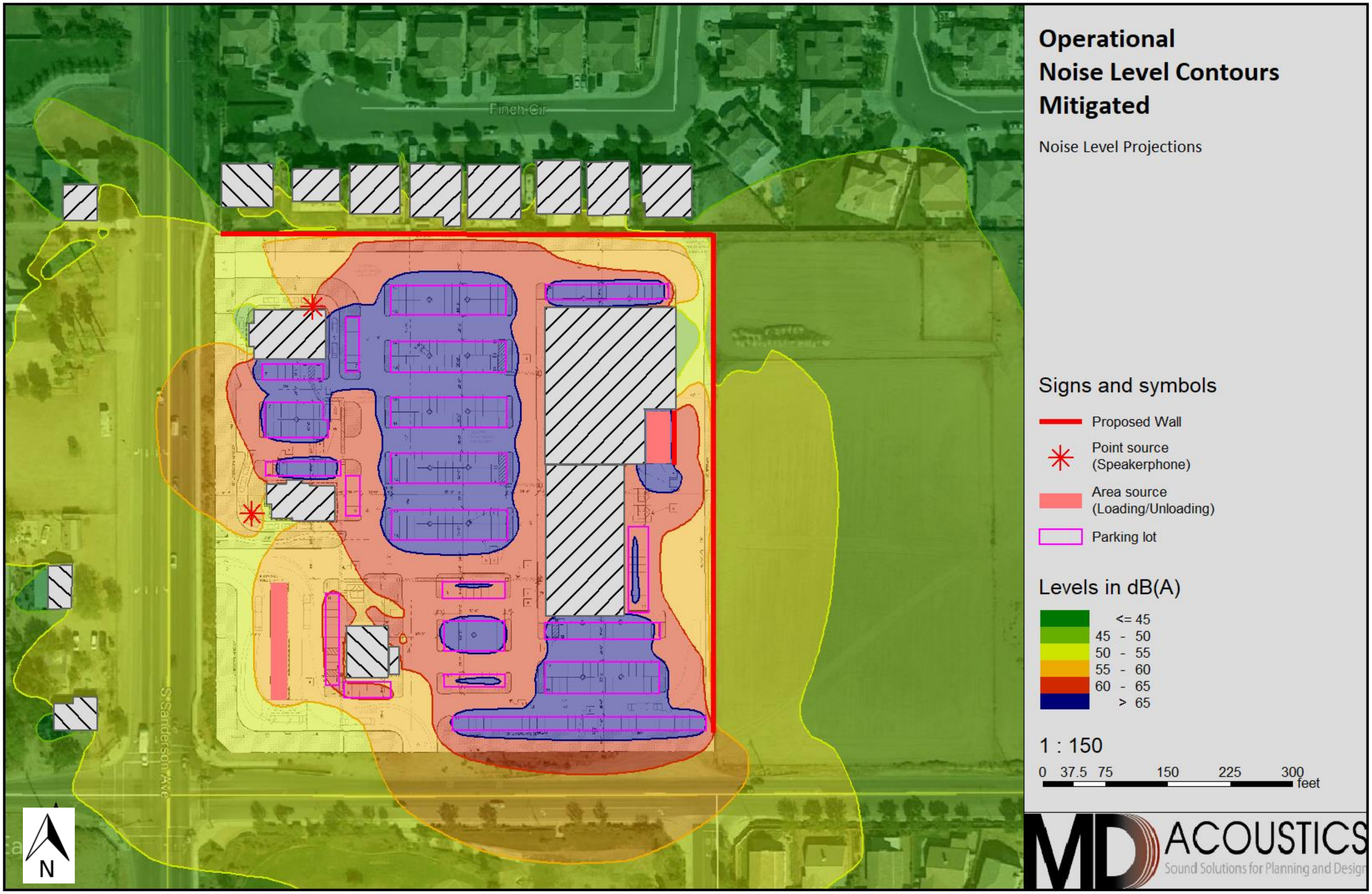


Exhibit G
Future Nighttime Operational Noise Level Projections

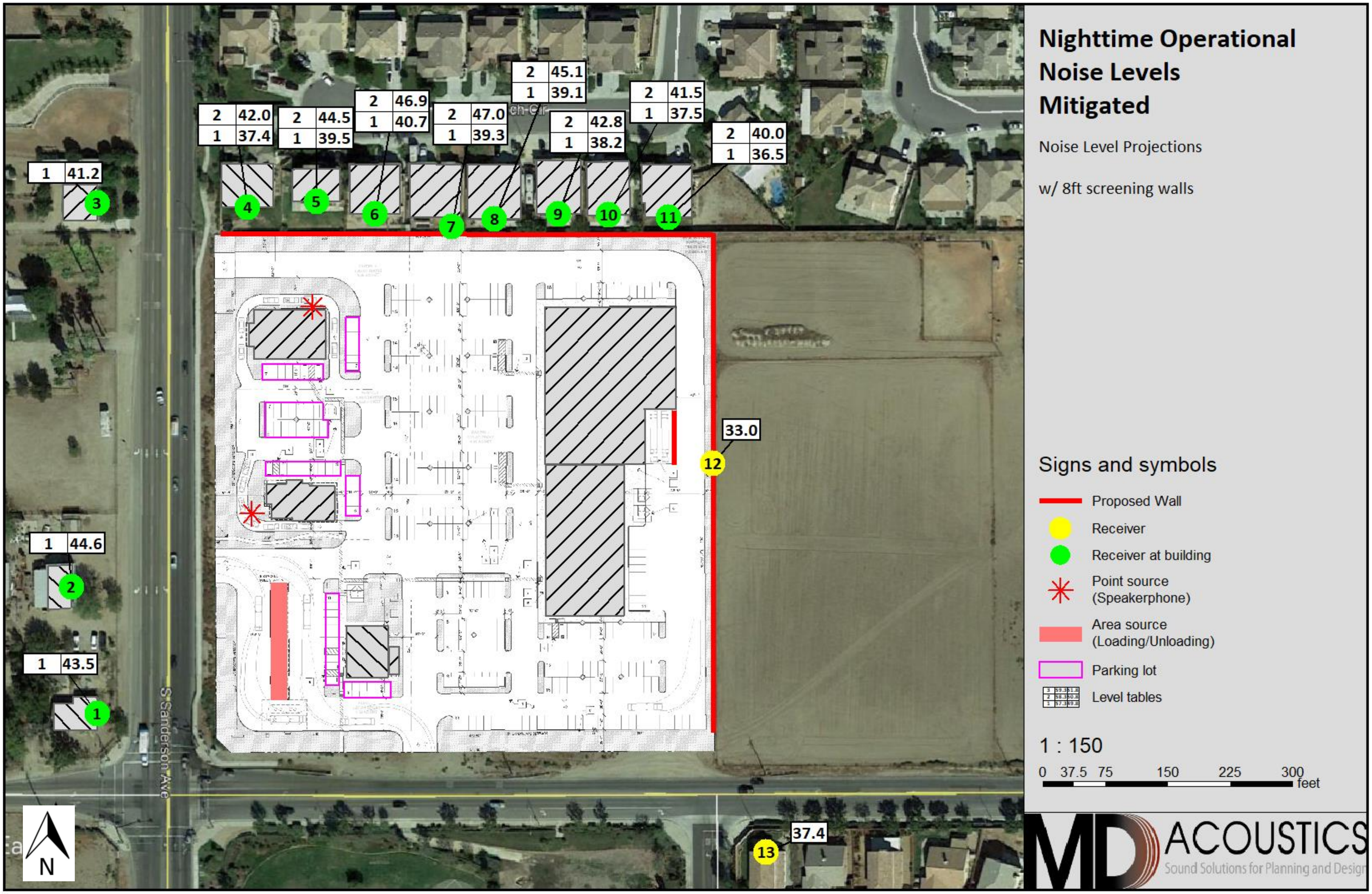
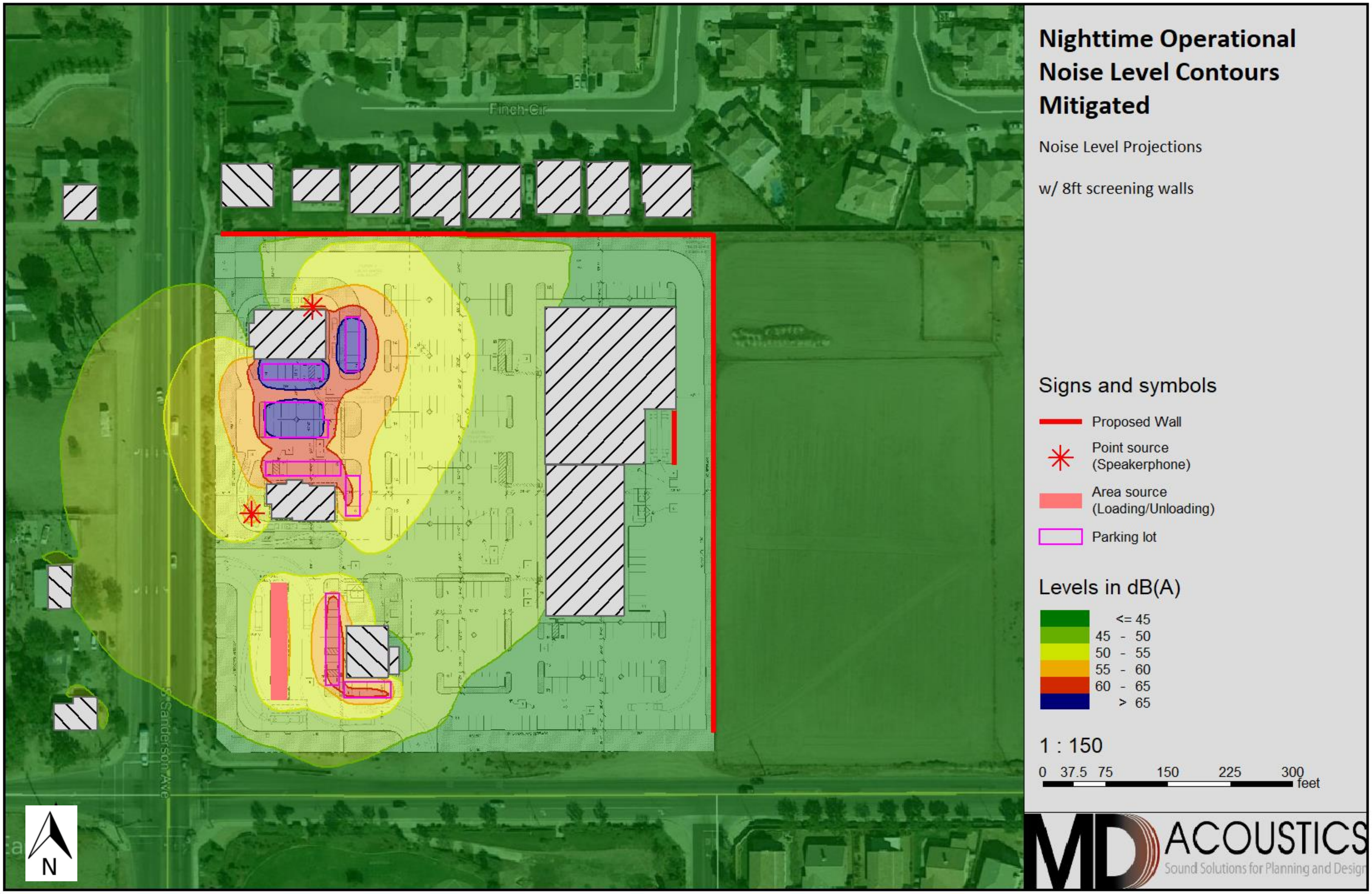


Exhibit H

Future Nighttime Operational Noise Level Contours



8.0 Construction Noise Impact

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities. Noise levels associated with the construction will vary with the different phases of construction.

8.1 Construction Noise

The Environmental Protection Agency (EPA) has compiled data regarding the noise generated characteristics of typical construction activities. The data is presented in Table 7.

Table 7: Typical Construction Noise Levels[1]

Equipment Powered by Internal Combustion Engines

Type	Noise Levels (dBA) at 50 Feet
Earth Moving	
Compactors (Rollers)	73 - 76
Front Loaders	73 - 84
Backhoes	73 - 92
Tractors	75 - 95
Scrapers, Graders	78 - 92
Pavers	85 - 87
Trucks	81 - 94
Materials Handling	
Concrete Mixers	72 - 87
Concrete Pumps	81 - 83
Cranes (Movable)	72 - 86
Cranes (Derrick)	85 - 87
Stationary	
Pumps	68 - 71
Generators	71 - 83
Compressors	75 - 86

Impact Equipment

Type	Noise Levels (dBA) at 50 Feet
Saws	71 - 82
Vibrators	68 - 82

Notes:
[1] Referenced Noise Levels from the Environmental Protection Agency (EPA)

Construction noise is considered a short-term impact and would be considered significant if construction activities are taken outside the allowable times as described in the City's Municipal Code (Section 8.40.090). Construction is anticipated to occur during the permissible hours according the City's Municipal Code. Construction noise will have a temporary or periodic increase in the ambient noise level above the existing within the project vicinity. Furthermore, noise reduction measures are provided to further reduce construction noise (Section 8.3). The impact is considered less than significant however construction noise level projections are provided.

Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Noise levels will be loudest during grading phase. A likely worst-case construction noise scenario during grading assumes the use of a grader, a dozer, and two (2) excavators, two (2) backhoes and a scrapper operating at 50 feet from the nearest sensitive receptor.

Assuming a usage factor of 40 percent for each piece of equipment, unmitigated noise levels at 50 feet have the potential to reach 90 dBA L_{eq} and 92 dBA L_{max} at the nearest sensitive receptors during grading. Noise levels for the other construction phases would be lower and range between 85 to 90 dBA.

8.2 Construction Vibration

Construction activities can produce vibration that may be felt by adjacent land uses. The construction of the proposed project would not require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. The primary vibration source during construction may be from a bull dozer. A large bull dozer has a vibration impact of 0.089 inches per second peak particle velocity (PPV) at 25 feet which is perceptible but below any risk to architectural damage.

The fundamental equation used to calculate vibration propagation through average soil conditions and distance is as follows:

$$PPV_{equipment} = PPV_{ref} (100/D_{rec})^n$$

Where: PPV_{ref} *= reference PPV at 100ft.*
D_{rec} *= distance from equipment to receiver in ft.*
n = 1.1 (the value related to the attenuation rate through ground)

The thresholds from the Caltrans Transportation and Construction Induced Vibration Guidance Manual in Table 8 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 8: Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
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

Source: Table 19, Transportation and Construction Vibration Guidance Manual, Caltrans, Sept. 2013.
Note: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 9 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

Table 9: Vibration Source Levels for Construction Equipment[1]

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level LV (dVB) at 25 feet
Pile driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

At a distance of 20 feet, a large bull dozer would yield a worst-case 0.114 PPV (in/sec) which may be perceptible for short periods of time during grading along the western property line of the project site, but is below any threshold of damage. The impact is less than significant and no mitigation is required.

8.3 Construction Noise Reduction Measures

Construction operations must follow the City's General Plan and the Noise Ordinance, which states that construction, repair or excavation work performed must occur within the permissible hours. To further ensure that construction activities do not disrupt the adjacent land uses, the following measures should be taken:

1. Construction should occur during the permissible hours as defined in Section 8.40.090.

2. During construction, the contactor shall ensure all construction equipment is equipped with appropriate noise attenuating devices.

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

4. Idling equipment should be turned off when not in use.

5. Equipment shall be maintained so that vehicles and their loads are secured from rattling and banging.

9.0 References

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

City of Jacinto: General Plan Noise Element. May, 2006.

City of Jacinto: City of San Jacinto Noise Ordinance. Apr, 2018.

Institute of Transportation Engineers, Trip General Manual, 10^{th} Edition, 2018.

TJW Engineering, Tentative Parcel Map No. 37231 – Rancho Estudillo Plaza Traffic Impact Analysis, Apr 2018

Urban Crossroads: City of San Jacinto General Plan Traffic Study. January 10, 2005.

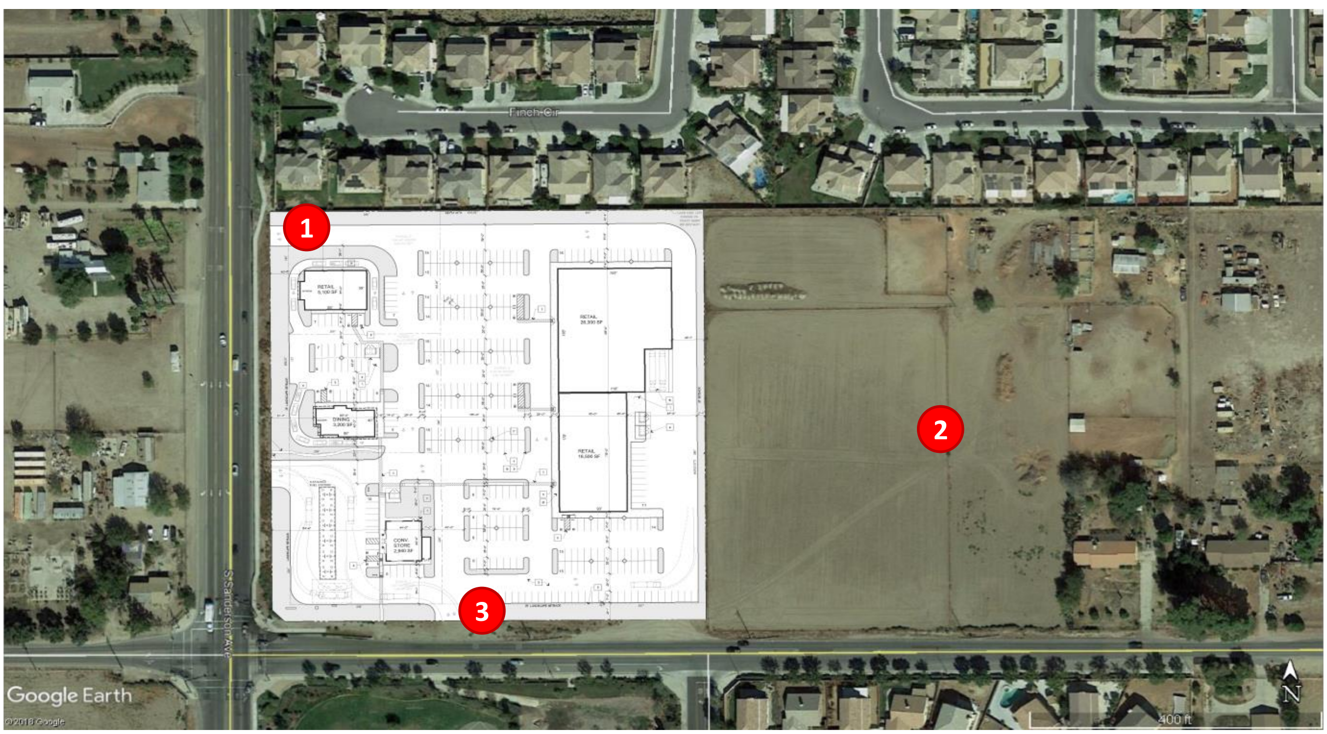
Appendix A:
Field Measurement Data

Project: Tenatitive Parcel Map No. 37231 - Rancho Estudillo Plaza NIS, City of San Jacinto, CA
Client: Panorama Properties
Site Location: NEC Sanderson Ave and 7th Street
Date: 4/13/2018
Engineer: Mike Dickerson, INCE
Source/System: Existing Traffic along Sanderson and 7th Street.

Meteorological Cond. 78 degrees F, 2 to 5 mph wind from east
Location North property line, South property line, East property line
Meter Larson Davis 831, Type 1
Settings A-weighted, slow, 1-sec, 10 min interval

Table 1: Summary of SLM Data (dBA)

SLM Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
Location 1	2:30 PM	2:37 PM	64.0	81.3	40.0	70.6	66.7	64.1	61.9	47.0
Location 2	2:47 PM	2:57 PM	61.1	71.6	42.0	68.8	66.5	61.9	54.7	45.9
Location 3	3:12 PM	3:22 PM	47.0	55.9	38.6	51.8	50.2	48.1	45.9	41.7



Notes: Location 1 is located approx 90 feet from C/L of Sanderson Ave
Location 2 is located approx 100 feet from C/L of 7th Street
Location 3 is located approx 350 feet from C/L of 7th Street

Figure 1: Location 1 - Meter Location - North Border looking South East

Figure 2: Location 2 - Meter Location - South border looking North West

Figure 3: Location 3 - Meter Location - East Border looking West

Appendix B:

Traffic FHWA Worksheets

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	TENTATIVE PARCEL MAP NO. 37231 – RANCHO ESTUDILLO PLAZA NOISE IMPACT STUDY	JOB #:	0144-8-1601
ROADWAY:	SANDERSON AVENUE - NORTH OF 7TH	DATE:	27-Apr-18
LOCATION:	EXISTING - NOISE CONTOURS	ENGINEER:	M. DICKERSON

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	24,268
SPEED =	40
PK HR % =	10
NEAR LANE/FAR LANE DIST =	65
ROAD ELEVATION =	0.0
GRADE =	0.0 %
PK HR VOL =	2,427

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		50
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15
MEDIUM TRUCKS =	15
HEAVY TRUCKS =	15

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL=	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.755	0.140	0.104	0.9200
MEDIUM TRUCKS	0.480	0.020	0.500	0.0300
HEAVY TRUCKS	0.480	0.020	0.500	0.0500

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	38.11	- -
MEDIUM TRUCKS	4.0	38.01	- -
HEAVY TRUCKS	8.0	38.12	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.0	68.0	66.7	60.6	69.1	69.7
MEDIUM TRUCKS	64.1	60.1	52.3	61.5	67.7	67.7
HEAVY TRUCKS	71.1	67.2	59.4	68.6	74.7	74.8
NOISE LEVELS (dBA)	74.1	71.0	67.6	69.9	76.4	76.6

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.0	68.0	66.7	60.6	69.1	69.7
MEDIUM TRUCKS	64.1	60.1	52.3	61.5	67.7	67.7
HEAVY TRUCKS	71.1	67.2	59.4	68.6	74.7	74.8
NOISE LEVELS (dBA)	74.1	71.0	67.6	69.9	76.4	76.6

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	137	295	635	1368
LDN	134	288	620	1336

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	TENTATIVE PARCEL MAP NO. 37231 – RANCHO ESTUDILLO PLAZA NOISE IMPACT STUDY	JOB #:	0144-8-1601
ROADWAY:	SANDERSON AVENUE - NORTH OF 7TH	DATE:	27-Apr-18
LOCATION:	EXISTING PLUS PROJECT - NOISE CONTOURS	ENGINEER:	M. DICKERSON

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	25,199
SPEED =	40
PK HR % =	10
NEAR LANE/FAR LANE DIST =	65
ROAD ELEVATION =	0.0
GRADE =	0.0 %
PK HR VOL =	2,520

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		50
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15
MEDIUM TRUCKS =	15
HEAVY TRUCKS =	15

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL=	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.755	0.140	0.104	0.9200
MEDIUM TRUCKS	0.480	0.020	0.500	0.0300
HEAVY TRUCKS	0.480	0.020	0.500	0.0500

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	38.11	- -
MEDIUM TRUCKS	4.0	38.01	- -
HEAVY TRUCKS	8.0	38.12	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.2	68.1	66.8	60.8	69.2	69.8
MEDIUM TRUCKS	64.3	60.3	52.5	61.7	67.9	67.9
HEAVY TRUCKS	71.3	67.3	59.5	68.7	74.9	74.9
NOISE LEVELS (dBA)	74.2	71.1	67.7	70.1	76.6	76.7

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	70.2	68.1	66.8	60.8	69.2	69.8
MEDIUM TRUCKS	64.3	60.3	52.5	61.7	67.9	67.9
HEAVY TRUCKS	71.3	67.3	59.5	68.7	74.9	74.9
NOISE LEVELS (dBA)	74.2	71.1	67.7	70.1	76.6	76.7

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	140	302	651	1402
LDN	137	295	636	1370

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	TENTATIVE PARCEL MAP NO. 37231 – RANCHO ESTUDILLO PLAZA NOISE IMPACT STUDY	JOB #:	0144-6-1601
ROADWAY:	7TH STREET - EAST OF SANDERSON AVENUE	DATE:	27-Apr-18
LOCATION:	EXISTING - NOISE CONTOURS	ENGINEER:	M. DICKERSON

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	7,082	
SPEED =	40	
PK HR % =	10	
NEAR LANE/FAR LANE DIST	25	
ROAD ELEVATION =	0.0	
GRADE =	0.0	%
PK HR VOL =	708	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER =		10
PAD ELEVATION =		0.0
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

AUTOMOBILES =	15
MEDIUM TRUCKS =	15
HEAVY TRUCKS =	15

(10 = HARD SITE, 15 = SOFT SITE)

WALL INFORMATION

HTH WALL=	0.0	
AMBIENT=	0.0	
BARRIER =	0	(0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.755	0.140	0.105	0.9742
MEDIUM TRUCKS	0.489	0.022	0.489	0.0184
HEAVY TRUCKS	0.473	0.054	0.473	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	48.51	- -
MEDIUM TRUCKS	4.0	48.42	- -
HEAVY TRUCKS	8.0	48.51	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	63.3	61.3	60.0	54.0	62.4	63.0
MEDIUM TRUCKS	55.0	51.1	43.7	52.4	58.6	58.6
HEAVY TRUCKS	55.9	51.9	48.5	53.1	59.3	59.4
NOISE LEVELS (dBA)	64.6	62.1	60.4	58.0	65.2	65.6

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	63.3	61.3	60.0	54.0	62.4	63.0
MEDIUM TRUCKS	55.0	51.1	43.7	52.4	58.6	58.6
HEAVY TRUCKS	55.9	51.9	48.5	53.1	59.3	59.4
NOISE LEVELS (dBA)	64.6	62.1	60.4	58.0	65.2	65.6

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	25	55	118	253
LDN	24	52	111	239

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: TENTATIVE PARCEL MAP NO. 37231 – RANCHO ESTUDILLO PLAZA NOISE IMPACT STUDY
ROADWAY: 7TH STREET - EAST OF SANDERSON AVENUE
LOCATION: EXISTING PLUS PROJECT - NOISE CONTOURS

JOB #: 0144-6-1601
DATE: 27-Apr-18
ENGINEER: M. DICKERSON

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT = 9,565
SPEED = 40
PK HR % = 10
NEAR LANE/FAR LANE DIST = 25
ROAD ELEVATION = 0.0
GRADE = 0.0 %
PK HR VOL = 957

RECEIVER INPUT DATA

RECEIVER DISTANCE = 50
DIST C/L TO WALL = 0
RECEIVER HEIGHT = 5.0
WALL DISTANCE FROM RECEIVER = 10
PAD ELEVATION = 0.0
ROADWAY VIEW: LF ANGLE= -90
RT ANGLE= 90
DF ANGLE= 180

SITE CONDITIONS

AUTOMOBILES = 15
MEDIUM TRUCKS = 15 (10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS = 15

WALL INFORMATION

HTH WALL= 0.0
AMBIENT= 0.0
BARRIER = 0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.755	0.140	0.105	0.9742
MEDIUM TRUCKS	0.489	0.022	0.489	0.0184
HEAVY TRUCKS	0.473	0.054	0.473	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	48.51	- -
MEDIUM TRUCKS	4.0	48.42	- -
HEAVY TRUCKS	8.0	48.51	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	64.6	62.6	61.3	55.3	63.7	64.3
MEDIUM TRUCKS	56.3	52.4	45.0	53.7	59.9	59.9
HEAVY TRUCKS	57.2	53.2	49.8	54.4	60.6	60.7
NOISE LEVELS (dBA)	65.9	63.4	61.7	59.3	66.5	66.9

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	64.6	62.6	61.3	55.3	63.7	64.3
MEDIUM TRUCKS	56.3	52.4	45.0	53.7	59.9	59.9
HEAVY TRUCKS	57.2	53.2	49.8	54.4	60.6	60.7
NOISE LEVELS (dBA)	65.9	63.4	61.7	59.3	66.5	66.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	31	67	144	310
LDN	29	63	136	292

Appendix C:
SoundPLAN Input and Output

Noise emissions of industry sources

Source name	Reference	Level		Frequency s	Corrections		
				500	Cwall	CI	CT
			dB(A)	Hz	dB(A)	dB(A)	dB(A)
Speaker Phone 1	Lw/m,m2	Leq1	73.0	73.0	-	-	-
		Lmax	-	-	-	-	-
Speaker Phone 2	Lw/m,m2	Leq1	73.0	73.0	-	-	-
		Lmax	-	-	-	-	-
Loading Area	Lw/m,m2	Leq1	75.0		-	-	-
		Lmax	-		-	-	-
Gas Canopy	Lw/m,m2	Leq1	55.0		-	-	-
		Lmax	-		-	-	-

Noise emissions of parking lot traffic

Name	Parking lot type	Low noise trolleys	Size	Movements per hour		Road surface	Separated method	Level
				Leq1	Lmax			dB(A)
Parking Lot 1	Visitors and staff	-	14 Parking bays	10.500	0.000	Asphaltic driving lane	no	76.2
Parking Lot 2	Visitors and staff	-	14 Parking bays	10.500	0.000	Asphaltic driving lane	no	76.2
Parking Lot 3	Visitors and staff	-	14 Parking bays	3.750	0.000	Asphaltic driving lane	no	76.2
Parking Lot 4	Visitors and staff	-	9 Parking bays	3.750	0.000	Asphaltic driving lane	no	72.5
Parking Lot 5	Visitors and staff	-	5 Parking bays	1.250	0.000	Asphaltic driving lane	no	70.0
Parking Lot 6	Visitors and staff	-	10 Parking bays	2.500	0.000	Asphaltic driving lane	no	73.0
Parking Lot 7	Visitors and staff	-	6 Parking bays	1.500	0.000	Asphaltic driving lane	no	70.8
Parking Lot 8	Visitors and staff	-	30 Parking bays	7.500	0.000	Asphaltic driving lane	no	81.1
Parking Lot 9	Visitors and staff	-	28 Parking bays	7.000	0.000	Asphaltic driving lane	no	80.7
Parking Lot 10	Visitors and staff	-	30 Parking bays	7.500	0.000	Asphaltic driving lane	no	81.1
Parking Lot 11	Visitors and staff	-	28 Parking bays	7.000	0.000	Asphaltic driving lane	no	80.7
Parking Lot 12	Visitors and staff	-	30 Parking bays	7.500	0.000	Asphaltic driving lane	no	81.1
Parking Lot 13	Visitors and staff	-	8 Parking bays	2.000	0.000	Asphaltic driving lane	no	72.0
Parking Lot 14	Visitors and staff	-	16 Parking bays	4.000	0.000	Asphaltic driving lane	no	77.2
Parking Lot 15	Visitors and staff	-	8 Parking bays	2.000	0.000	Asphaltic driving lane	no	72.0
Parking Lot 16	Visitors and staff	-	30 Parking bays	7.500	0.000	Asphaltic driving lane	no	81.1
Parking Lot 17	Visitors and staff	-	30 Parking bays	7.500	0.000	Asphaltic driving lane	no	81.1
Parking Lot 18	Visitors and staff	-	14 Parking bays	3.500	0.000	Asphaltic driving lane	no	76.2
Parking Lot 19	Visitors and staff	-	11 Parking bays	2.750	0.000	Asphaltic driving lane	no	74.2
Parking Lot 20	Visitors and staff	-	16 Parking bays	4.000	0.000	Asphaltic driving lane	no	77.2

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
1 1.Fl	51.1	51.1
Gas Canopy	30.3	30.3
Loading Area	21.8	21.8
Parking Lot 1	38.5	38.5
Parking Lot 2	42.4	42.4
Parking Lot 3	36.4	36.4
Parking Lot 4	28.3	28.3
Parking Lot 5	22.3	22.3
Parking Lot 6	35.1	35.1
Parking Lot 7	28.3	28.3
Parking Lot 8	38.4	38.1
Parking Lot 9	37.2	37.2
Parking Lot 10	40.1	40.1
Parking Lot 11	42.3	42.4
Parking Lot 12	43.6	43.6
Parking Lot 13	24.7	24.7
Parking Lot 14	31.3	31.3
Parking Lot 15	29.3	29.3
Parking Lot 16	41.9	42.0
Parking Lot 17	41.1	41.1
Parking Lot 18	27.6	27.6
Parking Lot 19	12.6	12.6
Parking Lot 20	21.9	21.5
Speaker Phone 1	21.2	21.2
Speaker Phone 2	-3.6	-3.6
2 1.Fl	51.4	51.4
Gas Canopy	29.4	29.4
Loading Area	21.4	21.4
Parking Lot 1	38.8	38.8
Parking Lot 2	43.9	43.9
Parking Lot 3	38.1	38.1
Parking Lot 4	31.9	31.9
Parking Lot 5	18.7	18.7
Parking Lot 6	34.6	34.6
Parking Lot 7	26.6	26.6
Parking Lot 8	41.9	41.9
Parking Lot 9	41.6	41.5
Parking Lot 10	38.9	38.8
Parking Lot 11	39.9	39.7
Parking Lot 12	44.7	44.6
Parking Lot 13	29.4	29.4
Parking Lot 14	34.4	34.4
Parking Lot 15	19.3	19.3
Parking Lot 16	37.7	37.7
Parking Lot 17	35.8	35.8
Parking Lot 18	32.5	32.5
Parking Lot 19	12.9	12.9
Parking Lot 20	29.8	28.9
Speaker Phone 1	23.7	23.7
Speaker Phone 2	-0.7	-0.7
3 1.Fl	49.6	49.4
Gas Canopy	21.5	21.5
Loading Area	20.5	20.5
Parking Lot 1	36.7	36.6
Parking Lot 2	35.4	35.2
Parking Lot 3	37.3	37.3
Parking Lot 4	34.3	34.3
Parking Lot 5	23.7	23.7
Parking Lot 6	27.3	27.3
Parking Lot 7	17.3	17.3
Parking Lot 8	43.8	43.5
Parking Lot 9	42.5	42.5
Parking Lot 10	38.9	38.9

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
Parking Lot 11	35.4	35.4
Parking Lot 12	38.6	38.6
Parking Lot 13	25.1	25.1
Parking Lot 14	32.6	32.6
Parking Lot 15	21.1	21.1
Parking Lot 16	35.8	35.8
Parking Lot 17	35.3	35.4
Parking Lot 18	20.9	21.0
Parking Lot 19	10.7	10.7
Parking Lot 20	35.1	31.8
Speaker Phone 1	21.0	21.0
Speaker Phone 2	24.7	24.7
4 1.Fl 53.2 47.9		
Gas Canopy	15.0	11.3
Loading Area	22.5	22.2
Parking Lot 1	44.3	38.3
Parking Lot 2	30.9	29.2
Parking Lot 3	30.0	27.4
Parking Lot 4	27.1	25.0
Parking Lot 5	19.0	16.0
Parking Lot 6	19.3	17.3
Parking Lot 7	9.9	7.8
Parking Lot 8	47.4	41.9
Parking Lot 9	46.2	40.7
Parking Lot 10	45.7	40.1
Parking Lot 11	42.7	37.4
Parking Lot 12	40.8	36.1
Parking Lot 13	23.9	19.6
Parking Lot 14	31.0	27.1
Parking Lot 15	21.3	17.9
Parking Lot 16	33.0	30.2
Parking Lot 17	33.1	29.5
Parking Lot 18	21.5	17.9
Parking Lot 19	13.9	12.1
Parking Lot 20	38.0	33.3
Speaker Phone 1	15.8	9.9
Speaker Phone 2	31.5	28.4
4 2.Fl 52.9 51.9		
Gas Canopy	17.1	17.1
Loading Area	22.8	23.0
Parking Lot 1	44.4	43.5
Parking Lot 2	31.5	31.5
Parking Lot 3	30.6	30.6
Parking Lot 4	28.0	28.0
Parking Lot 5	19.2	19.2
Parking Lot 6	19.5	19.5
Parking Lot 7	9.5	9.5
Parking Lot 8	47.4	45.7
Parking Lot 9	46.0	44.9
Parking Lot 10	45.1	44.3
Parking Lot 11	41.9	41.4
Parking Lot 12	40.1	39.9
Parking Lot 13	23.3	23.3
Parking Lot 14	30.6	30.6
Parking Lot 15	21.3	21.3
Parking Lot 16	33.4	33.3
Parking Lot 17	32.8	32.9
Parking Lot 18	20.8	20.9
Parking Lot 19	12.7	12.7
Parking Lot 20	37.1	35.0
Speaker Phone 1	17.4	17.4
Speaker Phone 2	33.1	33.1

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
5 1.Fl	55.6	49.8
Gas Canopy	10.2	9.9
Loading Area	23.7	23.4
Parking Lot 1	47.6	41.3
Parking Lot 2	30.8	28.8
Parking Lot 3	29.5	26.9
Parking Lot 4	29.0	25.7
Parking Lot 5	26.6	21.0
Parking Lot 6	22.4	17.4
Parking Lot 7	12.8	7.2
Parking Lot 8	50.1	44.2
Parking Lot 9	47.7	41.9
Parking Lot 10	47.0	41.3
Parking Lot 11	45.2	39.5
Parking Lot 12	44.8	39.3
Parking Lot 13	28.7	23.2
Parking Lot 14	36.1	30.7
Parking Lot 15	27.3	21.9
Parking Lot 16	38.6	33.5
Parking Lot 17	36.5	31.5
Parking Lot 18	24.0	19.3
Parking Lot 19	14.5	13.0
Parking Lot 20	36.6	30.6
Speaker Phone 1	8.6	8.4
Speaker Phone 2	32.7	29.2
5 2.Fl	55.3	54.2
Gas Canopy	12.7	12.7
Loading Area	24.0	24.1
Parking Lot 1	47.6	46.5
Parking Lot 2	31.3	31.3
Parking Lot 3	30.3	30.3
Parking Lot 4	29.4	29.3
Parking Lot 5	26.1	25.3
Parking Lot 6	21.9	21.9
Parking Lot 7	11.7	11.7
Parking Lot 8	50.1	48.5
Parking Lot 9	47.7	46.6
Parking Lot 10	46.8	45.9
Parking Lot 11	44.5	43.7
Parking Lot 12	43.8	43.1
Parking Lot 13	27.4	26.7
Parking Lot 14	34.7	34.0
Parking Lot 15	25.8	25.1
Parking Lot 16	37.4	36.6
Parking Lot 17	35.2	34.4
Parking Lot 18	22.6	22.0
Parking Lot 19	13.3	13.3
Parking Lot 20	36.6	36.0
Speaker Phone 1	12.3	12.3
Speaker Phone 2	34.6	34.6
7 1.Fl	57.7	51.1
Gas Canopy	13.3	10.4
Loading Area	24.8	24.5
Parking Lot 1	48.9	41.9
Parking Lot 2	37.9	31.2
Parking Lot 3	37.5	30.8
Parking Lot 4	35.9	29.5
Parking Lot 5	27.4	21.0
Parking Lot 6	30.0	23.9
Parking Lot 7	12.7	6.2
Parking Lot 8	53.4	46.6
Parking Lot 9	49.6	43.0
Parking Lot 10	48.4	41.8

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
Parking Lot 11	46.2	39.7
Parking Lot 12	45.8	39.3
Parking Lot 13	29.8	23.4
Parking Lot 14	37.5	31.1
Parking Lot 15	28.7	22.3
Parking Lot 16	39.6	33.7
Parking Lot 17	36.1	30.8
Parking Lot 18	23.9	19.0
Parking Lot 19	15.1	14.0
Parking Lot 20	41.3	35.7
Speaker Phone 1	12.4	7.9
Speaker Phone 2	32.2	28.5
7 2.Fl	57.6	57.0
Gas Canopy	14.7	14.7
Loading Area	25.3	25.3
Parking Lot 1	48.8	48.3
Parking Lot 2	37.5	37.4
Parking Lot 3	37.4	37.2
Parking Lot 4	35.5	35.3
Parking Lot 5	26.9	26.7
Parking Lot 6	28.7	28.6
Parking Lot 7	11.3	11.3
Parking Lot 8	53.4	52.5
Parking Lot 9	49.6	49.0
Parking Lot 10	48.2	47.9
Parking Lot 11	45.8	45.6
Parking Lot 12	45.0	44.9
Parking Lot 13	28.7	28.5
Parking Lot 14	36.2	36.1
Parking Lot 15	27.3	27.2
Parking Lot 16	38.2	38.2
Parking Lot 17	34.7	34.6
Parking Lot 18	22.5	22.4
Parking Lot 19	14.2	14.2
Parking Lot 20	41.2	40.0
Speaker Phone 1	14.7	14.7
Speaker Phone 2	33.9	33.9
8 1.Fl	59.5	51.3
Gas Canopy	18.5	14.3
Loading Area	26.6	26.1
Parking Lot 1	48.2	40.3
Parking Lot 2	39.1	31.2
Parking Lot 3	38.7	30.9
Parking Lot 4	35.6	27.8
Parking Lot 5	27.5	19.3
Parking Lot 6	29.8	22.0
Parking Lot 7	13.5	6.0
Parking Lot 8	56.4	48.0
Parking Lot 9	51.1	42.9
Parking Lot 10	49.9	41.6
Parking Lot 11	47.1	38.6
Parking Lot 12	46.1	37.7
Parking Lot 13	29.9	21.6
Parking Lot 14	37.2	29.0
Parking Lot 15	28.2	20.1
Parking Lot 16	39.0	31.8
Parking Lot 17	35.0	29.1
Parking Lot 18	23.2	18.2
Parking Lot 19	16.2	15.1
Parking Lot 20	45.0	37.8
Speaker Phone 1	11.3	1.8
Speaker Phone 2	28.6	25.2

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
8 2.Fl	59.4	59.4
Gas Canopy	19.1	19.1
Loading Area	27.2	27.2
Parking Lot 1	48.2	48.2
Parking Lot 2	39.0	39.0
Parking Lot 3	38.5	38.5
Parking Lot 4	35.1	35.1
Parking Lot 5	26.9	26.9
Parking Lot 6	28.6	28.6
Parking Lot 7	12.1	12.1
Parking Lot 8	56.3	56.3
Parking Lot 9	51.1	51.2
Parking Lot 10	49.8	49.8
Parking Lot 11	46.9	46.9
Parking Lot 12	45.5	45.5
Parking Lot 13	28.8	28.8
Parking Lot 14	35.9	35.9
Parking Lot 15	26.8	26.8
Parking Lot 16	37.7	37.7
Parking Lot 17	33.8	33.8
Parking Lot 18	22.1	22.1
Parking Lot 19	15.7	15.7
Parking Lot 20	45.0	44.8
Speaker Phone 1	11.7	11.7
Speaker Phone 2	29.7	29.7
9 1.Fl	58.5	51.4
Gas Canopy	19.8	17.7
Loading Area	27.3	27.3
Parking Lot 1	46.5	39.9
Parking Lot 2	38.2	31.5
Parking Lot 3	38.0	31.6
Parking Lot 4	34.6	27.9
Parking Lot 5	26.1	19.5
Parking Lot 6	28.4	22.0
Parking Lot 7	13.1	5.8
Parking Lot 8	54.9	47.6
Parking Lot 9	50.3	43.2
Parking Lot 10	48.9	41.9
Parking Lot 11	46.3	39.3
Parking Lot 12	45.6	38.6
Parking Lot 13	29.8	22.8
Parking Lot 14	37.1	30.2
Parking Lot 15	28.2	21.4
Parking Lot 16	38.9	32.8
Parking Lot 17	33.5	28.9
Parking Lot 18	22.2	18.3
Parking Lot 19	16.6	16.1
Parking Lot 20	47.3	40.4
Speaker Phone 1	8.2	0.9
Speaker Phone 2	26.3	24.4
9 2.Fl	58.3	58.0
Gas Canopy	20.2	20.2
Loading Area	28.2	28.5
Parking Lot 1	46.5	46.0
Parking Lot 2	38.1	37.8
Parking Lot 3	37.5	37.2
Parking Lot 4	33.7	33.7
Parking Lot 5	25.4	25.4
Parking Lot 6	27.1	27.1
Parking Lot 7	11.6	11.6
Parking Lot 8	54.8	54.4
Parking Lot 9	50.2	50.2
Parking Lot 10	48.8	48.8

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
Parking Lot 11	46.1	46.1
Parking Lot 12	44.9	44.9
Parking Lot 13	28.8	28.7
Parking Lot 14	35.8	35.8
Parking Lot 15	26.8	26.8
Parking Lot 16	37.6	37.5
Parking Lot 17	32.4	32.4
Parking Lot 18	21.2	21.2
Parking Lot 19	16.6	16.6
Parking Lot 20	47.3	46.6
Speaker Phone 1	8.6	8.6
Speaker Phone 2	27.2	27.2
10 1.Fl 56.9 50.5		
Gas Canopy	20.3	19.0
Loading Area	28.9	28.8
Parking Lot 1	44.5	38.6
Parking Lot 2	37.6	31.6
Parking Lot 3	36.7	31.0
Parking Lot 4	33.4	27.4
Parking Lot 5	25.4	19.4
Parking Lot 6	27.5	21.5
Parking Lot 7	12.9	5.3
Parking Lot 8	51.7	45.2
Parking Lot 9	48.6	42.2
Parking Lot 10	47.4	41.0
Parking Lot 11	44.7	38.4
Parking Lot 12	44.2	38.0
Parking Lot 13	28.3	22.2
Parking Lot 14	35.5	29.5
Parking Lot 15	26.8	20.8
Parking Lot 16	35.0	30.6
Parking Lot 17	28.2	27.4
Parking Lot 18	18.5	17.9
Parking Lot 19	17.8	17.7
Parking Lot 20	50.2	43.2
Speaker Phone 1	4.9	-0.5
Speaker Phone 2	23.8	22.7
10 2.Fl 56.7 56.0		
Gas Canopy	20.6	20.6
Loading Area	30.0	30.0
Parking Lot 1	44.3	43.5
Parking Lot 2	37.2	36.4
Parking Lot 3	35.9	35.1
Parking Lot 4	32.4	31.8
Parking Lot 5	24.5	24.0
Parking Lot 6	26.1	25.7
Parking Lot 7	11.5	11.5
Parking Lot 8	51.7	50.7
Parking Lot 9	48.6	47.9
Parking Lot 10	47.3	46.8
Parking Lot 11	44.4	44.0
Parking Lot 12	43.5	43.2
Parking Lot 13	27.2	27.1
Parking Lot 14	34.3	34.2
Parking Lot 15	25.5	25.5
Parking Lot 16	34.5	34.5
Parking Lot 17	28.6	28.6
Parking Lot 18	18.8	18.8
Parking Lot 19	18.7	18.7
Parking Lot 20	50.2	49.4
Speaker Phone 1	5.3	5.3
Speaker Phone 2	24.5	24.5

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
11 1.Fl	55.5	49.3
Gas Canopy	20.1	19.0
Loading Area	30.1	29.8
Parking Lot 1	43.4	37.8
Parking Lot 2	37.5	31.6
Parking Lot 3	35.7	30.1
Parking Lot 4	32.6	26.7
Parking Lot 5	25.0	19.1
Parking Lot 6	24.8	19.5
Parking Lot 7	6.6	5.2
Parking Lot 8	49.3	43.2
Parking Lot 9	47.2	41.1
Parking Lot 10	45.2	39.2
Parking Lot 11	40.9	35.5
Parking Lot 12	37.2	33.4
Parking Lot 13	18.2	16.5
Parking Lot 14	29.1	25.4
Parking Lot 15	18.1	15.7
Parking Lot 16	30.4	29.0
Parking Lot 17	28.3	27.9
Parking Lot 18	19.0	18.6
Parking Lot 19	19.2	18.9
Parking Lot 20	51.1	43.9
Speaker Phone 1	3.0	-1.5
Speaker Phone 2	22.3	21.4
11 2.Fl	55.4	54.6
Gas Canopy	20.5	20.5
Loading Area	31.4	31.4
Parking Lot 1	42.9	42.0
Parking Lot 2	36.7	35.8
Parking Lot 3	34.6	33.8
Parking Lot 4	31.4	30.8
Parking Lot 5	23.9	23.4
Parking Lot 6	23.8	23.5
Parking Lot 7	5.8	5.8
Parking Lot 8	49.3	48.1
Parking Lot 9	47.1	46.4
Parking Lot 10	45.0	44.4
Parking Lot 11	40.6	40.3
Parking Lot 12	37.5	37.4
Parking Lot 13	19.5	19.5
Parking Lot 14	29.1	29.1
Parking Lot 15	18.9	18.9
Parking Lot 16	31.5	31.5
Parking Lot 17	29.3	29.3
Parking Lot 18	19.9	19.9
Parking Lot 19	20.7	20.7
Parking Lot 20	51.0	50.3
Speaker Phone 1	3.3	3.3
Speaker Phone 2	22.8	22.8
12 1.Fl	53.5	47.5
Gas Canopy	12.5	10.3
Loading Area	31.2	30.1
Parking Lot 1	42.2	36.9
Parking Lot 2	37.2	31.5
Parking Lot 3	34.5	29.2
Parking Lot 4	30.4	24.7
Parking Lot 5	17.2	12.5
Parking Lot 6	17.3	15.0
Parking Lot 7	6.1	5.2
Parking Lot 8	46.9	41.2
Parking Lot 9	44.8	38.9
Parking Lot 10	39.6	34.2

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
Parking Lot 11	33.3	30.5
Parking Lot 12	32.3	30.4
Parking Lot 13	16.0	14.7
Parking Lot 14	23.7	22.4
Parking Lot 15	14.6	13.5
Parking Lot 16	31.4	28.2
Parking Lot 17	30.0	28.2
Parking Lot 18	21.0	19.0
Parking Lot 19	21.5	19.6
Parking Lot 20	50.0	42.9
Speaker Phone 1	1.3	-2.5
Speaker Phone 2	20.7	20.1
12 2.Fl	53.3	52.6
Gas Canopy	17.3	17.3
Loading Area	32.5	32.5
Parking Lot 1	41.3	40.4
Parking Lot 2	36.0	35.1
Parking Lot 3	33.3	32.3
Parking Lot 4	29.2	28.6
Parking Lot 5	17.5	17.5
Parking Lot 6	18.5	18.5
Parking Lot 7	5.9	5.9
Parking Lot 8	46.8	45.5
Parking Lot 9	44.4	43.7
Parking Lot 10	39.4	39.2
Parking Lot 11	34.3	34.3
Parking Lot 12	33.6	33.6
Parking Lot 13	17.6	17.6
Parking Lot 14	25.6	25.6
Parking Lot 15	16.1	16.1
Parking Lot 16	32.3	32.3
Parking Lot 17	31.1	31.1
Parking Lot 18	21.9	21.9
Parking Lot 19	23.0	23.0
Parking Lot 20	50.0	49.4
Speaker Phone 1	1.5	1.5
Speaker Phone 2	21.1	21.1
13 1.Fl	63.4	59.6
Gas Canopy	10.8	13.2
Loading Area	63.2	58.8
Parking Lot 1	28.5	30.2
Parking Lot 2	28.4	29.6
Parking Lot 3	26.0	26.1
Parking Lot 4	27.9	26.0
Parking Lot 5	17.8	18.6
Parking Lot 6	16.7	18.7
Parking Lot 7	11.9	14.0
Parking Lot 8	31.8	33.8
Parking Lot 9	31.3	33.2
Parking Lot 10	33.4	34.5
Parking Lot 11	39.5	38.3
Parking Lot 12	33.8	35.7
Parking Lot 13	18.0	20.2
Parking Lot 14	26.1	28.2
Parking Lot 15	18.3	20.3
Parking Lot 16	43.5	45.6
Parking Lot 17	45.0	47.4
Parking Lot 18	37.9	39.8
Parking Lot 19	43.0	44.8
Parking Lot 20	31.4	30.3
Speaker Phone 1	-1.4	0.9
Speaker Phone 2	-3.1	-0.7

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
14 1.Fl	52.6	52.5
Gas Canopy	17.6	17.6
Loading Area	43.6	43.1
Parking Lot 1	30.4	30.4
Parking Lot 2	37.1	37.1
Parking Lot 3	31.2	31.2
Parking Lot 4	24.7	24.7
Parking Lot 5	23.0	23.0
Parking Lot 6	22.9	22.9
Parking Lot 7	25.9	25.9
Parking Lot 8	31.1	31.1
Parking Lot 9	31.1	31.1
Parking Lot 10	34.5	34.5
Parking Lot 11	35.8	35.8
Parking Lot 12	40.0	40.0
Parking Lot 13	28.9	28.9
Parking Lot 14	37.6	37.6
Parking Lot 15	29.8	29.8
Parking Lot 16	48.0	48.0
Parking Lot 17	47.0	47.0
Parking Lot 18	38.7	38.8
Parking Lot 19	35.2	34.5
Parking Lot 20	23.4	20.5
Speaker Phone 1	12.8	12.8
Speaker Phone 2	-8.4	-8.4

Noise emissions of industry sources

Source name	Reference	Level		Frequency s	Corrections		
				500	Cwall	CI	CT
			dB(A)	Hz	dB(A)	dB(A)	dB(A)
Speaker Phone 1	Lw/m,m2	Leq1	73.0	73.0	-	-	-
		Lmax	-	-	-	-	-
Speaker Phone 2	Lw/m,m2	Leq1	73.0	73.0	-	-	-
		Lmax	-	-	-	-	-
Gas Canopy	Lw/m,m2	Leq1	55.0		-	-	-
		Lmax	-		-	-	-

Noise emissions of parking lot traffic

Name	Parking lot type	Low noise trolleys	Size	Movements per hour Leq1	Movements per hour Lmax	Road surface	Separated method	Level dB(A)
Parking Lot 1	Visitors and staff	-	14 Parking bays	5.250	0.000	Asphaltic driving lane	no	76.2
Parking Lot 2	Visitors and staff	-	14 Parking bays	5.250	0.000	Asphaltic driving lane	no	76.2
Parking Lot 3	Visitors and staff	-	14 Parking bays	3.750	0.000	Asphaltic driving lane	no	76.2
Parking Lot 4	Visitors and staff	-	9 Parking bays	3.750	0.000	Asphaltic driving lane	no	72.5
Parking Lot 5	Visitors and staff	-	5 Parking bays	1.250	0.000	Asphaltic driving lane	no	70.0
Parking Lot 6	Visitors and staff	-	10 Parking bays	2.500	0.000	Asphaltic driving lane	no	73.0
Parking Lot 7	Visitors and staff	-	6 Parking bays	1.500	0.000	Asphaltic driving lane	no	70.8

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
1 1.Fl 43.5 43.5		
Gas Canopy	30.3	30.3
Parking Lot 1	35.5	35.5
Parking Lot 2	39.4	39.4
Parking Lot 3	36.4	36.4
Parking Lot 4	28.3	28.3
Parking Lot 5	22.3	22.3
Parking Lot 6	35.1	35.1
Parking Lot 7	28.3	28.3
Speaker Phone 1	21.2	21.2
Speaker Phone 2	-3.6	-3.6
2 1.Fl 44.6 44.6		
Gas Canopy	29.4	29.4
Parking Lot 1	35.8	35.8
Parking Lot 2	40.9	40.9
Parking Lot 3	38.1	38.1
Parking Lot 4	31.9	31.9
Parking Lot 5	18.7	18.7
Parking Lot 6	34.6	34.6
Parking Lot 7	26.6	26.6
Speaker Phone 1	23.7	23.7
Speaker Phone 2	-0.7	-0.7
3 1.Fl 41.3 41.2		
Gas Canopy	21.5	21.5
Parking Lot 1	33.7	33.6
Parking Lot 2	32.3	32.1
Parking Lot 3	37.3	37.3
Parking Lot 4	34.3	34.3
Parking Lot 5	23.7	23.7
Parking Lot 6	27.3	27.3
Parking Lot 7	17.3	17.3
Speaker Phone 1	21.0	21.0
Speaker Phone 2	24.7	24.7
4 1.Fl 42.4 37.4		
Gas Canopy	15.0	11.3
Parking Lot 1	41.3	35.3
Parking Lot 2	27.9	26.1
Parking Lot 3	30.0	27.4
Parking Lot 4	27.1	25.0
Parking Lot 5	19.0	16.0
Parking Lot 6	19.3	17.3
Parking Lot 7	9.9	7.8
Speaker Phone 1	15.8	9.9
Speaker Phone 2	31.5	28.4
4 2.Fl 42.7 42.0		
Gas Canopy	17.1	17.1
Parking Lot 1	41.4	40.5
Parking Lot 2	28.5	28.5
Parking Lot 3	30.6	30.6
Parking Lot 4	28.0	28.0
Parking Lot 5	19.2	19.2
Parking Lot 6	19.5	19.5
Parking Lot 7	9.5	9.5
Speaker Phone 1	17.4	17.4
Speaker Phone 2	33.1	33.1
5 1.Fl 45.2 39.5		
Gas Canopy	10.2	9.9
Parking Lot 1	44.6	38.3
Parking Lot 2	27.7	25.7
Parking Lot 3	29.5	26.9
Parking Lot 4	29.0	25.7

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
Parking Lot 5	26.6	21.0
Parking Lot 6	22.4	17.4
Parking Lot 7	12.8	7.2
Speaker Phone 1	8.6	8.4
Speaker Phone 2	32.7	29.2
5 2.Fl 45.4 44.5		
Gas Canopy	12.7	12.7
Parking Lot 1	44.5	43.5
Parking Lot 2	28.3	28.3
Parking Lot 3	30.3	30.3
Parking Lot 4	29.4	29.3
Parking Lot 5	26.1	25.3
Parking Lot 6	21.9	21.9
Parking Lot 7	11.7	11.7
Speaker Phone 1	12.3	12.3
Speaker Phone 2	34.6	34.6
7 1.Fl 47.3 40.7		
Gas Canopy	13.3	10.4
Parking Lot 1	45.9	38.9
Parking Lot 2	34.8	28.2
Parking Lot 3	37.5	30.8
Parking Lot 4	35.9	29.5
Parking Lot 5	27.4	21.0
Parking Lot 6	30.0	23.9
Parking Lot 7	12.7	6.2
Speaker Phone 1	12.4	7.9
Speaker Phone 2	32.2	28.5
7 2.Fl 47.3 46.9		
Gas Canopy	14.7	14.7
Parking Lot 1	45.8	45.3
Parking Lot 2	34.5	34.4
Parking Lot 3	37.4	37.2
Parking Lot 4	35.5	35.3
Parking Lot 5	26.9	26.7
Parking Lot 6	28.7	28.6
Parking Lot 7	11.3	11.3
Speaker Phone 1	14.7	14.7
Speaker Phone 2	33.9	33.9
8 1.Fl 47.1 39.3		
Gas Canopy	18.5	14.3
Parking Lot 1	45.2	37.3
Parking Lot 2	36.1	28.2
Parking Lot 3	38.7	30.9
Parking Lot 4	35.6	27.8
Parking Lot 5	27.5	19.3
Parking Lot 6	29.8	22.0
Parking Lot 7	13.5	6.0
Speaker Phone 1	11.3	1.8
Speaker Phone 2	28.6	25.2
8 2.Fl 47.0 47.0		
Gas Canopy	19.1	19.1
Parking Lot 1	45.2	45.2
Parking Lot 2	36.0	36.0
Parking Lot 3	38.5	38.5
Parking Lot 4	35.1	35.1
Parking Lot 5	26.9	26.9
Parking Lot 6	28.6	28.6
Parking Lot 7	12.1	12.1
Speaker Phone 1	11.7	11.7
Speaker Phone 2	29.7	29.7

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
9 1.Fl 45.6 39.1		
Gas Canopy	19.8	17.7
Parking Lot 1	43.4	36.9
Parking Lot 2	35.2	28.5
Parking Lot 3	38.0	31.6
Parking Lot 4	34.6	27.9
Parking Lot 5	26.1	19.5
Parking Lot 6	28.4	22.0
Parking Lot 7	13.1	5.8
Speaker Phone 1	8.2	0.9
Speaker Phone 2	26.3	24.4
9 2.Fl 45.4 45.1		
Gas Canopy	20.2	20.2
Parking Lot 1	43.4	43.0
Parking Lot 2	35.1	34.8
Parking Lot 3	37.5	37.2
Parking Lot 4	33.7	33.7
Parking Lot 5	25.4	25.4
Parking Lot 6	27.1	27.1
Parking Lot 7	11.6	11.6
Speaker Phone 1	8.6	8.6
Speaker Phone 2	27.2	27.2
10 1.Fl 44.0 38.2		
Gas Canopy	20.3	19.0
Parking Lot 1	41.4	35.6
Parking Lot 2	34.6	28.6
Parking Lot 3	36.7	31.0
Parking Lot 4	33.4	27.4
Parking Lot 5	25.4	19.4
Parking Lot 6	27.5	21.5
Parking Lot 7	12.9	5.3
Speaker Phone 1	4.9	-0.5
Speaker Phone 2	23.8	22.7
10 2.Fl 43.6 42.8		
Gas Canopy	20.6	20.6
Parking Lot 1	41.3	40.5
Parking Lot 2	34.1	33.4
Parking Lot 3	35.9	35.1
Parking Lot 4	32.4	31.8
Parking Lot 5	24.5	24.0
Parking Lot 6	26.1	25.7
Parking Lot 7	11.5	11.5
Speaker Phone 1	5.3	5.3
Speaker Phone 2	24.5	24.5
11 1.Fl 43.0 37.5		
Gas Canopy	20.1	19.0
Parking Lot 1	40.4	34.8
Parking Lot 2	34.5	28.6
Parking Lot 3	35.7	30.1
Parking Lot 4	32.6	26.7
Parking Lot 5	25.0	19.1
Parking Lot 6	24.8	19.5
Parking Lot 7	6.6	5.2
Speaker Phone 1	3.0	-1.5
Speaker Phone 2	22.3	21.4
11 2.Fl 42.3 41.5		
Gas Canopy	20.5	20.5
Parking Lot 1	39.9	39.0
Parking Lot 2	33.7	32.8
Parking Lot 3	34.6	33.8
Parking Lot 4	31.4	30.8

Contribution levels of the receivers

Source name	Level w/o NP Leq1 dB(A)	Level w NP Leq1 dB(A)
Parking Lot 5	23.9	23.4
Parking Lot 6	23.8	23.5
Parking Lot 7	5.8	5.8
Speaker Phone 1	3.3	3.3
Speaker Phone 2	22.8	22.8
12 1.Fl 41.8 36.5		
Gas Canopy	12.5	10.3
Parking Lot 1	39.2	33.9
Parking Lot 2	34.2	28.5
Parking Lot 3	34.5	29.2
Parking Lot 4	30.4	24.7
Parking Lot 5	17.2	12.5
Parking Lot 6	17.3	15.0
Parking Lot 7	6.1	5.2
Speaker Phone 1	1.3	-2.5
Speaker Phone 2	20.7	20.1
12 2.Fl 40.8 40.0		
Gas Canopy	17.3	17.3
Parking Lot 1	38.3	37.4
Parking Lot 2	33.0	32.1
Parking Lot 3	33.3	32.3
Parking Lot 4	29.2	28.6
Parking Lot 5	17.5	17.5
Parking Lot 6	18.5	18.5
Parking Lot 7	5.9	5.9
Speaker Phone 1	1.5	1.5
Speaker Phone 2	21.1	21.1
13 1.Fl 32.7 33.0		
Gas Canopy	10.8	13.2
Parking Lot 1	25.5	27.1
Parking Lot 2	25.4	26.6
Parking Lot 3	26.0	26.1
Parking Lot 4	27.9	26.0
Parking Lot 5	17.8	18.6
Parking Lot 6	16.7	18.7
Parking Lot 7	11.9	14.0
Speaker Phone 1	-1.4	0.9
Speaker Phone 2	-3.1	-0.7
14 1.Fl 37.4 37.4		
Gas Canopy	17.6	17.6
Parking Lot 1	27.4	27.4
Parking Lot 2	34.0	34.0
Parking Lot 3	31.2	31.2
Parking Lot 4	24.7	24.7
Parking Lot 5	23.0	23.0
Parking Lot 6	22.9	22.9
Parking Lot 7	25.9	25.9
Speaker Phone 1	12.8	12.8
Speaker Phone 2	-8.4	-8.4

Appendix D:

Construction Noise Modeling Output

Activity	L_{eq} at 50 feet dBA	L_{Max} at 50 feet dBA
Grading	90	92
Building Construction	85	87
Paving	87	90

Equipment Summary	Reference (dBA) 50 ft Lmax
Rock Drills	96
Jack Hammers	82
Pneumatic Tools	85
Pavers	80
Dozers	85
Scrappers	87
Haul Trucks	88
Cranes	82
Portable Generators	80
Rollers	80
Tractors	80
Front-End Loaders	86
Hydraulic Excavators	86
Graders	86
Air Compressors	86
Trucks	86

Grading

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
		Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements								
1	Grader	86	1	40	50	0.5	0	86.0	82.0	159242868
2	Dozer	85	1	40	50	0.5	0	85.0	81.0	126491106
3	Excavator	86	2	40	50	0.5	0	89.0	85.0	318485736
4	Tractor/Backhoe	80	2	40	50	0.5	0	83.0	79.0	80000000
5	Scrapper	87	2	40	50	0.5	0	90.0	86.0	400949787
							Lmax*	92	Leq	90
							Lw	124	Lw	122

Source: MD Acoustics, April 2018.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**90**	**89**	**88**	**87**	**86**	**85**	**84**	**83**	**82**	**81**	**80**	**79**	**78**	**77**	**76**	**75**
60	18.3	0.5	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73
70	21.3	0.5	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72
80	24.4	0.5	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70
90	27.4	0.5	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69
100	30.5	0.5	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68
110	33.5	0.5	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67
120	36.6	0.5	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66
130	39.6	0.5	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65
140	42.7	0.5	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
150	45.7	0.5	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63
160	48.8	0.5	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63
170	51.8	0.5	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62
180	54.9	0.5	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61
190	57.9	0.5	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61
200	61.0	0.5	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60
210	64.0	0.5	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60
220	67.1	0.5	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59
230	70.1	0.5	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59
240	73.1	0.5	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58
250	76.2	0.5	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58
260	79.2	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
270	82.3	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
280	85.3	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
290	88.4	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
300	91.4	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
310	94.5	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
320	97.5	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
330	100.6	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
340	103.6	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
350	106.7	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
360	109.7	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
370	112.8	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54

Building Construction

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
	Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements									
1	Cranes	82	1	40	50	0.5	0	82.0	78.0	63395727.7
2	Forklift/Tractor	80	3	40	50	0.5	0	84.8	80.8	120000000
3	Generator	80	1	40	50	0.5	0	80.0	76.0	40000000
4	Tractor/Backhoe	80	3	40	50	0.5	0	84.8	80.8	120000000
							Lmax*	**87**	**Leq**	**85**
							Lw	**118**	**Lw**	**117**

Source: MD Acoustics, April 2018.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**85**	**84**	**83**	**82**	**81**	**80**	**79**	**78**	**77**	**76**	**75**	**74**	**73**	**72**	**71**	**70**
60	18.3	0.5	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68
70	21.3	0.5	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67
80	24.4	0.5	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65
90	27.4	0.5	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
100	30.5	0.5	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63
110	33.5	0.5	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62
120	36.6	0.5	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61
130	39.6	0.5	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60
140	42.7	0.5	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59
150	45.7	0.5	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58
160	48.8	0.5	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58
170	51.8	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
180	54.9	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
190	57.9	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
200	61.0	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
210	64.0	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
220	67.1	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
230	70.1	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
240	73.1	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
250	76.2	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
260	79.2	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
270	82.3	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
280	85.3	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
290	88.4	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
300	91.4	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
310	94.5	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
320	97.5	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
330	100.6	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
340	103.6	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
350	106.7	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
360	109.7	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49
370	112.8	0.5	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49

Paving

No.	Equipment Description	Reference (dBA) 50 ft Lmax	Quantity	Usage Factor[1]	Distance to Receptor (ft)	Ground Effect	Shielding (dBA)	Calculated (dBA) Lmax	Calculated (dBA) Leq	Energy
	Noise Level Calculation Prior to Implementation of Noise Attenuation Requirements									
1	Pavers	86	2	40	50	0.5	0	89.0	85.0	318485736
2	Rollers	80	2	40	50	0.5	0	83.0	79.0	80000000
3	Paving Equipment	80	2	40	50	0.5	0	83.0	79.0	80000000
							Lmax*	**90**	**Leq**	**87**
							Lw	**122**	**Lw**	**118**

Source: MD Acoustics, April 2018.

1- Percentage of time that a piece of equipment is operating at full power.

dBA – A-weighted Decibels

Lmax- Maximum Level

Leq- Equivalent Level

Feet	Meters	Ground Effect	No Shielding Leq dBA	1 dBA Shielding Leq dBA	2 dBA Shielding Leq dBA	3 dBA Shielding Leq dBA	4 dBA Shielding Leq dBA	5 dBA Shielding Leq dBA	6 dBA Shielding Leq dBA	7 dBA Shielding Leq dBA	8 dBA Shielding Leq dBA	9 dBA Shielding Leq dBA	10 dBA Shielding Leq dBA	11 dBA Shielding LeqdBA	12 dBA Shielding Leq dBA	13 dBA Shielding Leq dBA	14 dBA Shielding Leq dBA	15 dBA Shielding Leq dBA
50	**15.2**	**0.5**	**87**	**86**	**85**	**84**	**83**	**82**	**81**	**80**	**79**	**78**	**77**	**76**	**75**	**74**	**73**	**72**
60	18.3	0.5	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70
70	21.3	0.5	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68
80	24.4	0.5	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67
90	27.4	0.5	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65
100	30.5	0.5	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64
110	33.5	0.5	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63
120	36.6	0.5	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62
130	39.6	0.5	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61
140	42.7	0.5	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61
150	45.7	0.5	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60
160	48.8	0.5	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59
170	51.8	0.5	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59
180	54.9	0.5	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58
190	57.9	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
200	61.0	0.5	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57
210	64.0	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
220	67.1	0.5	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56
230	70.1	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
240	73.1	0.5	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55
250	76.2	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
260	79.2	0.5	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54
270	82.3	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
280	85.3	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
290	88.4	0.5	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53
300	91.4	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
310	94.5	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
320	97.5	0.5	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52
330	100.6	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
340	103.6	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
350	106.7	0.5	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51
360	109.7	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50
370	112.8	0.5	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50

VIBRATION LEVEL IMPACT

Project:	Tentative Parcel Map 37282	Date: 4/30/18
Source:	Large Bulldozer	
Scenario:	Unmitigated	
Location:	Project Site	
Address:		

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

DATA INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN BLUE
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	20.00	Distance from Equipment to Receiver (ft)	
n =	1.10	Vibration attenuation rate through the ground	

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

DATA OUT RESULTS

PPV =	**0.114**	IN/SEC	OUTPUT IN RED