Palo Alto Mercedes Benz and Audi Dealership Project

Noise Assessment Study

May 2019 | YSM-01

Prepared for:

YSM Design
305 North Coast Highway, Suite L
Laguna Beach, CA 92651

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

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ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
APN	Assessor's Parcel Number
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
CAD	Computer Aided Design
CadnaA	Computer Aided Noise Abatement
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
City	City of Palo Alto
CNEL	Community Noise Equivalent Level
CS	City of Palo Alto Commercial Services Zone
dB	decibel
dBA	A-weighted decibels
FHWA	Federal Highway Administration
HVAC	Heating, ventilation, and air conditioning
Hz	Hertz
in/sec	inches per second
kHz	kilohertz
L_{DN}	Day-Night level
L_{EQ}	equivalent sound level
L_{MAX}	maximum noise level
mPa	micro-Pascals
NSLU	noise-sensitive land use
PPV	peak particle velocity
RCNM	Roadway Construction Noise Model
SF	square feet
SPL	sound pressure level
STC	sound transmission class
S_{WL}	sound power level

ACRONYMS AND ABBREVIATIONS (cont.)

TIA	Transportation Impact analysis
TNM	Traffic Noise Model
US-101	U.S. Highway 101

EXECUTIVE SUMMARY

This report presents an assessment of potential construction and operational noise impacts associated with the proposed Palo Alto Mercedes Benz and Audi Dealership Project (project), located at the southeast corner of Embarcadero Road and East Bayshore Road, at 1700 and 1730 Embarcadero Road in the City of Palo Alto, California. The project would construct a new Mercedes-Benz automobile dealership showroom and new parking garage and service facilities for the Mercedes-Benz and Audi dealerships, on a 4.82-acre site.

Anticipated construction noise impacts would generate elevated noise levels for adjacent land uses. Noise from project construction equipment would not exceed the City noise ordinance construction noise limits and the project would not result in a temporary increase ambient noise levels in the vicinity of the project in excess of standards established by the City. Construction vibration impacts at neighboring uses would be less than significant.

Operation of the project's proposed car wash and backup generators would result in significant noise impacts at nearby property lines. With implementation of mitigation measure MM-1 to install automated door on the car wash tunnel entrance and exit, car wash operational impacts would be reduced to less than significant. Operation of the proposed backup generators would be reduced to less than significant levels with implementation of MM-2 to install sound walls around the generators. Long-term operational noise related to the proposed buildings' mechanical equipment and parking areas would not result in a significant increase in ambient noise levels. With the mitigation measures described in the report, the combined operations of the car wash, rooftop heating, ventilation, and air conditioning (HVAC), parking areas, and backup generators would not exceed allowable exterior limits established by the City of Palo Alto (City) noise ordinance at the project property lines.

The project would add traffic to nearby roadways. The estimated maximum increase in traffic noise at the nearest receptors to project affect roadways would not result in a perceptible change in ambient noise levels. Impacts related to traffic noise increases would be less than significant.

The project would not expose people residing or working in the project area to excessive noise from a nearby public use airport or private airstrip and impacts related to aircraft noise would be less than significant.

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1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report analyzes potential noise and vibration impacts associated with the proposed Palo Alto Mercedes Benz and Audi Dealership Project (project). The analysis includes a description of existing conditions in the project vicinity, an assessment of potential impacts associated with project construction, and an evaluation of project operational impacts. Analysis within this report addresses the relevant issues listed in Appendix G of the California Environmental Quality Act (CEQA) Guidelines.

1.2 PROJECT LOCATION

The project is located on a 4.82-acre site comprising Assessor's Parcel Numbers [APNs] 008-03-066 and 008-03-084. The property is located at 1700 and 1730 Embarcadero Road in the City of Palo Alto, at the southeast corner of Embarcadero Road and East Bayshore Road. The project site is located approximately 850 feet east of U.S. Highway 101 (US-101). See Figure 1, *Regional Location*, and Figure 2, *Surrounding Land Use and Noise Measurement Locations*.

1.3 PROJECT DESCRIPTION

The project would demolish an existing vacant restaurant and Audi dealership service building. A Mercedes-Benz showroom totaling approximately 54,000 square feet (SF) would be constructed to provide a ground level showroom, offices, employee facilities, and a large open area at the middle of the building for an automated car stacking system. An approximately 106,000 SF combined service building and two-story parking garage (3 parking levels) would extend across the rear of the new Mercedes-Benz and existing Audi showrooms. Two backup generators would be included in the project, one located to the rear of the Audi portion of parking garage and one on the southwest side of the Mercedes Benz portion of the parking garage. An approximately 2,155-SF detached automated car wash would be located to the rear of the Audi portion of the project site. Paved drive isles and surface parking area would be located along the perimeter of the buildings. See Figure 3, *Site Plan*.

1.4 NOISE AND SOUND LEVEL DESCRIPTORS AND TERMINOLOGY

1.4.1 Descriptors

All noise level or sound level values presented herein are expressed in terms of decibels (dB), with A-weighting (dBA) to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol L_{EQ}, with a specified duration. The Community Noise Equivalent Level (CNEL) is a 24-hour average, where noise levels during the evening hours of 7:00 p.m. to 10:00 p.m. have an added 5 dBA weighting, and noise levels during the nighttime hours of 10:00 p.m. to 7:00 a.m. have an added 10 dBA weighting. This is similar to the Day Night sound level (L_{DN}), which is a 24-hour average with an added 10 dBA weighting on the same nighttime hours but no added weighting on the evening hours. Sound levels expressed in CNEL or L_{DN} are always reported in dBA. These metrics are used to express noise levels for both measurement and municipal regulations, as well as for land use guidelines and enforcement of noise ordinances.

1.4.2 Terminology

1.4.2.1 Sound, Noise, and Acoustics

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. Noise is defined as loud, unexpected, or annoying sound.

In the science of acoustics, the fundamental model consists of a sound (or noise) source, a receiver, and the propagation path between the two. The loudness of the noise source and obstructions or atmospheric factors affecting the propagation path to the receiver determines the sound level and characteristics of the noise perceived by the receiver. The field of acoustics deals primarily with the propagation and control of sound.

1.4.2.2 Frequency

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz (Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz (20 kHz).

1.4.2.3 Sound Pressure Levels and Decibels

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (mPa). One mPa is approximately one hundred billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to 100,000,000 mPa. Because of this wide range of values, sound is rarely expressed in terms of mPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of dBA. The threshold of hearing for the human ear is about 0 dBA, which corresponds to 20 mPa.

1.4.2.4 Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted through standard arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3 dBA increase. In other words, when two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dBA higher than from one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dBA—rather, they would combine to produce 73 dBA. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dBA louder than one source.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dBA changes in sound levels, when exposed to steady, single-frequency (“pure-tone”) signals in the mid-frequency (1,000 Hz–8,000 Hz) range. In typical noisy environments, changes in noise of 1 to 2 dBA are generally not perceptible. It is widely accepted, however, that people begin to detect sound level increases of 3 dB in typical noisy environments. Further, a 5 dBA increase is generally perceived as a distinctly noticeable increase, and a 10 dBA increase is generally perceived as a doubling of loudness.

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HELIX Environmental Planning

Regional Location

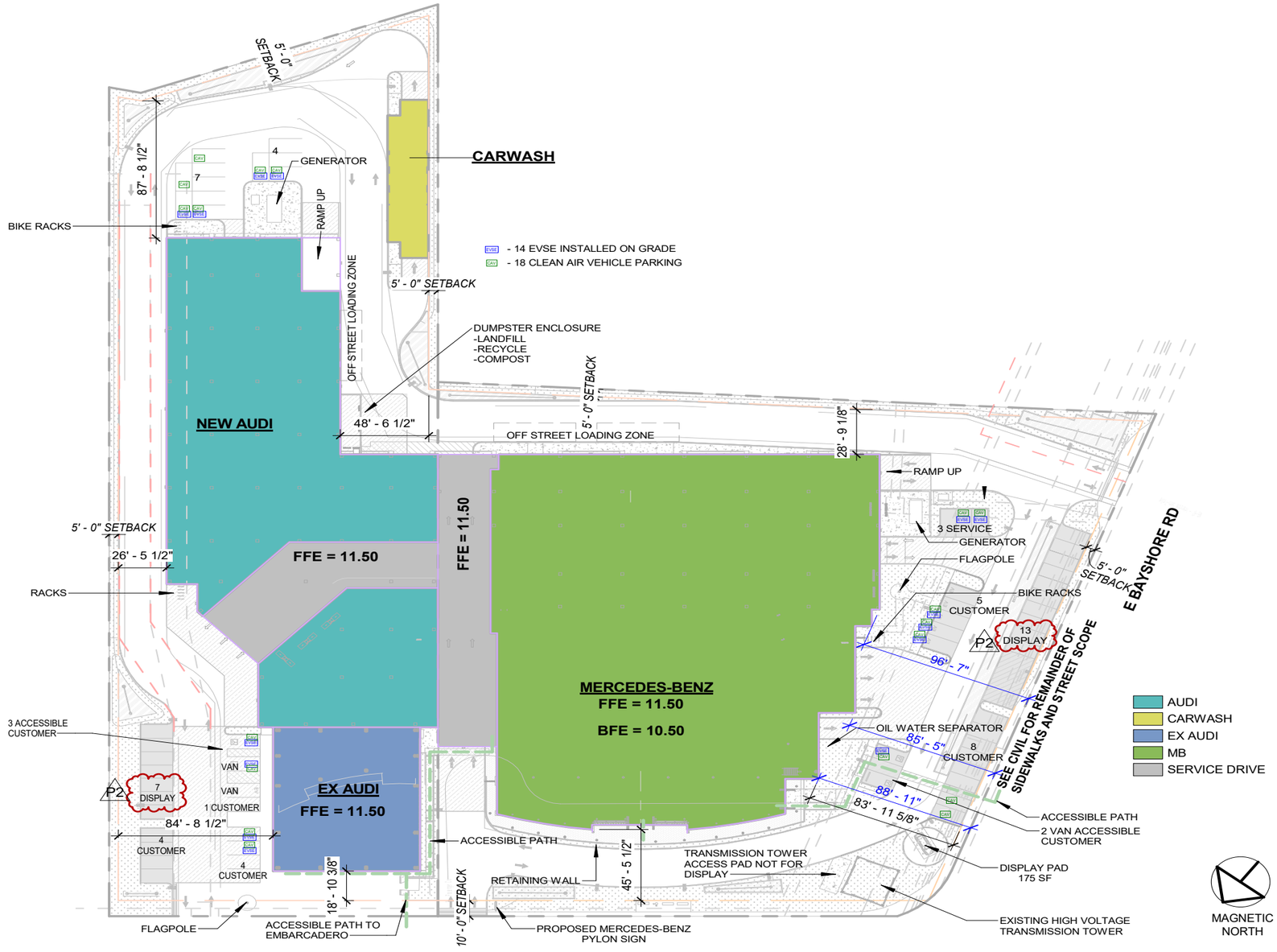
Figure 1

Source: Aerial (NearMap, 2019)

HELIX Environmental Planning

Surrounding Land Use and Noise Measurement Locations

Figure 2



ARCH SITE PLAN

MERCEDES BENZ / AUDI of PALO ALTO

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Source: YSM Design 2019

No known studies have directly correlated the ability of a healthy human ear to discern specific levels of change in traffic noise over a 24-hour period. Many ordinances, however, specify an increase of 3 CNEL as a threshold to determine whether a project would result in a substantial increase in noise levels. This is based on the concept of a doubling in noise energy resulting in a 3 dBA change in noise, which is the amount of change in noise necessary for the increase to be perceptible to the average healthy human ear.

1.5 REGULATORY FRAMEWORK

1.5.1 California Noise Control Act

The California Noise Control Act is a section within the California Health and Safety Code that describes excessive noise as a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also finds that there is a continuous and increasing bombardment of noise in the urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the State to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

1.5.2 City of Palo Alto Comprehensive Plan

The Natural Environment Element of the City's Comprehensive Plan includes guidelines for the compatibility of land uses with exterior noise levels, as shown in Table 1, *Land Use Compatibility for Community Noise Environment* (Palo Alto 2017a):

Table 1
LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENT

Land Use Category	Exterior Noise Exposure L_{DN} or CNEL, dBA		
	Normally Acceptable	Conditionally Acceptable	Unacceptable
Residential, Hotel, & Motels	Less than 60	60 to 75	Above 75
Outdoor Sports & Recreation, Neighborhood Parks & Playgrounds	Less than 65	65 to 80	Above 80
Schools, Libraries, Museums, Hospitals, Personal Care, Meeting Halls, Churches	Less than 60	60 to 75	Above 75
Office Buildings, Business Commercial, & Professional	Less than 70	70 to 80	Above 80
Auditoriums, Concert Halls, & Amphitheaters	NA	Less than 75	Above 75
Industrial, Manufacturing, Utilities, & Agriculture	Less than 70	More Than 70	NA

Source: City of Palo Alto 2030 Comprehensive Plan Natural Environment Element Table N-1 (Palo Alto 2017a).
NA = Not Applicable

1.5.3 City of Palo Alto Noise Ordinance

Chapter 9.10, *Noise*, sections 9.10.010 through 9.10.080 of the City of Palo Alto Municipal Code pertain to City noise requirements. The following sections of the noise ordinance would be applicable to the project (Palo Alto 2019):

9.10.020 Definitions.

(b) "Precision sound level meter" means a device for measuring sound level in decibel units within the performance specifications in the American National Standards Institute Standard S1.4, "Specification for Sound Level Meters."

(c) "Noise level" means the maximum continuous sound level or repetitive peak sound level, produced by a source or group of sources as measured with a precision sound level meter. In order to measure a noise level, the controls of the precision sound level meter should be arranged to the setting appropriate to the type of noise being measured.

(d) "Local ambient" means the lowest sound level repeating itself during a six-minute period as measured with a precision sound level meter, using slow response and "A" weighting. The minimum sound level shall be determined with the noise source at issue silent, and in the same location as the measurement of the noise level of the source or sources at issue. However, for purposes of this chapter, in no case shall the local ambient be considered or determined to be less than: (1) 30 dBA for interior noise in Section 9.10.030(b); (2) 40 dBA in all other sections. If a significant portion of the local ambient is produced by one or more individual identifiable sources which would otherwise be operating continuously during the six-minute measurement period and contributing significantly to the ambient sound level, determination of the local ambient shall be accomplished with these separate identifiable noise sources silent.

(f) "Property plane" means a vertical plane including the property line which determines the property boundaries in space.

9.10.040 Commercial and industrial property noise limits.

No person shall produce, suffer or allow to be produced by any machine or device, or any combination of same, on commercial or industrial property, a noise level more than 8 dB above the local ambient at any point outside of the property plane.

9.10.060 Special provisions.

The special exceptions listed in this section shall apply, notwithstanding the provisions of Sections 9.10.030 through 9.10.050.

Said exceptions shall apply only to the extent and during the hours specified in each of the following enumerated exceptions.

(a) General Daytime Exception. Any noise source which does not produce a noise level exceeding 70 dBA at a distance of 25 feet under its most noisy condition of use shall be exempt from the provisions of Sections 9.10.030(a), 9.10.040 and 9.10.050(a) between the hours of 8:00 a.m. and 8:00 p.m. Monday through Friday, 9:00 a.m. and 8:00 p.m. on Saturday, except Sundays and holidays, when the exemption herein shall apply between 10:00 a.m. and 6:00 p.m.

(b) Construction. Except for construction on residential property as described in subsection (c) of this section, construction, alteration and repair activities which are authorized by valid

city building permit shall be prohibited on Sundays and holidays and shall be prohibited except between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday, 9:00 a.m. and 6:00 p.m. on Saturday provided that the construction, demolition or repair activities during those hours meet the following standards:

(1) No individual piece of equipment shall produce a noise level exceeding 110 dBA at a distance of 25 feet. If the device is housed within a structure on the property, the measurement shall be made outside the structure at a distance as close to 25 feet from the equipment as possible.

(2) The noise level at any point outside of the property plane of the project shall not exceed 110 dBA.

2.0 ENVIRONMENTAL SETTING

2.1 SURROUNDING LAND USES

Surrounding land uses include developed commercial office and retail auto sales properties adjacent to project site to the south and east, developed commercial properties across Embarcadero Road to the north, and a medical office building across East Bayshore Road to the west. The southeastern edge of the project site is adjacent to an open-space/restored wetland (designated Open Space/Controlled Development in the City's 2030 Comprehensive Plan [Palo Alto 2017b]). A multi-use trail crosses the open space approximately 280 feet southeast of the project site. The project site is zoned Commercial Services (CS) and is designated Service Commercial in the City's 2030 Comprehensive Plan (Palo Alto 2017b). The project site is currently occupied by a vacant restaurant building at 1700 Embarcadero Road and the existing Audi auto dealership at 1730 Embarcadero Road. See Figure 1, *Regional Location*, and Figure 2, *Surrounding Land Use and Noise Measurement Locations*.

2.2 NOISE-SENSITIVE LAND USES

Noise-sensitive land uses (NSLUs) are land uses that may be subject to stress and/or interference from excessive noise. The City's 2030 Comprehensive Plan Natural Environment Element includes the following in the definition of NSLUs: residences, schools, hospitals, convalescent homes, senior and child care facilities and public conservation land (Palo Alto 2017a). Noise receptors are individual locations that may be affected by noise. The closest NSLUs to the project site is the Hope Technology School approximately 420 feet (0.08 mile) to the south beyond an office building. According to Map L-6, from the 2030 Comprehensive Plan, the closest designated public conservation land is located approximately 1,000 feet (0.19 mile) southeast of the project site (Palo Alto 2017b). The closest residential NSLUs are multi-family building approximately 1,130 feet (0.21 mile) to the southwest across US-101.

2.3 EXISTING NOISE ENVIRONMENT

The existing noise environment is dominated by vehicular traffic noise on US-101, approximately 850 feet (0.16 mile) to the west. Other noise sources include traffic on local streets and general noise associated with parking lots and commercial building HVAC systems on the project site and on adjacent commercial properties. The nearest airport to the project site is the Palo Alto Airport, a general aviation airport located approximately 3,400 feet (0.64 mile) to the northeast. The project is subject to general

aviation aircraft noise from aircraft approaching and departing from the Palo Alto airport as well as noise from commercial aircraft noise approaching the San Francisco International Airport, 17 miles to the northwest. In addition, occasional overflights of the project site occur from military and commercial aircraft operating at Moffett Federal Airfield, 4 miles to the southeast, and commercial aircraft operating at San Jose International Airport, 11 miles to the southeast.

2.3.1 Ambient Noise Survey

Four short-term ambient and traffic noise measurements (M1 through M4) were conducted during a site visit on April 30, 2019. Site M1 was located at the south corner of the project site, adjacent to a commercial office property and the open space/restored wetland. Site M2 was located at the southeast corner of the project site, adjacent to a commercial office property and the open space/restored wetland. Site M3 was located at the north corner of the project site, approximately 45 feet from the centerline of Embarcadero Road. Site M4 was located along the west edge of the project site, approximately 35 from the centerline of East Bayshore Road. Locations of each measurement site are shown in Figure 2.

The measured noise levels and related weather conditions for the short-term measurements are shown in Table 2, *Project Site Visit Noise Measurement Results*. See Appendix A, *On-Site Noise Measurements*, for survey notes from the short-term measurements.

Table 2
PROJECT SITE VISIT NOISE MEASUREMENT RESULTS

M1 - Ambient	
Date:	April 30, 2019
Conditions:	Temperature: 69°F. Wind Speed: 13 mph. 44% humidity. Sunny.
Time:	1:10 p.m. – 1:25 p.m.
Location:	South corner of the project site, adjacent to a commercial office property and the open space/restored wetland, approximately 4 feet from the fence.
Measured Noise Level:	52.8 dBA L_{EQ}
Notes:	Traffic noise from US-101 was the primary noise source, the commercial building to the west blocked some traffic noise; some noise from the Audi service are and parking lot including car alarms twice during the measurement.
M2 - Ambient	
Date:	April 30, 2019
Conditions:	Temperature: 69°F. Wind Speed: 13 mph. 43% humidity. Sunny.
Time:	1:28 p.m. – 1:43 p.m.
Location:	Southeast corner of the project site, adjacent to a commercial office property and the open space/restored wetland, approximately 4 feet from the fence.
Measured Noise Level:	56.3 dBA L_{EQ}
Notes:	Traffic noise from US-101 was the primary noise source, the commercial building to the west blocked less traffic noise compared to location M1; some noise from the Audi service are and parking lot including car alarms and horns during the measurement.

Table 2 (cont.)
PROJECT SITE VISIT NOISE MEASUREMENT RESULTS

M3 - Traffic	
Date:	April 30, 2019
Conditions:	Temperature: 70°F. Wind Speed: 13 mph. 41% humidity. Sunny.
Time:	1:48 p.m. – 1:58 p.m.
Location:	North corner of the project site, approximately 45 feet from the centerline of Embarcadero Road.
Measured Noise Level:	65.1 dBA L_{EQ}
Notes:	Traffic along Embarcadero Road and from US-101 was the dominant noise source. 73 cars, 3 medium trucks, and 1 heavy truck counted during measurement. A tow truck stopped and idled in front of the meter, last minute of measurement.
M4 - Traffic	
Date:	April 30, 2019
Conditions:	Temperature: 70°F. Wind Speed: 13 mph. 41% humidity. Sunny.
Time:	2:03 p.m. – 2:13 p.m.
Location:	Western edge of the project site along Vista Village drive, approximately 60 feet from roadway centerline.
Measured Noise Level:	63.7 dBA L_{EQ}
Notes:	Traffic along East Bayshore Drive and from US-101 was the dominant noise source. 66 cars, 3 medium trucks, and 1 heavy truck counted during measurement

3.0 ANALYSIS, METHODOLOGY, AND ASSUMPTIONS

3.1 METHODOLOGY

3.1.1 Ambient Noise Survey

The following equipment was used for noise measurements:

- Larson Davis Sound Track LxT Noise Meter
- Larson Davis Model CAL150 Calibrator
- Windscreen and tripod for the sound level meter

The sound level meter was field-calibrated immediately prior to the noise measurements to ensure accuracy. All sound level measurements conducted and presented in this report were made with a sound level meter that conforms to the American National Standards Institute (ANSI) specifications for sound level meters (ANSI SI.4-1983 R2006). All instruments were maintained with National Institute of Standards and Technology traceable calibration per the manufacturers' standards.

3.1.2 Noise Modeling Software

Modeling of the exterior noise environment for this report was accomplished using the Computer Aided Noise Abatement (CadnaA) version 2019 model. CadnaA is a program developed by *DataKustik* for predicting noise impacts in a wide variety of conditions. It allows for the input of project-related information, such as noise source data, barriers, structures, and topography to create a detailed model, and uses the methodology from the U.S. Department of Transportation Federal Highway Administration (FHWA) Traffic Noise Model TNM version 2.5. The noise models used in this analysis were developed from Computer Aided Design (CAD) plans provided by the project architect. Input variables included mechanical equipment reference noise levels, estimated parking lot activity, road alignment, elevation, lane configuration, area topography, projected traffic volumes, estimated truck composition percentages, and vehicle speeds.

The anticipated noise reduction from the implementation of automated doors on the car wash tunnel entrance and exit was modeled using the Insul Sound Transmission Class (STC) prediction program developed by Marshall Day Acoustics. The STC for the door material is entered into the Insul program to provide the STC noise reduction index curve used in CadnaA to predict interior to exterior noise through a panel.

The one-hour L_{EQ} noise level is calculated utilizing peak-hour traffic; peak-hour traffic volumes can be estimated based on the assumption that 10 percent of the average daily traffic would occur during a peak hour. The one-hour L_{EQ} noise level output calculated by the model based on the 10 percent peak hour traffic is equivalent to the CNEL (Caltrans 2013a).

Project construction noise was analyzed using the Roadway Construction Noise Model ([RCNM]; FHWA 2008), which utilizes estimates of sound levels from standard construction equipment based on measurements and surveys conducted on a project site in Boston, Massachusetts.

3.2 ASSUMPTIONS

3.2.1 Construction Equipment

Construction activities would include demolition, site preparation, building construction, paving, and architectural coatings (e.g., painting). Construction activities would use a variety of construction equipment, including, but not limited to: graders, rubber-tired dozers, loaders/backhoes, excavators, cranes, forklifts, water trucks, vibratory rollers, and pavers. The most intensive construction noise would be during the demolition and grading phases, which could involve the simultaneous uses of multiple pieces of heavy equipment. For construction noise modeling, a worst-case scenario of a grader, excavator, and rubber-tired dozer operating simultaneously during the grading phase was assumed.

The most likely source of vibration during project construction would be a vibratory roller, which may be used to achieve soil compaction as part of foundation construction and fill compaction. Due to the soil conditions at the project site, the project building would be supported by pile foundation systems. According to the Geotechnical Investigation report for the project, an auger cast pile foundation system is recommended (Romig 2018). The equipment required to install an auger cast pile foundation is not a significant source of vibrations compared to impact or vibratory driven pile foundations.

3.2.2 Local Ambient Noise Level

To determine compliance with the City's noise ordinance, the local ambient exterior noise level at the project property in the vicinity of proposed project operational noise sources is used. As described in section 2.3.1, two 15-minute noise measurement were conducted near the property line at the quietest portion of the project site, adjacent to the open space/restored wetland to the south. During the measurements, it was noted that the dominant source of noise in the area is from traffic on US-101, approximately 850 feet (0.16 mile) west of the project site. Because traffic volumes on US-101 vary throughout the day, the local ambient noise level on the project site fluctuates. Hourly data for traffic volumes on US-101 was not available. Typical hourly traffic distribution for U.S. metropolitan freeways was developed in a report by Wyle Laboratories, "Development of Ground Transportation Systems Noise Contours for the San Diego Region" (December 1973). Similar traffic distribution patterns were noted in a study prepared by Ogden International, "Road Travel Survey" (1986). Using the hourly traffic distribution from the above reports, any hourly traffic noise level can be calculated. The estimated average daytime (7:00 a.m. to 7:00 p.m.) ambient noise level is 52.9 dBA L_{EQ} at measurement location M1 and 56.4 dBA L_{EQ} at measurement location M2. The estimated hourly local ambient noise levels for all hours are provided in Appendix B, *Traffic Noise*.

3.2.3 Operation

Anticipated operational noise sources are assumed to include machine operations related to the automated car wash, backup generators, rooftop HVAC units, and parking lots noise. In addition, the project would generate vehicular traffic that would add to noise levels on nearby roadways. This analysis assumes that the proposed project would operate on the same schedule as the existing Audi dealership: Monday through Friday from 7:30 a.m. to 7:00 p.m., Saturday from 8:00 a.m. to 7 p.m. and Sunday (showroom only) from 10 a.m. to 6 p.m.

3.2.3.1 Car Wash

Blower

Noise generated by the car wash is assumed to be from several internal sources. The loudest single source is the air-blast drying systems (blower) just inside the car wash exit. The blower units to be used at the project's car wash are a Broadway Equipment Company 45 horsepower assembly. The manufacturer's data sheet indicates that the blowers would generate a noise level of 83.0 dBA at a distance of 30 feet from the car wah tunnel exit, and a noise level of 79.1 dBA at a distance of 30 feet from the car wah tunnel entrance, with the car wash tunnel doors open. The sheet is attached as Appendix C, *Blower Assembly Data Sheets*. All systems were modeled with the blowers operating in steady state (maximum noise level).

Automated Doors

The noise reduction resulting from the implementation of automated doors on the carwash tunnel entrance and exit was modeled assuming a door construction of 22-gauge (0.2999-inches thickness) steel door panel sections (typical for lightweight doors). The estimated reduction is shown in Table 3, *Car Wash Door Noise Reduction Index Curve*.

Table 3
CAR WASH DOOR NOISE REDUCTION INDEX CURVE

Noise Reduction in Decibels[1] (dB) Measured at Octave Frequencies								
31.5 Hz	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**	**8 kHz**
5	9	12	17	22	27	31	37	33

Source: Insul STC prediction program.
Notes: [1] Sound Power Levels (S_{WL}); Hz = Hertz; kHz = kilohertz.

3.2.3.2 Back Up Generators

Specific information about the generators was unknown at the time of this analysis. However, general planning may be performed based on typical generator noise levels. Open frame and weather cabinet enclosure-only generators may produce noise levels as high as 115 dBA at 23 feet (7 meters) and would have potentially significant impacts. Modeling is based on a typical noise level of 75 dBA at 23 feet (7 meters). This noise level is a typical maximum for generators up to 150 kW (and larger) in a manufacturers Class II noise control enclosure. Data sheets for an example generator (Kohler 150REZGC) with a sound enclosure, producing an estimated noise level of 73 dBA at 23 feet (7 meters), are included in Appendix D, *Generator Data Sheets*.

3.2.3.3 Heating, Ventilation, and Air Conditioning Units

The locations and geometry of the shielding walls for proposed HVAC equipment is shown on the project plans. Specific unit types were not available at the time of the analysis. Standard HVAC planning assumes one ton of HVAC for every 350 SF of habitable space (American Society of Heating, Refrigeration, and Air Conditioning Engineers [ASHRAE] 2012). Based on an estimate of approximately 40,000 SF of conditioned space for the existing Audi showroom and 80,000 SF of conditioned space for the new Mercedes-Benz showroom, six 20-ton units would be required for the project. This analysis assumes 20-ton Carrier Centurion Model 50 PG03-24 commercial rooftop-mounted package units with a sound rating of 84.9 dBA sound power. The manufacturer's noise data for the HVAC units is provided below in Table 4, *HVAC System Noise Data*; more detailed data can be found in Appendix E, *HVAC Data Sheets*. The analysis assumes shielding by parapet walls installed on the building rooflines and an additional mechanical equipment screening wall on the roof of the Mercedes-Benz showroom, as shown on the project plans.

Table 4
HVAC SYSTEM NOISE DATA

Noise Levels in Decibels[1] (dB) Measured at Octave Frequencies								Overall Noise Level in A-weighted Scale (dBA)[1]
63 Hz	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**	**8 kHz**	
90.0	86.3	83.6	82.9	80.3	74.9	71.4	66.5	84.0

Notes: [1] Sound Power Levels (S_{WL}); Hz = Hertz; kHz = kilohertz.

3.2.3.4 Parking Lot Noise

The project would include a total of 382 parking spaces for retail sales vehicle inventory and display, customer and employee parking, and parking for vehicles waiting for service. The noise modeling includes 41 at-grade parking spaces around the perimeter of the buildings, and 220 outdoor spaces on the third floor of the proposed parking garage. Typical parking lots noise events include vehicle movement, engines starting and stopping, doors slamming, car alarms and horns, and conversations. The project's parking spaces were modeled as parking areas in CadnaA which estimates the noise generated based on the number of events (vehicle entering or leaving a space) per parking space per hour. Based on the project trip generation from the Transportation Impact Analysis (TIA), an average of 332 vehicles are anticipated to enter and exit the project driveways during the peak hour, or approximately 3,320 vehicles per day (Hexagon 2019). Based on the trip generation, the following conservative (high) estimate of events per hour per space was used in the model: 2 per hour for the 41 at-grade spaces and 1 per hour for the third-floor parking garage outdoor space. The parking spaces on the first and second floor of the parking garage would be substantially shielded by the building structure and are not included in the model.

3.2.3.5 Off-Site Traffic Noise

Off-site traffic noise modeling is based on data in the TIA (Hexagon 2019) for four scenarios: existing, existing plus project; cumulative , and cumulative plus project. Table 5*, Project Traffic Volumes* displays the traffic volumes on surrounding streets. Existing traffic data for the nearby US-101 is based on the peak hour traffic estimates from Caltrans for 2017 for the Embarcadero Road segment in Palo Alto of 16,500 vehicles in the southbound directions and 16,200 vehicles in the northbound direction (Caltrans 2017). To estimate future traffic volumes on US-101 in the project vicinity, a compound growth factor of 1.4 percent per year was applied (Hexagon 2019). Anticipated future traffic noise levels are based on the forecasted traffic volumes. All traffic was modeled using the posted speed limits: 25 miles per hour (mph) for Embarcadero Road and East Bayshore Road, 35 mph for Oregon Expressway, and 65 mph for US-101. A typical vehicle mix of 96 percent cars and light trucks, 3 percent medium trucks, and 1 percent heavy trucks was used for modeling existing and future noise conditions in the vicinity of the project for all segments. Forecasts for the cumulative scenario are used to model anticipated future noise levels at the project site. Traffic volumes for all scenarios can be found in Appendix B, *Traffic Noise*.

Table 5
PROJECT TRAFFIC VOLUMES

Roadway Segment	Peak Hour Trips (PM)			
	Existing	Existing + Project	Cumulative No Project	Cumulative + Project
Embarcadero Road				
Geng Road to East Bayshore Road	849	986	1194	1,331
East Bayshore Road to Saint Francis Drive	2,525	2,666	2,873	3,014
East Bayshore Road				
Embarcadero Road to Pulgas Avenue	1,387	1,415	1,449	1,560
Oregon Expressway				
West Bayshore Road to Middlefield Road	2,653	2,693	2,942	2,982
US-101 at Embarcadero Road				
Southbound	16,965	-	18,441	-
Northbound	16,657	-	18,106	-

Source: Hexagon 2019; Caltrans 2017

3.3 GUIDELINES FOR THE DETERMINATION OF SIGNIFICANCE

Based on Appendix G of the CEQA Guidelines, implementation of the project would result in a significant adverse impact if it would:

Threshold 1: *Result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the City of Palo Alto Comprehensive Plan or noise ordinance.*

Construction (temporary) noise impacts would be significant if noise from any individual piece of equipment produces a noise level exceeding 110 dBA at a distance of twenty-five feet; or if the noise level at any point outside of the property plane of the project exceeds 110 dBA; or if construction noise is generated outside of the hours from 8:00 a.m. to 6:00 p.m. Monday through Friday, 9:00 a.m. to 6:00 p.m. on Saturday, or anytime on Sundays or holidays.

Operational (permanent) noise impacts would be significant if a project operational noise source would result in an increase in noise at the property plane in excess of 8 dBA above the existing local ambient noise level; or if a noise source would be limited to the hours between 8:00 a.m. and 8:00 p.m. Monday through Friday, 9:00 a.m. and 8:00 p.m. on Saturday, and 10:00 a.m. and 6:00 p.m. on Sundays and holidays, and the noise source would exceed 70 dBA at a distance of 25 feet. Based on the estimated local ambient noise level discussed in section 3.2.2, the allowable daytime (7:00 a.m. to 7:00 p.m.) noise level would be 60.9 dBA at measurement location M1, and 64.4 dBA at measurement location M2.

Transportation (permanent) noise impacts would be significant if the addition of project-generated traffic would result in exterior noise in excess of the normally acceptable levels for land uses identified in the City's Comprehensive Plan; or if the addition of project-generated traffic would result in a just-perceivable noise increase of 3 dBA CNEL.

Threshold 2: *Result in the generation of excessive groundborne vibration or groundborne noise levels.*

Excessive ground-borne vibration would occur if construction-related ground-borne vibration exceeds the "strongly perceptible" vibration annoyance potential criteria for human receptors, as specified by Caltrans (2013b), of 0.1 inches per second peak particle velocity (PPV), and 0.2 inches per second PPV for architectural damage (e.g., cracking of plaster) to normal structures for continuous/frequent intermittent construction sources (such as vibratory compaction equipment).

***Threshold 3*:** *For a project located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public use airport or private airstrip, expose people residing or working in the project area to excessive noise*.

Excessive noise exposure from aircraft is defined as noise levels that exceed the standards in the City's Comprehensive Plan Natural Environment Element for the associated land use.

4.0 IMPACTS

4.1 ISSUE 1: EXCESSIVE NOISE LEVELS

Result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the City of Palo Alto Comprehensive Plan or noise ordinance?

4.1.1 Temporary Construction Noise

The most substantial noise increases from construction activities that may affect off-site uses would occur during the grading operations. During grading/excavations it is anticipated that an excavator, a grader, a rubber-tired dozer, and a loader/backhoes would be required. Although it is not anticipated that multiple pieces of construction equipment would operate in close proximity simultaneously or be concentrated near the project property line, to be conservative, all equipment was modeled operating simultaneously at the same location 10 feet from the project site boundary. The RCNM equipment noise database does not include rubber-tired dozers. Therefore, the dozer was modeled as a tracked dozer, which are typically louder than rubber-tired dozers. The combined total noise levels of all equipment at the property plane would be 98 dBA L_{EQ} and the maximum noise level (L_{MAX}) would be 99 dBA. The output from the construction noise model is included in Appendix F, *Construction Noise Modeling Outputs*. Therefore, the use of construction equipment would not exceed the City Noise Ordinance construction threshold of 110 dBA L_{MAX} during the grading/excavation phase. In addition, in accordance with the City noise ordinance section 9.10.060, construction activity would be not be allowed in the hours from 8:00 a.m. to 6:00 p.m. Monday through Friday, or 9:00 a.m. to 6:00 p.m. on Saturday, or at any hour on Sundays or holidays. As other project construction activities would be expected to use less intensive equipment or fewer number of equipment simultaneously, project construction noise would comply with the City noise ordinance and temporary increases in ambient noise levels from construction activity would be less than significant.

4.1.2 Permanent On-Site Operational Noise

Potential noise sources on the project site, including an automated car wash, generators, roof-top mounted HVAC systems, and parking lot noise were analyzed using the CadnaA software.

4.1.2.1 Car Wash

The proposed car wash was modeled for two scenarios: the car wash blower system operating without tunnel doors (or with tunnel door open); and the car wash blower system operating with closed tunnel doors at both the entrance and exit. The resulting predicted noise levels at the ambient noise measurement locations are compared to the allowable noise increase per the City noise ordinance in Table 5, *Modeled Car Wash Noise Levels*. The model noise contour plots are shown in Figure 4, *Noise Contours – Car Wash with Doors Open*, and in Figure 6, *Noise Contours – Car Wash with Doors Closed*.

Table 6
MODELED CAR WASH NOISE LEVELS

Measurement Location	Noise Level (dBA)	Threshold (dBA)	Exceed Threshold?
Car Wash Doors Open			
M1 (south corner of property)	78.6	60.9[1]	**Yes**
M2 (southeast corner of property)	54.9	64.4[1]	No
M3 (north, along Embarcadero Road)	30.4	73.1[1]	No
M4 (west, along E. Bayshore Road)	44.7	71.1[1]	No
Car Wash Doors Closed			
M1 (south corner of property)	49.8	60.9[1]	No
M2 (southeast corner of property)	26.5	64.4[1]	No
M3 (north, along Embarcadero Road)	6.4	73.1[1]	No
M4 (west, along E. Bayshore Road)	19.8	71.1[1]	No

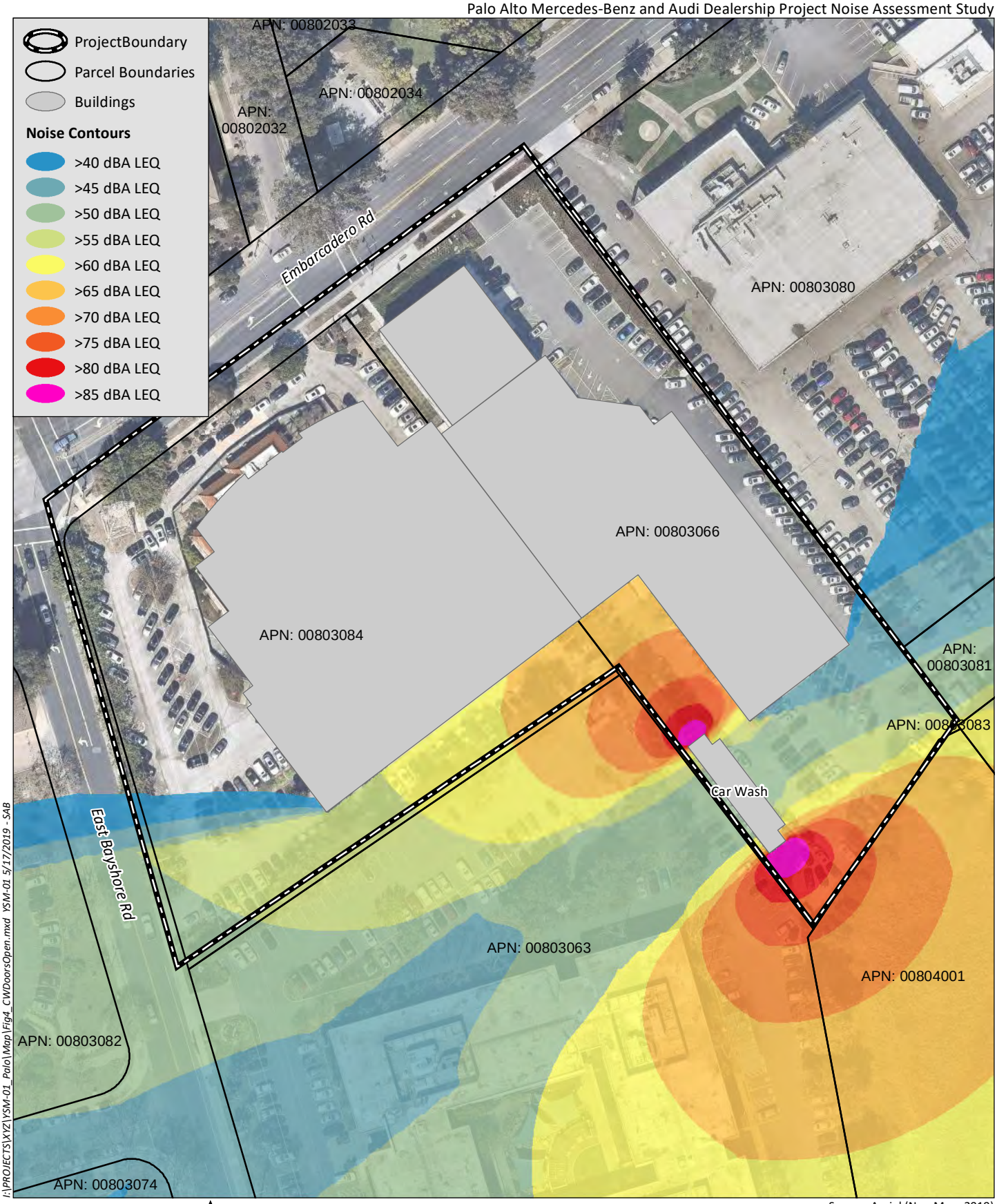
Source: CadnaA version 2019.

[1] Thresholds are based on the measured local ambient noise level and the City ordinance limit of 8 dBA maximum increase above the local ambient level at a commercial property plane.

As shown in Table 5, without closed doors on the car wash tunnel, the predicted noise level would exceed the City noise ordinance standard of a maximum of 8 dBA above the local ambient noise level at measurement location M1. Mitigation measure MM-1 would require the proposed car wash to be equipped with automated doors at the tunnel entrance and exit. As shown in Table 5 and Figure 5, with implementation of MM-1, long-term operation of the proposed car wash would not result in the generation of a substantial permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the City noise ordinances. The impact would be less than significant with mitigation incorporated.

Mitigation Measures

MM-1 To comply with the City noise ordinance limits of 60.9 dBA at measurement location M1 and 64.4 dBA at measurement location M2, the applicant shall specify on the project plans and/or car wash specifications the installation of automated doors on the car wash tunnel entrance and exit and that the car wash blower system shall be configured such that it will not operate unless both the entrance and exit doors are closed. Prior to issuing final permits to operate, the City shall verify that the doors are installed and that the blower system will not operate with the doors open.



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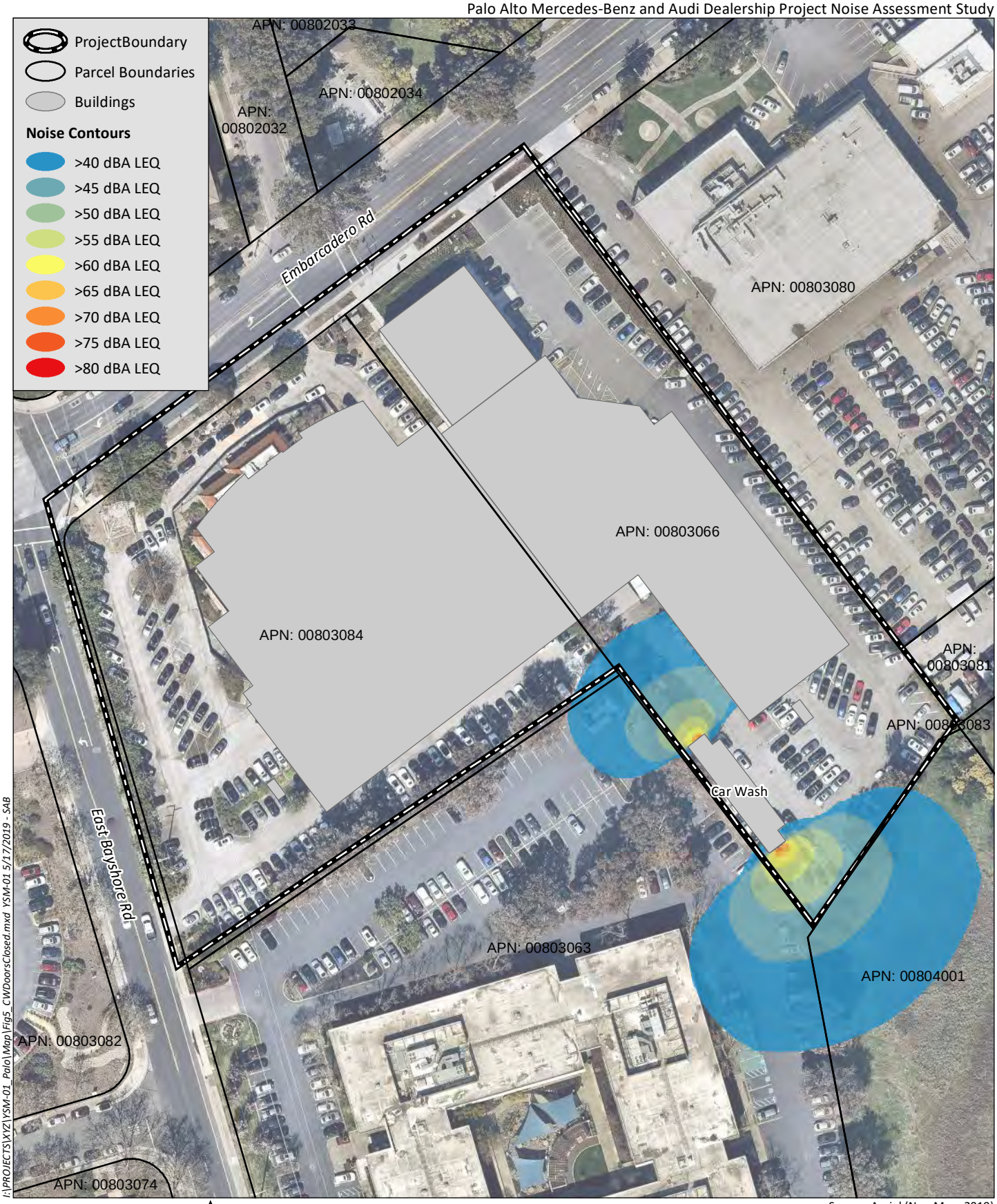
Noise Contours - Car Wash with Doors Open

Figure 4



Source: Aerial (NearMap, 2019)

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Noise Contours - Car Wash with Doors Closed

Figure 5

4.1.2.2 Backup Generators

The proposed backup generators were modeled in the locations shown on the project site plan (see Figure 3) for two scenarios: with and without a 9-foot sound wall around each generator. The resulting predicted noise levels at the ambient noise measurement locations are compared to the allowable noise increase per the City noise ordinance in Table 7, *Modeled Generator Noise Levels*. The modeled noise contour plot for the generators with the surrounding sound walls is shown in Figure 6, *Noise Contours – Generators with Sound Walls*.

Table 7
MODELED GENERATOR NOISE LEVELS

Measurement Location	Noise Level (dBA)	Threshold (dBA)	Exceed Threshold?
Generator No Barrier			
M1 (south corner of property)	62.0	60.9[1]	**Yes**
M2 (southeast corner of property)	64.6	64.4[1]	**Yes**
M3 (north, along Embarcadero Road)	31.4	73.1[1]	No
M4 (west, along E. Bayshore Road)	64.5	71.1[1]	No
Generator With Barrier			
M1 (south corner of property)	46.8	60.9[1]	No
M2 (southeast corner of property)	49.9	64.4[1]	No
M3 (north, along Embarcadero Road)	29.9	73.1[1]	No
M4 (west, along E. Bayshore Road)	49.3	71.1[1]	No

Source: CadnaA version 2019.

[1] Thresholds are based on the measured local ambient noise level and the City ordinance limit of 8 dBA maximum increase above the local ambient level at a commercial property plane.

As shown in Table 6, without the sound walls, the predicted noise level would exceed the City noise ordinance standard of a maximum of 8 dBA above the local ambient noise level at measurement locations M1 and M2. Mitigation measure MM-2 would require the installation of high sound walls around the generators with a minimum height 1.5 feet higher than the installed height of the generator enclosure. With implementation of MM-2, operation of the proposed backup generators would not result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the City noise ordinances. The impact would be less than significant with mitigation incorporated.

Mitigation Measures

MM-2 To comply with the City noise ordinance limits of 60.9 dBA at measurement location M1 and 64.4 dBA at measurement location M2, the applicant shall specify on the project plans the installation of sound walls around the generators with a minimum height 1.5 feet higher than the installed height of the generator enclosure. The walls shall be constructed of a material with a minimum STC rating of 20 and there shall be no gaps or holes in or under the walls. Doors installed in the sound wall shall be the full height of the wall and have a minimum STC rating of 20 and shall be installed such that, when closed, there are no gaps around or under the door. Prior to issuing final permits to operate or occupy, the City shall verify that the sound walls are installed as specified on the project plans.

4.1.2.3 HVAC Systems and Parking Lots

HVAC systems in the rooftop location shown on the project plans and in the existing locations for the Audi showroom were modeled along with the parapet walls shown on the project plans. Outdoor parking areas around the building and on the third floor of the parking garage modeled as discussed in section 3.2.3, above. The combined noise levels for all HVAC systems and outdoor parking areas are compared to the allowable noise increase per the City noise ordinance in Table 8, *Modeled HVAC and Parking Noise Levels*.

Table 8
MODELED HVAC AND PARKING NOISE LEVELS

Measurement Location	Level (dBA)	Threshold (dBA)	Exceed Threshold?
M1 (south corner of property)	43.7	60.9[1]	No
M2 (southeast corner of property)	49.5	64.4[1]	No
M3 (north, along Embarcadero Road)	57.0	73.1[1]	No
M4 (west, along E. Bayshore Road)	47.9	71.1[1]	No

Source: CadnaA version 2019.

[1] Thresholds are based on the measured local ambient noise level and the City ordinance limit of 8 dBA maximum increase above the local ambient level at a commercial property plane.

As shown in Table 7, noise levels from HVAC systems and parking areas would remain well below the City noise ordinance limits at a commercial property plane. Therefore, long-term operation of the proposed dealership buildings and parking areas would not result in the generation of a substantial permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the City noise ordinances and the impact would be less than significant.

4.1.2.4 Combined On-Site Operational Noise Sources

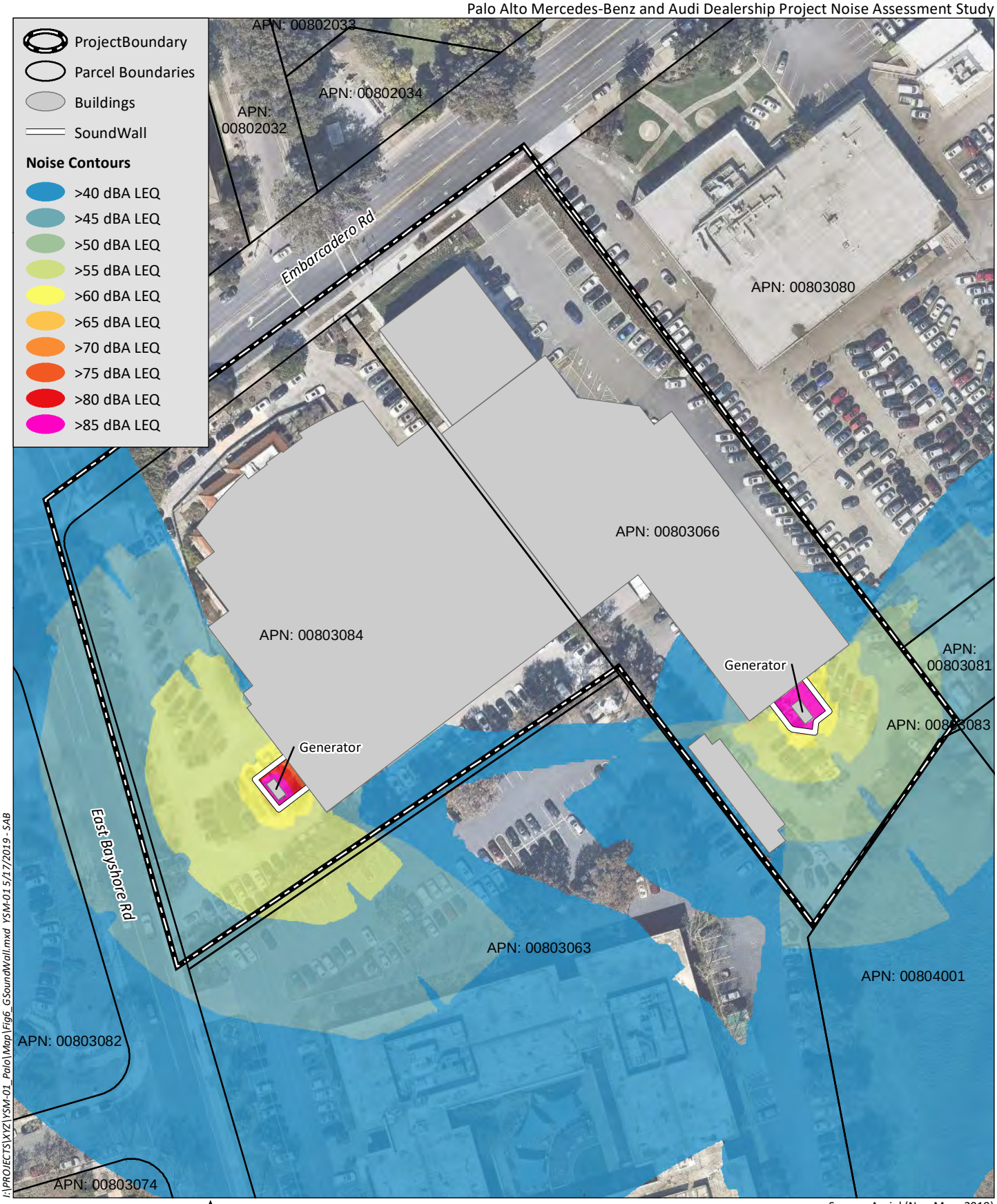
The combined noise levels for the car wash (with mitigation incorporated), the backup generators (with mitigation incorporated), HVAC systems, and outdoor parking areas are compared to the allowable noise increase per the City noise ordinance in Table 9, *Modeled On-Site Noise Levels*. These noise levels assume all noise sources are running at steady state simultaneously.

Table 9
MODELED ON-SITE NOISE LEVELS

Measurement Location	Level (dBA)	Threshold (dBA)	Exceed Threshold?
M1 (south corner of property)	52.3	60.9[1]	No
M2 (southeast corner of property)	52.7	64.4[1]	No
M3 (north, along Embarcadero Road)	57.0	73.1[1]	No
M4 (west, along E. Bayshore Road)	51.7	71.1[1]	No

Source: CadnaA version 2019.

[1] Thresholds are based on the measured local ambient noise level and the City ordinance limit of 8 dBA maximum increase above the local ambient level at a commercial property plane.



Source: Aerial (NearMap, 2019)

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Noise Contours - Generators with Sound Walls

Figure 6

As shown in Table 7, noise levels from the combined on-site operation noise sources would remain well below the City noise ordinance limits at a commercial property plane. Therefore, long-term operation of the project would not result in the generation of a substantial permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the City noise ordinances and the impact would be less than significant with mitigation incorporated.

4.1.3 Project-Generated Transportation Noise

CadnaA was used to evaluate potential increases in traffic noise along the four roadway segments analyzed in the TIA for four scenarios: Existing, Existing Plus Project, Cumulative No Project, and Cumulative Plus Project. The project-generated traffic noise roadway modeling represents a conservative analysis that does not account for topography or attenuation provided by existing structures. The results of this analysis for the CNEL at the nearest receptor to the roadway segments are shown below in Table 10, *Modeled Off-Site Traffic Noise Levels*. The complete noise level table for all receptors analyzed is included in Appendix B, *Traffic Noise*.

Table 10
MODELED OFF-SITE TRAFFIC NOISE LEVELS

Roadway Segment	Distance to Nearest Receptor (feet)[1]	Receptor Land Use	CNEL at Nearest NSLU					
			Existing	Existing + Project	Change in CNEL	Cumulative No Project	Cumulative + Project	Change in CNEL
Embarcadero Road								
Geng Road to East Bayshore Rd	64	Comm.	67.7	67.8	0.1	68.3	68.4	0.1
East Bayshore Rd to Saint Francis Dr	108	Res.	72.9	72.9	0.0	73.3	73.3	0.0
East Bayshore Road								
Embarcadero Rd to Pulgas Ave	35	Comm.	75.1	75.1	0.0	75.4	75.5	0.1
Oregon Expressway								
West Bayshore Rd to Middlefield Rd	70	Res.	71.9	71.9	0.0	72.3	72.3	0.0

[1] Distance measured from roadway centerline.
Comm = Commercial; Res = Residential

As shown in Table 9, the maximum increase in noise at the nearest receptors to the roadway segments analyzed in the TIA would be 0.1 CNEL. This increase in noise would not be perceptible by the human ear and is well below the threshold of 3 CNEL. Therefore, project-generated traffic noise would not result a substantial increase in ambient noise levels in the vicinity of the project and the impact would be less than significant.

4.1.4 Exposure to Excessive Noise for New Uses

The project's proposed commercial land use would be compatible if exterior noise levels from traffic would not exceed the City's Comprehensive Plan normally acceptable exterior standard of 70 CNEL for commercial uses. As discussed in section 2.2, above the on-site short-term measurements were

65.1 dBA L_{EQ} at location M3 along Embarcadero Road and 63.7 dBA L_{EQ} at location M4 along East Bayshore Road. These measurements were taken at approximate 2:00 p.m. on a weekday. According to the Caltrans Technical Noise Supplement to the Traffic Noise Protocol, the peak-hour traffic L_{EQ} is equivalent to the CNEL (Caltrans 2013a). Conservatively assuming that the peak-hour traffic would be twice the volume compared to the measurement period, resulting in a 3 dBA increase, the maximum noise level on the project property line would be 68.1 CNEL, less than the City's Comprehensive Plan normally acceptable exterior standard of 70 CNEL for commercial uses line. Therefore, the project would be compatible with the City's exterior noise standard for commercial land uses.

4.2 ISSUE 2: EXCESSIVE VIBRATION

Would the project expose persons to or generate excessive groundborne vibration or groundborne noise levels?

4.2.1 Construction Vibration

The largest potential on-site source of vibration during project construction would be a vibratory roller (primarily used to achieve soil compaction as part of the foundation and paving construction). A vibratory roller could be used approximately 50 feet from the nearest off-site commercial structure to the northeast of the project site. A vibratory roller would create approximately 0.210 inch per second PPV at a distance of 25 feet (Caltrans 2013b). A 0.210 inch per second PPV vibration level would equal 0.098 inch per second PPV at a distance of 50 feet.[1] This would be lower than what is considered a "strongly perceptible" thresholds for humans of 0.1 inches per second PPV, and the architectural damage threshold to normal structures of 0.2 inches per second PPV. Therefore, although a vibratory roller may be perceptible to nearby human receptors, temporary groundborne vibration and groundborne noise impacts associated project construction would be less than significant.

4.2.2 Operational Vibration

Long-term operation of the project would not be a significant source of gourndborne vibrations or groundborne noise and there would be no impact.

4.3 ISSUE 3: AIRPORT NOISE EXPOSURE

Would the project expose people residing or working in the project area to excessive noise from a nearby public use airport or private airstrip?

The nearest airport to the project site is the Palo Alto Airport located approximately 3,400 feet (0.64 mile) to the northeast. According to the Comprehensive Land Use Plan for the Palo Alto Airport, the project site is not within the 55 CNEL noise contour for the year 2022 (Santa Clara County 2016a). Moffett Federal Airfield is located approximately 4 miles to the southeast. According to the Comprehensive Land Use Plan for Moffett Field the project site is not within the Airport Influence Area 65 CNEL noise contour for the year 2022 (Santa Clara County 2016b). The San Francisco International Airport (SFO) is located approximately 17 miles to the northwest. Some aircraft on approach to SFO overfly the project site. However, according to the SFO Noise Exposure Map for the year 2019, the

[1] Equipment PPV = Reference PPV * $(25/D)^n$ (in/sec), where Reference PPV is PPV at 25 feet, D is distance from equipment to the receiver in feet, and n = 1.1 (the value related to the attenuation rate through the ground)(Caltrans 2013b).

project site is not within the 65 CNEL noise contour (San Francisco 2015). Therefore, noise from nearby airports would not expose people working in the project area to noise in excess of the City's Comprehensive Plan normally acceptable exterior standard of 70 CNEL for commercial uses and the impact would be less than significant.

5.0 LIST OF PREPARERS

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Appendix A

On-Site Noise Measurements

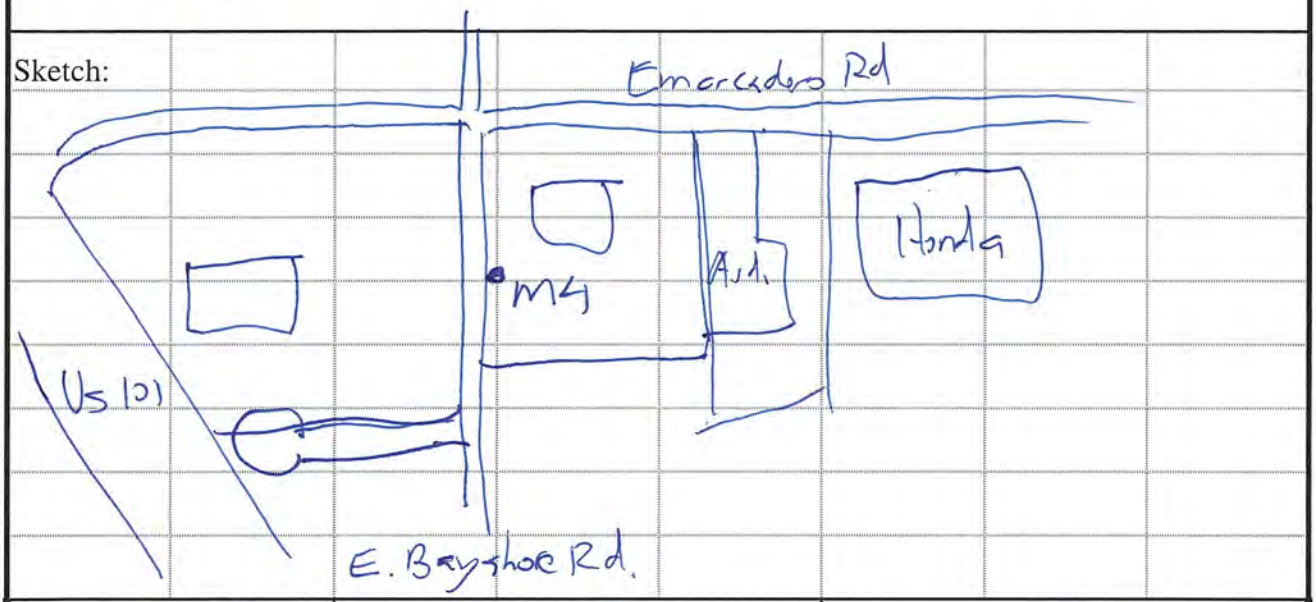
M4

Site Survey

Job # YSM-01	Project Name: Palo Alto Mercedes		
Date: 4/30/19	Site #:	Engineer: Martin Rolph	
Address:			
Meter: LDLXT1	Serial #: 1013	Calibrator: CAL150	Serial #: 5529

Notes: Freeway noise, partially shielded by Stanford Medical building to the west.

Sketch:



Temp: 70°F	Wind Spd: 13 mph mph	Humidity: 41 %	
Start of Measurement: 2:03	End of Measurement: 2:13	63.7 dBA L_{EQ}	

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
~~IIII IIII III~~	III	1
66 cars total	3 MD Trucks	1 HD Truck
Noise Measurement for Information Only		
No Through Roadways		
No Calibration Analysis Will Be Provided		

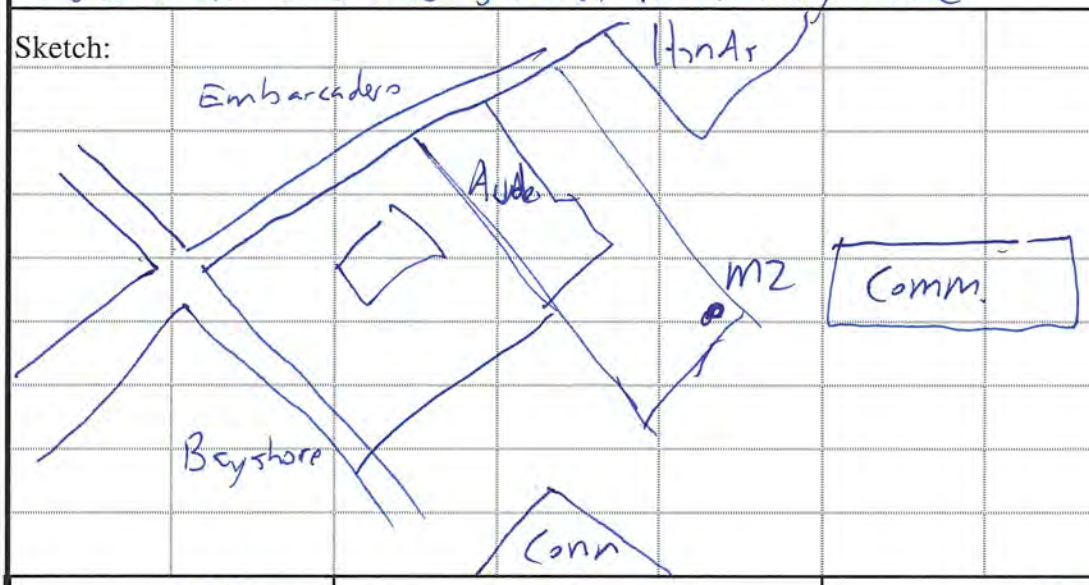
M2

Site Survey

Job # YSM-01	Project Name: Palo Alto Mercedes		
Date: 4/30/19	Site #:	Engineer: Martin Rolph	
Address:			
Meter: LDLXT1	Serial #: 1013	Calibrator: CAL150	Serial #: 5529

Notes: Freeway noise. Vehicle activity in parking lot/service area
Car alarms and horns
Measurement site less shielded from Fwy noise

Sketch:



Temp: 69°F	Wind Spd: 13 mph	mph	Humidity: 43	%	
Start of Measurement: 1:28	End of Measurement: 1:43		56.3	dBA L_{EQ}	

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

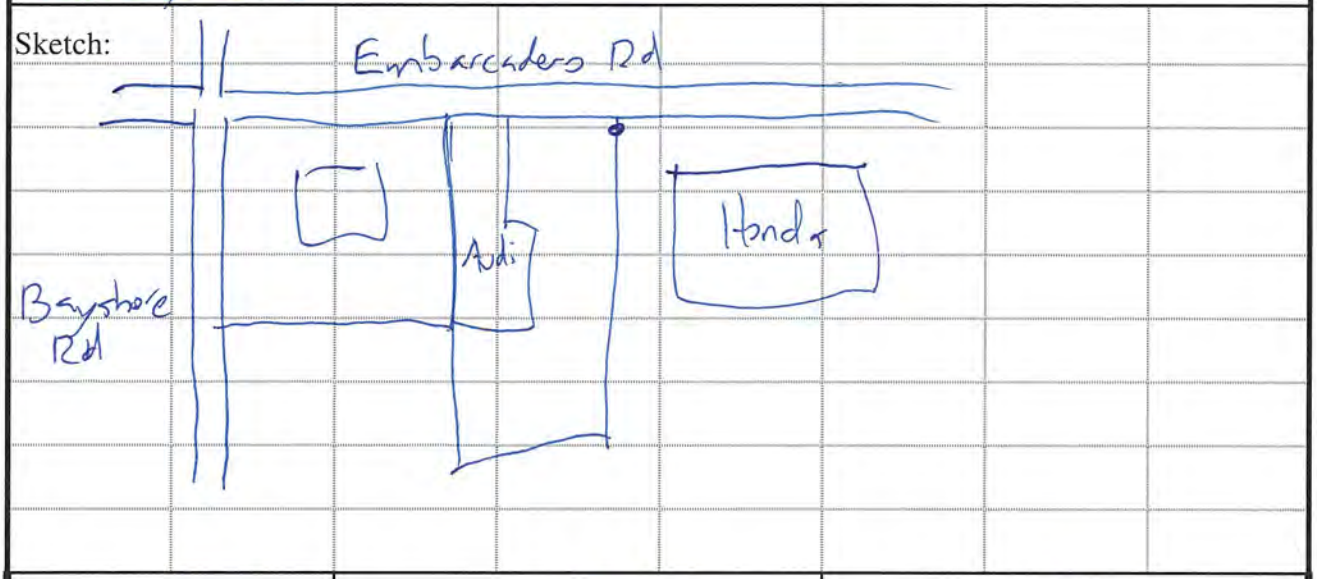
M3

Site Survey

Job # YSM-01		Project Name: Palo Alto Mercedes	
Date: 4/30/19	Site #:	Engineer: Martin Rolph	
Address:			
Meter: LDLXT1	Serial #: 1013	Calibrator: CAL150	Serial #: 5529

Notes: Back-up alarm 1:54
Tow-truck 1:57
Freeway noise

Sketch:



Temp: 70°F	Wind Spd: 13 mph	mph	Humidity: 41	%	
Start of Measurement: ~~2:03~~ 1:48	End of Measurement: 1:58		65.1	dBA L_{EQ}	

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)
~~HHT LHT IIII~~	III	I
73 cars total	3 MD Trucks	1 HD Truck

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

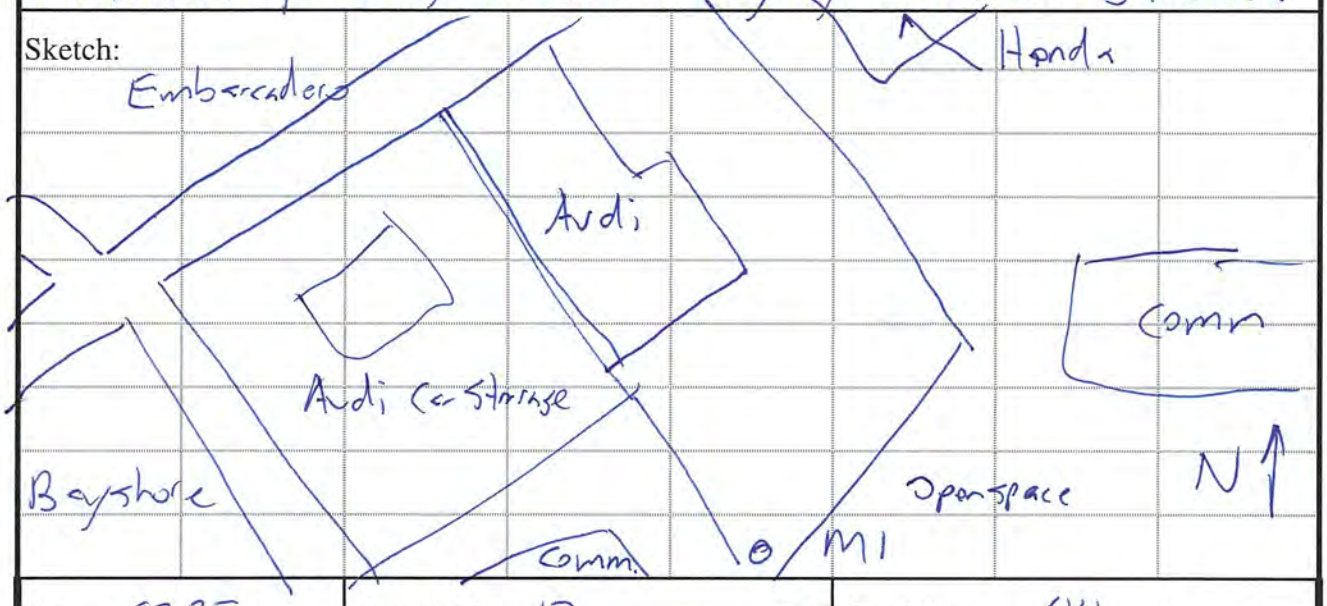
M1

Site Survey

Job # YSM-01	Project Name: Palo Alto Mercedes		
Date: 4/30/19	Site #:	Engineer: Martin Rolph	
Address:			
Meter: LDLXT1	Serial #: 1013	Calibrator: CAL150	Serial #: 5529

Notes: Freeway noise. Vehicle activity in parking lot/service area
Car alarms at 1:18 and 1:25.
Measurement partially shielded from Fwy by Comm. Buildings to west.

Sketch:



Temp: 69°F	Wind Spd: 13	mph	Humidity: 44	%	
Start of Measurement: 1:10	End of Measurement: 1:25		52.8	dBA L_{EQ}	

Cars (tally per 5 cars)	Medium Trucks (MT)	Heavy Trucks (HT)

Noise Measurement for Information Only

No Through Roadways

No Calibration Analysis Will Be Provided

Appendix B

Traffic Noise

Peak Hour Traffic

Peak Hour Traffic				
Segment	Exitsting	Existing + Project	Cumulative	Cumulative + Project
Embarcadero Rd				
Geng Rd to E Bayshore Rd	849	986	1194	1331
E Bayshore Rd to St. Francis Dr	2525	2666	2873	3014
East Bayshore Rd				
South of Embarcadero Rd	1387	1415	1449	1560
North of Embarcadero Rd	1387	1415	1449	1560
Oregon Expressway				
W Bayshore Rd to Middlefield Rd	2653	2693	2942	2982
US-101				
Soutbound at Embarcadero Rd	16965		18441	
Northbound at Embarcadero Rd	16657		18106	

US-101 Compound Growth (1.4% per year)		
Year	Southbound	Northbound
2017	16500	16200
2018	16731	16427
2019	16965	16657
2020	17203	16890
2021	17444	17126
2022	17688	17366
2023	17935	17609
2024	18187	17856
2025	18441	18106

Source:
Hexagon Transportation Consultants, Inc. *1700-1730 Embarcadero Road Audi and Mercedes Benz Dealerships Transportation Impact Analysis* (2019).
California Department of Transportation (Caltrans). *2017 Traffic Volumes (for all vehicles on CA State Highways)*. Available at:

Hourly Freeway Noise Calculation

Location M1				Location M2			
Hour	Distribution	Level (dBA L_{EQ})	bel	Hour	Distribution	Level (dBA L_{EQ})	bel
Site Measuremets							
1:00 PM	6.0%	52.8		1:00 PM	6.0%	56.3	
Calculated Levels							
12:00 AM	0.8%	44.3	27000	12:00 AM	0.8%	47.8	60446
1:00 AM	0.6%	42.9	19286	1:00 AM	0.6%	46.4	43176
2:00 AM	0.7%	43.2	20829	2:00 AM	0.7%	46.7	46630
3:00 AM	0.7%	43.6	23143	3:00 AM	0.7%	47.1	51811
4:00 AM	1.8%	47.6	57858	4:00 AM	1.8%	51.1	129528
5:00 AM	3.5%	50.5	111859	5:00 AM	3.5%	54.0	250421
6:00 AM	4.8%	51.9	154288	6:00 AM	4.8%	55.4	345409
7:00 AM	6.8%	53.3	216004	7:00 AM	6.8%	56.8	483572
8:00 AM	6.1%	52.9	192860	8:00 AM	6.1%	56.4	431761
9:00 AM	5.1%	52.1	162003	9:00 AM	5.1%	55.6	362679
10:00 AM	5.0%	52.0	158146	10:00 AM	5.0%	55.5	354044
11:00 AM	5.2%	52.2	165860	11:00 AM	5.2%	55.7	371314
12:00 PM	5.8%	52.7	185146	12:00 PM	5.8%	56.2	414490
1:00 PM	6.0%	52.8	190546	1:00 PM	6.0%	56.3	426580
2:00 PM	6.2%	52.9	196718	2:00 PM	6.2%	56.4	440396
3:00 PM	6.8%	53.3	216004	3:00 PM	6.8%	56.8	483572
4:00 PM	7.2%	53.6	229504	4:00 PM	7.2%	57.1	513795
5:00 PM	7.6%	53.9	243004	5:00 PM	7.6%	57.4	544018
6:00 PM	5.8%	52.7	185146	6:00 PM	5.8%	56.2	414490
7:00 PM	4.0%	51.0	127288	7:00 PM	4.0%	54.5	284962
8:00 PM	3.3%	50.3	106073	8:00 PM	3.3%	53.8	237468
9:00 PM	2.7%	49.3	84859	9:00 PM	2.7%	52.8	189975
10:00 PM	2.1%	48.3	67501	10:00 PM	2.1%	51.8	151116
11:00 PM	1.5%	46.7	46286	11:00 PM	1.5%	50.2	103623
Daytime Average		**52.9**		**Daytime Average**		**56.4**	
Evening Average		**51.4**		**Evening Average**		**53.8**	
Nighttime Average		**47.7**		**Nighttime Average**		**51.2**	

Source: Normal weekday roadway traffic follows a typical distribution pattern as a percentage of the overall traffic. This observation and typical distribution pattern was noted in the City of San Diego (and other metropolitan areas) originally in a report prepared by Wyle Laboratories, "Development of Ground Transportation Systems Noise Contours for the San Diego Region" (December 1973). Similar traffic distribution patterns were noted in a study prepared by Ogden International, "Road Travel Survey" (1986).

Notes: Daytime = 7:00 AM to 7:00 PM; Evening = 7:00 PM to 10 PM; Nighttime = 10 PM to 7 AM.

Traffic Noise Levels

Receptor Name	ID	Coordinates (UTM meters)			Model Noise Leve Results (dBA CNEL)					
		X	Y	Z	Existing	Existing + Project	Change	Cumulative	Cumulative + Project	Change
Embarcadero 1 Commercial	EM1	577978	4145231	1.52	67.7	67.8	0.1	68.3	68.4	0.1
Embarcadero 2 Commercial	EM2	577912	4145187	1.52	70.0	70.0	0.0	70.4	70.5	0.1
Embarcadero 3 Commercial	EM3	577387	4144954	1.52	75.3	75.3	0.0	75.6	75.6	0.0
Embarcadero 4 Residential	EM4	577375	4144834	1.52	72.9	72.9	0.0	73.3	73.3	0.0
Oregon Ex 1 Residenital	OR1	577487	4144555	1.52	71.9	71.9	0.0	72.3	72.3	0.0
Oregon Ex 2 Residenital	OR2	577438	4144582	1.52	71.2	71.2	0.0	71.6	71.6	0.0
Oregon Ex 3 Residenital	OR3	577420	4144469	1.52	70.5	70.6	0.1	70.9	70.9	0.0
E. Bayshore 1 School/Church	EB1	577972	4144861	1.52	74.7	74.7	0.0	75.1	75.1	0.0
E. Bayshore 2 Commercial	EB2	577905	4144942	1.52	74.0	74.0	0.0	74.4	74.4	0.0
E. Bayshore 3 Commercial	EB3	577945	4144956	1.52	72.5	72.5	0.0	72.9	72.9	0.0
E. Bayshore 4 Commercial	EB4	577816	4145153	1.52	72.8	72.8	0.0	73.2	73.2	0.0
E. Bayshore 5 Commercial	EB5	577744	4145129	1.52	75.1	75.1	0.0	75.4	75.5	0.1
E. Bayshore 6 Commercial	EB6	577542	4145187	1.52	80.2	80.2	0.0	80.6	80.6	0.0
E. Bayshore 7 Commercial	EB7	577447	4145256	1.52	82.1	82.1	0.0	82.5	82.5	0.0

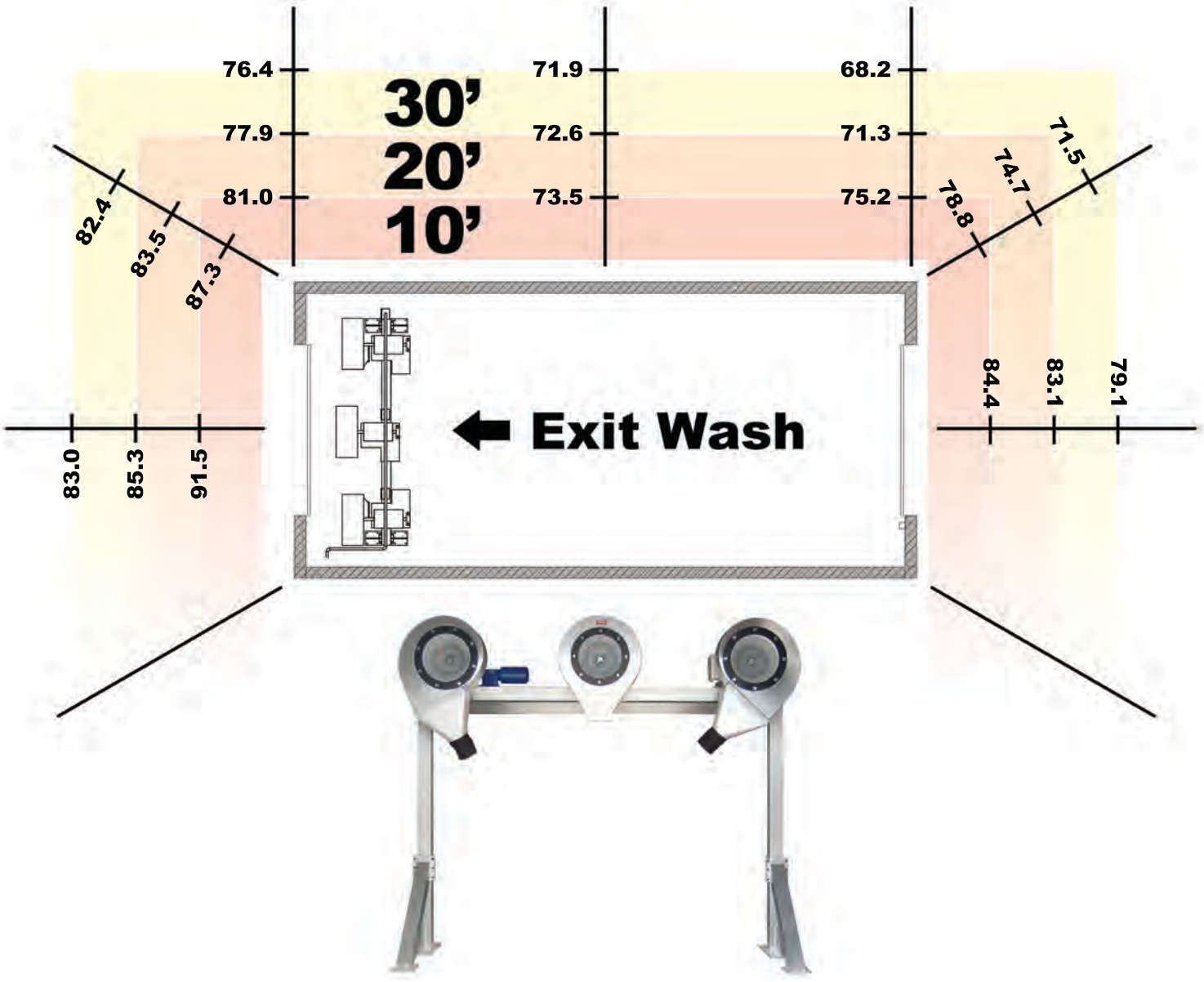
CadnaA Version 2019: Palo Alto Mercedes-Benz and Audi Dealership model output May 15, 2019.

Appendix C

Blower Assembly Data Sheets

Broadway Equipment Company Car Wash / Dryer Noise Levels

Figure 4: Typical db values at locations around Broadway's 45hp Car Wash.



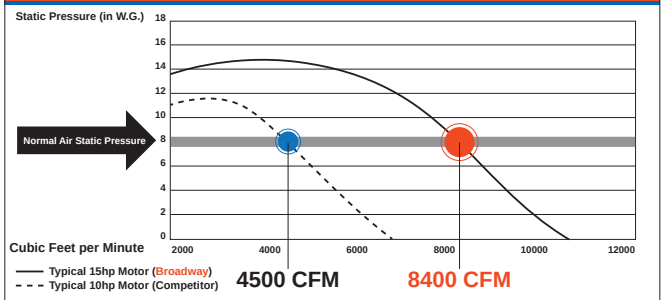
Note: All db readings are variable due to building size, site considerations, ect.

Broadway
CAR WASH EQUIPMENT
Since 1977

45 HP TOUCH FREE CAR DRYERS

Broadway's 45 hp Car Dryers effectively finish the wash process with a clean, dry vehicle. Our 45 hp features a fixed center distributor and two oscillatting distributors that drive water off the vehicle. The aluminum fans reach operating speeds almost immediately, reducing costly electrical surges. The aluminum frame provides durability in the harsh car wash environment and requires no maintenance.

Direct Drive Curves - Output at 8" Static Pressure



Features:

- 45 hp Dryer (Touch Free) provides the driest car possible in all climates
- Variable frequency drive upgrade reduces electrical usage and provides noise control, local rebates available

Specifications:

- Minimum space required: *13'6" w x 7' l x 10'6" h*
- 45 hp Electrical service: *(3)15 hp motors, 150 amps, 3 phase, 208/230 or 460 volt*

1.800.976.WASH | www.broadwayequipment.com

Over 35 years

MADE IN THE USA

Appendix D

Generator Data Sheets

Model: 50REZGC

KOHLER. Power Systems

190–600 V **Gas**

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

EPA-Certified for Stationary Applications

Ratings Range

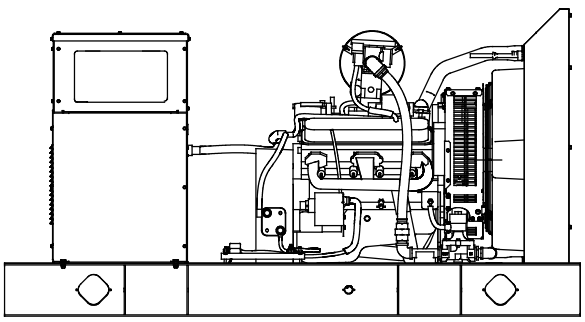
		60 Hz	50 Hz
Standby:	**kW**	44–53	40–44
	kVA	44–66	41–55

Generator Set Ratings

				Natural Gas 130°C Rise Standby Rating		LP Gas 130°C Rise Standby Rating	
Alternator	**Voltage**	**Ph**	**Hz**	**kW/kVA**	**Amps**	**kW/kVA**	**Amps**
4P7BX	120/208	3	60	50/63	173	52/65	180
	127/220	3	60	50/63	164	52/65	171
	120/240	3	60	50/63	150	52/65	156
	120/240	1	60	44/44	183	44/44	183
	139/240	3	60	50/63	150	52/65	156
	220/380	3	60	49/61	93	49/61	93
	277/480	3	60	50/63	75	52/65	78
	347/600	3	60	50/63	60	52/65	63
	110/190	3	50	40/50	152	42/53	161
	115/200	3	50	40/50	144	42/53	153
	120/208	3	50	40/50	139	42/53	147
	110/220	3	50	40/50	131	42/53	139
	110/220	1	50	40/40	182	40/40	182
	220/380	3	50	40/50	76	42/53	81
	230/400	3	50	40/50	72	42/53	76
	240/416	3	50	40/50	69	42/53	73
4P8X	120/208	3	60	51/64	177	53/66	184
	127/220	3	60	51/64	167	53/66	174
	120/240	3	60	51/64	153	53/66	159
	120/240	1	60	48/48	200	50/50	208
	139/240	3	60	51/64	153	53/66	159
	220/380	3	60	51/64	97	53/66	101
	277/480	3	60	51/64	77	53/66	80
	347/600	3	60	51/64	61	53/66	64
	110/190	3	50	42/52	158	44/55	167
	115/200	3	50	42/52	150	44/55	159
	120/208	3	50	42/52	144	44/55	153
	110/220	3	50	42/52	136	44/55	144
	110/220	1	50	41/41	186	42/42	191
	220/380	3	50	42/52	79	44/55	84
	230/400	3	50	42/52	75	44/55	79
	240/416	3	50	42/52	72	44/55	76
4P10X	120/208	3	60	53/66	183	55/69	182
	127/220	3	60	53/66	173	55/69	181
	120/240	3	60	53/66	159	55/69	166
	120/240	1	60	50/50	208	52/52	217
	139/240	3	60	53/66	159	55/69	166
	220/380	3	60	53/66	100	55/69	105
	277/480	3	60	53/66	79	55/69	83
	347/600	3	60	53/66	64	55/69	66
	110/190	3	50	44/55	167	46/58	175
	115/200	3	50	44/55	159	46/58	166
	120/208	3	50	44/55	153	46/58	160
	110/220	3	50	44/55	144	46/58	151
	110/220	1	50	42/42	191	44/44	200
	220/380	3	50	44/55	84	46/58	87
	230/400	3	50	44/55	79	46/58	83
	240/416	3	50	44/55	76	46/58	80
4Q10X	120/240	1	60	50/50	208	50/50	208
	110/220	1	50	41/41	186	41/41	186

Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A one-year limited warranty covers all generator set systems and components. Two- and five-year extended limited warranties are also available.
- Alternator features:
  - The unique Fast-Response® X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator.
  - The brushless, rotating-field alternator has broadrange reconnectability.
- Other features:
  - Kohler designed controller for one-source system integration and remote communication. See Controller on page 3.
  - The electronic, isochronous governor incorporates an integrated drive-by-wire throttle body actuator delivering precise frequency regulation.



RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor. *Standby Ratings:* The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. *Prime Power Ratings:* At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528-1 and ISO-3046-1. For limited running time and continuous ratings, consult the factory. Obtain technical information bulletin (TIB-101) for ratings guidelines, complete ratings definitions, and site condition derates. The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. For dual fuel engines, use the natural gas ratings for both the primary and secondary fuels.

Alternator Specifications

Specifications	Alternator
Manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Rare-Earth Permanent Magnet
Leads: quantity, type	
4PX	12, Reconnectable
4QX	4, 110–120/220–240
Voltage regulator	Solid State, Volts/Hz
Insulation:	NEMA MG1
Material	Class H
Temperature rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load	Controller Dependent
One-step load acceptance	100% of Rating
Unbalanced load capability	100% of Rated Standby Current
Peak motor starting kVA:	(35% dip for voltages below)
480 V, 400 V 4P7BX (12 lead)	180 (60 Hz), 136 (50 Hz)
480 V, 400 V 4P8X (12 lead)	261 (60 Hz), 218 (50 Hz)
480 V, 400 V 4P10X (12 lead)	275 (60 Hz), 220 (50 Hz)
240 V, 220 V 4Q10X (4 lead)	144 (60 Hz), 132 (50 Hz)

- The unique Fast-Response™ X excitation system delivers excellent voltage response and short-circuit capability using a rare-earth, permanent magnet (PM)-excited alternator.
- The brushless, rotating-field alternator has broadrange reconnectability.
- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.

Application Data

Engine

Engine Specifications	60 Hz	50 Hz
Manufacturer	General Motors	
Engine: model, type	Industrial Powertrain Vortec 5.7 L, 4-Cycle Natural Aspiration	
Cylinder arrangement	V-8	
Displacement, L (cu. in.)	5.7 (350)	
Bore and stroke, mm (in.)	101.6 x 88.4 (4.00 x 3.48)	
Compression ratio	9.1:1	
Piston speed, m/min. (ft./min.)	318 (1044)	265 (870)
Main bearings: quantity, type	5, M400 Copper Lead	
Rated rpm	1800	1500
Max. power at rated rpm, kW (HP)	78.3 (105)	65.6 (88)
Engine power at standby rating, kW (HP)	59.6 (85.9)	48.8 (67.5)
Cylinder head material	Cast Iron	
Piston type and material	High Silicon Aluminum	
Crankshaft material	Nodular Iron	
Valve (exhaust) material	Forged Steel	
Governor type	Electronic	
Frequency regulation, no-load to full-load	Isochronous	
Frequency regulation, steady state	±0.5%	
Frequency	Fixed	
Air cleaner type, all models	Dry	

Exhaust

Exhaust System	60 Hz	50 Hz
Exhaust manifold type	Dry	
Exhaust flow at rated kW, m^3/min. (cfm)	16.4 (580)	13.6 (480)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	649 (1200)	
Maximum allowable back pressure, kPa (in. Hg)	10.2 (3.0)	
Exhaust outlet size at engine hookup, mm (in.)	76 (3.0) OD	

Engine Electrical

Engine Electrical System	60 Hz	50 Hz
Ignition system	Electronic	
Battery charging alternator:		
Ground (negative/positive)	Negative	
Volts (DC)	12	
Ampere rating	70	
Starter motor rated voltage (DC)	12	
Battery, recommended cold cranking amps (CCA):		
Qty., rating for –18°C (0°F)	1, 630	
Battery voltage (DC)	12	

Fuel

Fuel System	60 Hz	50 Hz
Fuel type	Natural Gas, LP Gas, or Dual Fuel	
Fuel supply line inlet	1 NPTF	
Natural gas fuel supply pressure, kPa (in. H_2O)	1.74–2.74 (7-11)	
LPG vapor withdrawal fuel supply pressure, kPa (in. H_2O)	1.24–2.74 (5-11)	
Dual fuel engine, LPG vapor withdrawal fuel supply pressure, kPa (in. H_2O)	1.24 (5)	

Fuel Composition Limits *	Nat. Gas	LP Gas
Methane, % by volume	90 min.	—
Ethane, % by volume	4.0 max.	—
Propane, % by volume	1.0 max.	85 min.
Propene, % by volume	0.1 max.	5.0 max.
C_4 and higher, % by volume	0.3 max.	2.5 max.
Sulfur, ppm mass	25 max.	
Lower heating value, MJ/m^3 (Btu/ft^3), min.	33.2 (890)	84.2 (2260)

* Fuels with other compositions may be acceptable. If your fuel is outside the listed specifications, contact your local distributor for further analysis and advice.

Application Data

Lubrication

Lubricating System	60 Hz	50 Hz
Type	Full Pressure	
Oil pan capacity, L (qt.)	4.3 (4.5)	
Oil pan capacity with filter, L (qt.)	4.7 (5.0)	
Oil filter: quantity, type	1, Cartridge	

Cooling

Radiator System	60 Hz	50 Hz
Ambient temperature, °C (°F) *	50 (122)	
Engine jacket water capacity, L (gal.)	6.8 (1.8)	
Radiator system capacity, including engine, L (gal.)	20.8 (5.5)	
Engine jacket water flow, Lpm (gpm)	117.3 (31)	98.4 (26)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	54.8 (3120)	45.7 (2600)
Water pump type	Centrifugal	
Fan diameter, including blades, mm (in.)	533 (21)	
Fan, kWm (HP)	4.5 (6.0)	2.6 (3.5)
Max. restriction of cooling air, intake and discharge side of radiator, kPa (in. H_2O)	0.125 (0.5)	

* Enclosure with enclosed silencer reduces ambient temperature capability by 5°C (9°F).

Operation Requirements

Air Requirements	60 Hz	50 Hz
Radiator-cooled cooling air, m^3/min. (scfm)†	170 (6000)	136 (4800)
Combustion air, m^3/min. (cfm)	5.2 (185)	4.4 (155)
Heat rejected to ambient air:		
Engine, kW (Btu/min.)	30.9 (1760)	26.5 (1510)
Alternator, kW (Btu/min.)	7.7 (440)	6.9 (390)

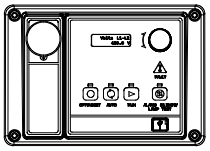
† Air density = 1.20 kg/m^3 (0.075 lbm/ft^3)

Fuel Consumption ‡	60 Hz	50 Hz
Natural Gas, m^3/hr. (cfh) at % load	**Standby Ratings**	
100%	21.8 (771)	18.2 (642)
75%	18.7 (659)	15.6 (549)
50%	13.1 (462)	10.9 (385)
25%	7.9 (280)	6.6 (233)
LP Gas, m^3/hr. (cfh) at % load	**Standby Ratings**	
100%	8.2 (293)	6.8 (245)
75%	6.3 (222)	5.3 (185)
50%	4.6 (163)	3.9 (136)
25%	3.2 (113)	2.7 (94)

‡ Nominal fuel rating: Natural gas, 37 MJ/m^3 (1000 Btu/$ft.^3$)
LP vapor, 93 MJ/m^3 (2500 Btu/$ft.^3$)

LP vapor conversion factors:
8.58 $ft.^3$ = 1 lb.
0.535 m^3 = 1 kg.
36.39 $ft.^3$ = 1 gal.

Controller



Decision-Maker® 3000 Controller
Provides advanced control, system monitoring, and system diagnostics for optimum performance and compatibility.

- Digital display and menu control provide easy local data access
- Measurements are selectable in metric or English units
- Remote communication thru a PC via network or serial configuration
- Controller supports Modbus® protocol
- Integrated hybrid voltage regulator with ±0.5% regulation
- Built-in alternator thermal overload protection
- NFPA 110 Level 1 capability

Refer to G6-100 for additional controller features and accessories.

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the
US and Canada, phone 1-800-544-2444
KOHLERPower.com

Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65) 6264-6422, Fax (65) 6264-6455

Standard Features

- Alternator Protection
- Battery Rack and Cables
- Gas Fuel System (includes fuel mixer, electronic secondary gas regulator, gas solenoid valve, and flexible fuel line between the engine and the skid-mounted fuel system components)
- Integral Vibration Isolation
- Local Emergency Stop Switch
- Oil Drain Extension
- Operation and Installation Literature

Available Options

Approvals and Listings

❑ CSA Certified
❑ IBC Seismic Certification
❑ UL 2200 Listing

Enclosed Unit

❑ Sound Enclosure (with enclosed critical silencer)
❑ Weather Enclosure (with enclosed critical silencer)

Open Unit

❑ Exhaust Silencer, Critical (kit: PA-352663)
❑ Flexible Exhaust Connector, Stainless Steel

Fuel System

❑ Dual Fuel NG/LPG (automatic changeover)
❑ Flexible Fuel Line
(required when the generator set skid is spring mounted)
❑ Gas Filter
❑ LP Liquid Withdrawal (vaporizer)
❑ Secondary Gas Solenoid Valve

Controller

❑ Common Fault Relay
❑ Communication Products and PC Software
❑ Input/Output Module
❑ Remote Annunciator Panel
❑ Remote Emergency Stop
❑ Run Relay

Cooling System

❑ Block Heater, 1500 W, 110–120 V
Required for ambient temperatures below 10°C (50°F)
❑ Radiator Duct Flange

Electrical System

❑ Alternator Strip Heater
❑ Battery
❑ Battery Charger, Equalize/Float Type
❑ Battery Heater
❑ Line Circuit Breaker (NEMA1 enclosure)
❑ Line Circuit Breaker with Shunt Trip (NEMA1 enclosure)

Miscellaneous

❑ Air Cleaner Restrictor Indicator
❑ Certified Test Report
❑ Engine Fluids Added
❑ Rated Power Factor Testing
❑ Rodent Guards

Literature

❑ General Maintenance
❑ NFPA 110
❑ Overhaul
❑ Production

Warranty

❑ 2-Year Basic Limited Warranty
❑ 5-Year Basic Limited Warranty
❑ 5-Year Comprehensive Limited Warranty

Other Options

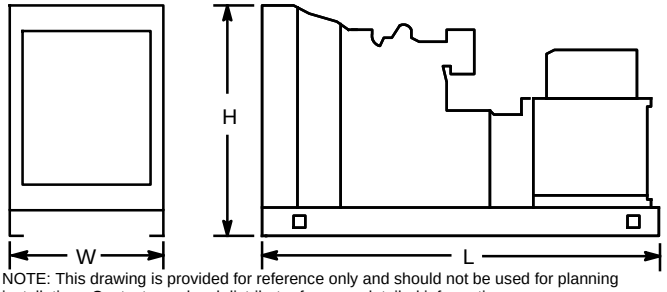
❑ _____
❑ _____
❑ _____
❑ _____
❑ _____
❑ _____
❑ _____
❑ _____

Dimensions and Weights

Overall Size, L x W x H, mm (in.):

Wide Skid	2200 x 1040 x 1175 (86.6 x 40.9 x 46.3)
Narrow Skid	2200 x 864 x 1175 (86.6 x 34.0 x 46.3)

Weight (radiator model), wet, kg (lb.): 878 (1937)



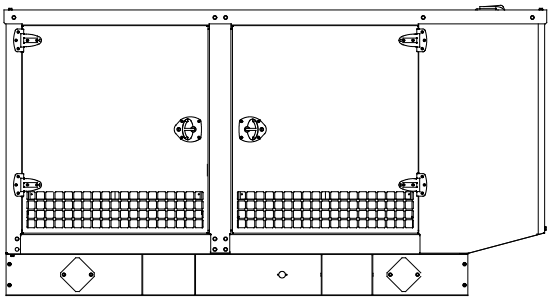
NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

DISTRIBUTED BY:

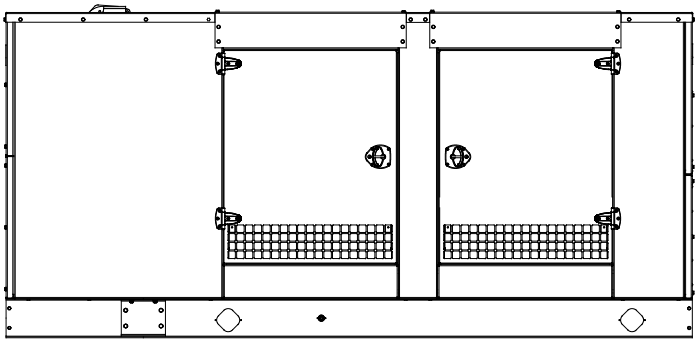
KOHLER. Power Systems

Weather and Sound Enclosures

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED



25–60 kW Enclosure



80–150 kW Enclosure

Applicable to the following:

25–45REZG
25–60REZGB
50/125/150REZGC and 125/150RZGC
80/100REZGD and 80/100RZGD

Weather Enclosure Standard Features

- Internal-mounted critical silencer and flexible exhaust connector.
- Skid-mounted, steel construction with hinged doors.
- Fade-, scratch-, and corrosion-resistant Kohler® Power Armor™ automotive-grade textured finish.
- Enclosure has four access doors which allow for easy maintenance.
- Lockable, flush-mounted door latches.
- Vertical air inlet and outlet discharge to redirect air and reduce noise.

Sound Enclosure Standard Features

- Includes all of the weather enclosure features with the addition of acoustic insulation material.
- Skid-mounted, steel or aluminum construction with hinged doors. Aluminum enclosures are recommended for high humidity and/or high salt/coastal regions.
- Acoustic insulation that meets UL 94 HF1 flammability classification and repels moisture absorption.
- Sound attenuated enclosure that uses up to 51 mm (2 in.) of acoustic insulation, acoustic-lined air inlet hoods, and acoustic-lined air discharge hood.
- 291 kph (181 mph) wind load analyzed for aluminum enclosures only.

Weather and Sound Enclosure Specifications

Model	Max. Dimensions, mm (in.)			Weight, kg (lb.) *			Sound Pressure Level at 60 Hz with Full Load, Weather/Sound, dB(A) †
	Length	Width	Height	Steel Weather Enclosure	Steel Sound Enclosure	Aluminum Sound Enclosure	
25REZG	2585(101.8)	1078 (42.4)	1513 (59.6)	855 (1880)	860 (1891)	768 (1689)	75/67
25REZGB				977 (2149)	982 (2160)	890 (1958)	76/65
30REZG				918 (2026)	924 (2037)	832 (1834)	75/68
30REZGB				977 (2149)	982 (2160)	890 (1958)	76/65
40REZG							76/65
45REZG				1040 (2288)	1045 (2299)	953 (2096)	76/65
50REZGB				1122 (2475)	1127 (2486)	1035 (2283)	77/63
50REZGC							77/63
60REZGB							77/64
80REZGD/RZGD	3526(138.8)	1153 (45.4)	1694 (66.7)	1454 (3205)	1465 (3228)	1403 (3092)	85/71
100REZGD/RZGD				1557 (3434)	1568 (3457)	1506 (3321)	85/71
125REZGC/RZGC			1724 (67.9)	1739 (3834)	1758 (3876)	1592 (3509)	84/73
150REZGC/RZGC			1696 (66.8)	1877 (4138)	1897 (4183)	1730 (3813)	84/73

Note: Data in table is for reference only, refer to the respective ADV drawings for details.

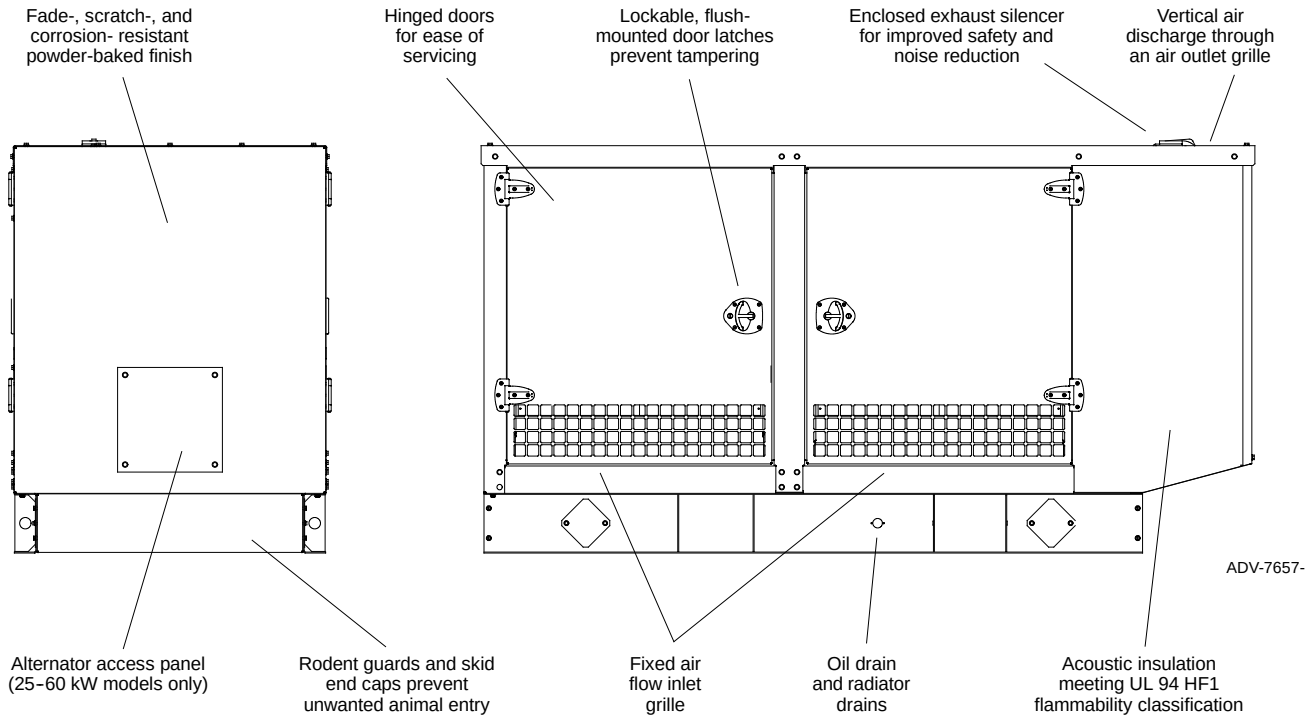
* Max. weight includes the generator set (wet) with largest alternator option, enclosure, and silencer.

† Log average sound pressure level of 8 measured positions around the perimeter of the unit at a distance of 7 m (23 ft). Refer to TIB-114 for details.

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the US and Canada, phone 1-800-544-2444
KOHLERPower.com

Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65) 6264-6422, Fax (65) 6264-6455

Weather and Sound Enclosure



Enclosure ships assembled on generator set skid when ordered installed.
Note: 25–60 kW shown, other models are similar.

Enclosure Features

- Available in steel (14 gauge) formed panel, solid construction. Preassembled package offering corrosion resistant, dent resilient structure mounting directly to skid.
- Power Armor™ automotive-grade finish resulting in advanced corrosion and abrasion protection as well as enhanced edge coverage and color retention.
- Internal critical exhaust silencer offering maximum component life and operator safety.

  NOTE: Installing an additional length of exhaust tail pipe may increase backpressure levels. Please refer to the generator set spec sheet for the maximum backpressure value.
- Interchangeable modular panel construction. Allows complete serviceability or replacement without compromising enclosure design.
- Cooling/combustion air intake with a horizontal air inlet. Sized for maximum cooling airflow.
- Service access. Multi-personnel doors for easy access to generator set control and servicing of the oil fill and battery.
- Cooling air discharge. Weather protective design featuring a vertical air discharge outlet grille. Redirects cooling air up and above enclosures to reduce noise ambient.

Additional Sound Enclosure Features

- Available in steel (14 gauge) or aluminum 3.2 mm (0.125 in.) formed panel, solid construction.
- Sound-attenuating design. Mechanically restrained acoustic insulation UL 94 HF1 listed for flame resistance.
- Cooling air discharge. The sound enclosures include acoustic insulation with urethane film.

Available Approvals and Listings

- ❑ UL 2200 Listing
- ❑ CSA Approval
- ❑ IBC Seismic Certification

NOTE: Some models may have limited third-party approvals; see your local distributor for details.

DISTRIBUTED BY:

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator set distributor for availability.

Appendix E

HVAC Data Sheets

50PG03–28
Ultra High Efficiency Single Package Electric Cooling with Optional Electric Heat Commercial Rooftop Units with PURON® (R–410A) Refrigerant, Optional EnergyX™ (Energy Recovery Ventilator)

Carrier®
Turn to the Experts.℠

Product Data

CENTURION

EnergyX model shown

DEALER DESIGN AWARDS
theNEWS | GOLD

BUILDINGS magazine
Editors' Choice
TOP 100 PRODUCTS
2005

Puron
the environmentally sound refrigerant

Operation Air Quantity Limits

50PG03-16 Units

UNIT 50PG	COOLING (cfm)		HEATING (cfm) ELECTRIC HEAT	
	Min	Max	Min	Max
03	600	1000	600	1000
04	900	1500	900	1500
05	1200	2000	1200	2000
06	1500	2500	1500	2500
07	1800	3000	1800	3000
08	2250	3750	2250	3750
09	2550	4250	2550	4250
12	3000	5000	3000	5000
14	3750	6250	3750	6250
16	4500	7500	4500	7500

50PG20-28 Units

50PG	COOLING		ELECTRIC HEAT	ELECTRIC HEAT (Vertical)	ELECTRIC HEAT (Horizontal)
	Minimum Cfm	Maximum Cfm		Minimum Cfm	Minimum Cfm
20	5000	9,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750
24	5500	10,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750
28	6500	12,000	High Heat (75 kW)	4,500	5,400
			Medium Heat (50 kW)	3,750	4,800
			Low Heat (25 kW)	3,750	3,750

Outdoor Sound Power (Total Unit)

UNIT 50PG	A-WEIGHTED* (dB)	OCTAVE BAND LEVELS dB							
		63	125	250	500	1000	2000	4000	8000
03	75.0	82.6	79.9	75.7	73.3	70.0	64.3	58.4	50.5
04	73.2	79.8	77.2	74.1	70.1	68.0	63.6	58.4	51.9
05	71.9	79.7	79.6	72.6	69.6	66.0	61.4	56.4	48.5
06	78.5	82.2	82.6	79.5	75.7	73.9	68.6	64.0	56.3
07	78.5	87.5	83.0	78.5	76.3	73.8	68.4	63.8	56.5
08	80.0	91.7	83.6	81.0	77.9	75.0	69.9	66.0	59.3
09	79.9	89.1	82.7	80.0	77.7	75.0	70.2	66.3	57.8
12	80.0	90.4	83.1	80.9	77.8	75.2	70.0	66.1	57.6
14	83.3	86.4	85.9	85.3	81.8	78.2	72.2	67.9	59.9
16	84.0	90.3	85.2	83.5	81.1	79.0	73.7	70.5	65.4
20	81.7	90.2	84.8	80.7	79.0	77.6	71.4	66.7	60.7
24	84.9	90.0	86.3	83.6	82.9	80.3	74.9	71.4	66.5
28	84.9	90.0	86.3	83.6	82.9	80.3	74.9	71.4	66.5

LEGEND

db – Decibel

*Sound Rating ARI or Tone Adjusted, A–Weighted Sound Power Level in dB. For sizes 03–12, the sound rating is in accordance with ARI Standard 270–1995. For sizes 14–28, the sound rating is in accordance with ARI 370–2001.

Outdoor Sound Power (Total Unit)
with High CFM EnergyX

UNIT 50PG w/ERV	A–WEIGHTED* (dB)	OCTAVE BAND LEVELS dB							
		63	125	250	500	1000	2000	4000	8000
03	83.0	82.8	81.4	79.7	78.1	77.9	76.5	72.5	70.1
04	82.7	80.2	79.6	79.1	77.3	77.6	76.5	72.5	70.1
05	82.6	80.1	81.1	78.8	77.2	77.4	76.4	72.4	70.0
06	83.8	82.4	83.4	81.6	79.1	78.8	76.9	72.9	70.2
07	83.8	87.6	83.8	81.1	79.3	78.8	76.9	72.9	70.2
08	87.3	92.0	86.8	84.5	82.4	81.8	80.5	78.0	74.2
09	87.2	89.6	86.4	84.1	82.4	81.8	80.5	78.1	74.2
12	87.3	90.8	86.5	84.5	82.4	81.8	80.5	78.0	74.2
14	88.2	87.2	88.0	87.0	84.2	82.7	80.8	78.2	74.3
16	91.4	93.2	92.8	88.2	86.3	85.5	84.4	83.4	78.4
20	91.2	93.1	92.7	87.4	85.8	85.2	84.2	83.3	78.3
24	91.7	93.0	93.0	88.2	86.9	85.8	84.5	83.5	78.5
28	91.7	93.0	93.0	88.2	86.9	85.8	84.5	83.5	78.5

LEGEND
dB – Decibel
***** Sound Rating ARI or tone Adjusted, A–Weighted Sound Power Level in dB. For sizes 03–12, the sound rating is in accordance with ARI Standard 270–1995. For sizes 14–28, the sound rating is in accordance with ARI 370–2001.

PHYSICAL DATA

50PG03-07

BASE UNIT 50PG		03	04	05	06	07
NOMINAL CAPACITY (Tons)		2	3	4	5	6
OPERATING WEIGHT (lb)						
Unit*		704	704	775	829	874
Economizer						
Vertical		40	40	40	40	40
Horizontal		50	50	50	50	50
Humidi-MiZer™ Adaptive Dehumidification System		22	22	31	27	26
Roof Curb						
14-in.		122	122	122	122	122
24-in.		184	184	184	184	184
COMPRESSOR		Fully Hermetic Scroll				
Quantity		1	1	1	1	1
Oil Type		Copeland 3MA				
Number of Refrigerant Circuits		1	1	1	1	1
Oil (oz)		38	42	42	66	56
REFRIGERANT TYPE		R-410A (Puron® Refrigerant)				
Expansion Device		TXV	TXV	TXV	TXV	TXV
Operating Charge (lb) — Standard Unit		7.3	9.0	15.7	16.6	19.0
Operating Charge (lb) — Unit with Humidi-MiZer System		11.75	13.50	25.00	22.00	22.70
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins				
Condenser A (Outer)						
Rows...Fins/in.		1…17	1…17	2…17	2…17	2…17
Face Area (sq ft)		12.6	12.6	12.6	12.6	12.6
Condenser B (Inner)						
Rows...Fins/in.		—	1…17	2…17	2…17	2…17
Face Area (sq ft)		—	12.6	12.6	12.6	12.6
HUMIDI–MIZER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins				
Rows...Fins/in.		1...17	1...17	1...17	1...17	1...17
Face Area (sq ft)		6.4	6.4	9.3	9.3	9.3
CONDENSER FAN		Propeller				
Quantity…Diameter (in.)		1…24	1…24	1…24	1…24	1…24
Nominal Cfm (Total, all fans)		3500	3500	3500	4500	4500
Motor Hp		1/8	1/8	1/8	1/4	1/4
Nominal Rpm — High Speed		825	825	825	1100	1100
Nominal Rpm — Low Speed		300	300	300	300	300
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Face Split				
Rows…Fins/in.		2…15	2…15	2…15	3…15	4…15
Face Area (sq ft)		9.3	9.3	9.3	9.3	9.3
EVAPORATOR FAN		Centrifugal Type, Belt Drive				
Quantity…Size (in.)	Low	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9
	High	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9	1...12 x 9
Type Drive	Low	Belt	Belt	Belt	Belt	Belt
	High	Belt	Belt	Belt	Belt	Belt
Nominal Cfm		800	1200	1600	2000	2400
Maximum Continuous Bhp	Low	0.85	0.85	0.85	0.85/2.40†	2.40
	High	0.85	0.85	1.60/2.40†	1.60/2.40†	3.10
Motor Nominal Rpm		1620	1620	1620	1725	1725
Motor Frame Size	Low	48Y	48Y	48Y	56Y	56Y
	High	48Y	48Y	56Y	56Y	56Y
Fan Rpm Range	Low	482-736	482-736	596-910	690-978	796-1128
	High	656-1001	796-1128	828-1173	929-1261	1150-1438
Motor Bearing Type		Ball	Ball	Ball	Ball	Ball
Maximum Fan Rpm		2000	2000	2000	2000	2000
Motor Pulley Pitch Diameter Range (in.)	Low	1.9-2.9	1.9-2.9	1.9-2.9	2.4-3.4	2.4-3.4
	High	1.9-2.9	2.4-3.4	2.4-3.4	2.8-3.8	4.0-5.0
Fan Pulley Pitch Diameter (in.)	Low	6.8	6.8	5.5	6.0	5.2
	High	5.0	5.2	5.0	5.2	6.0
Nominal Motor Shaft Diameter (in.)	Low	1/2	1/2	1/2	5/8	5/8
	High	1/2	1/2	5/8	5/8	7/8
Belt…Pitch Length (in.)	Low	49.3	49.3	49.3	49.3	49.3
	High	49.3	49.3	49.3	49.3	52.3
Belt…Type	Low	AX	AX	AX	AX	AX
	High	AX	AX	AX	AX	AX
Pulley Center Line Distance Min. (in.)	Low	16.2	16.2	16.2	16.2	16.2
	High	16.2	16.2	16.2	16.2	16.2
Pulley Center Line Distance Max. (in.)	Low	20.2	20.2	20.2	20.2	20.2
	High	20.2	20.2	20.2	20.2	20.2
Speed Change per Full Turn of Movable Pulley Flange (rpm)	Low	48	48	59	58	66
	High	65	62	69	66	58
Movable Pulley Maximum Full Turns from Closed Position	Low	5	5	5	5	5
	High	5	5	5	5	5
Factory Pulley Setting (rpm)	Low	482	482	596	690	796
	High	656	796	828	929	1150
Fan Shaft Diameter at Pulley (in.)		3/4	3/4	3/4	3/4	3/4
HIGH-PRESSURE SWITCH (psig)						
Cutout		660 ± 10	660 ± 10	660 ± 10	660 ± 10	660 ± 10
Reset (Auto.)		505 ± 20	505 ± 20	505 ± 20	505 ± 20	505 ± 20
RETURN-AIR FILTERS		Throwaway				
Quantity…Size (in.)		4…16 x 20 x 2	4…16 x 20 x 2	4…16 x 20 x 2	4…16 x 20 x 2	4…16 x 20 x 2

LEGEND

TXV – Thermostatic Expansion Valve

*Aluminum evaporator coil/aluminum condenser coil.

† Single phase/three phase

HUSSMANN®

Proto-Aire Outdoor Protocol

Environmental Benefits Compared to Traditional Rack Systems.

- Better energy efficiency reduces use of fossil fuels, reduces air pollution.
- Significantly smaller refrigerant charge reduces use of HFCs.
- Significantly lower refrigerant leak rate.

PROTO-AIRE

Outdoor Small Footprint Protocol Solution.

Proto-Aire is a compact footprint outdoor Protocol unit with an integrated air-cooled condenser and weatherproof skins. Units can be installed outside next to the store or on the roof. This allows for more flexibility with Protocol store designs and reduces space requirements for equipment inside the store.

Sustainable Solutions.

Protocol is the most widely used refrigeration system directly addressing today's environmental concerns. We are using the phrase "Sustainable Solutions" to underscore Protocol's important role in helping address environmental issues.

Hussmann is committed to developing advanced technologies that reduce the use of HFCs and improve energy efficiency. Protocol is just one of many alternatives we offer to promote sustainable solutions.

Several condenser sizes.

Proto-Aire is sized based on the compressor load and the heat of rejection requirements for the compressors. The largest condenser can support up to 450 MBH at a 20˚F TD.

Features and options.

- Weatherproof outdoor enclosure.
- Factory installed suction filters and liquid driers.
- Optional factory-installed gas defrost valves and winter control.
- Optional Polyfin and Electrofin coil coating.
- Optional oversized receiver with heat tape and insulation.
- Optional hail guards and rain doors.

All standard Protocol options.

Since the Proto-Aire builds upon the Protocol frame, all standard Protocol mechanical and electrical options are available with Proto-Aire.

Proto-Aire environmental advantages.

- Significant reduction in refrigerant charge.
- Significant reduction in greenhouse gas emissions.
- Better energy efficiency in virtually all applications.
- Less copper refrigerant piping.
- Fewer braze joints for fewer leaks.

Other advantages.

- Easy to install.
- No machine room needed.
- Lower installation costs.
- Decreases or eliminates the need for EPRs.
- Compact footprint.

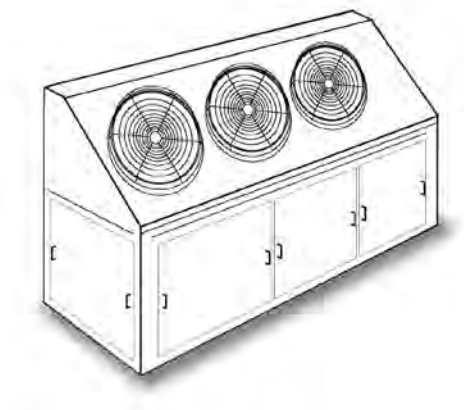
Proto-Aire dimensions.

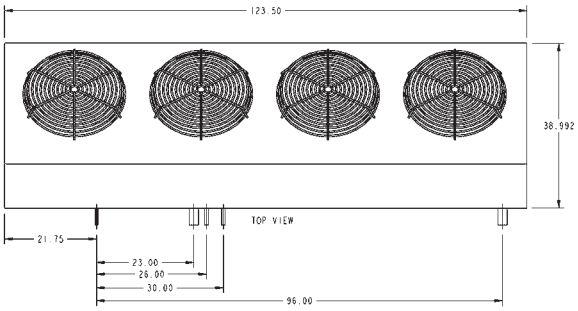
	L	H	D	Weight
Nomenclature	(in)	(in)	(in)	(lb)
3 and 4 Fan	128	56.5	42	2800
6 Fan (Super)	185	56.5	42	3700

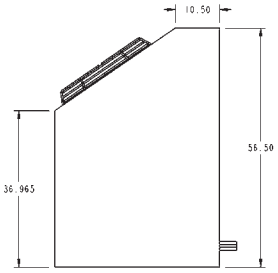
NOTE: We reserve the right to change or revise specifications and product design in connection with any feature of our products. Such changes do not entitle the buyer to corresponding changes, improvements, additions, or replacements for equipment previously sold or shipped.

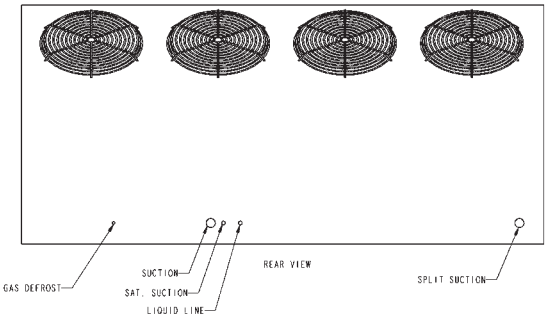
For additional resources, contact your representative or visit www.hussmann.com.

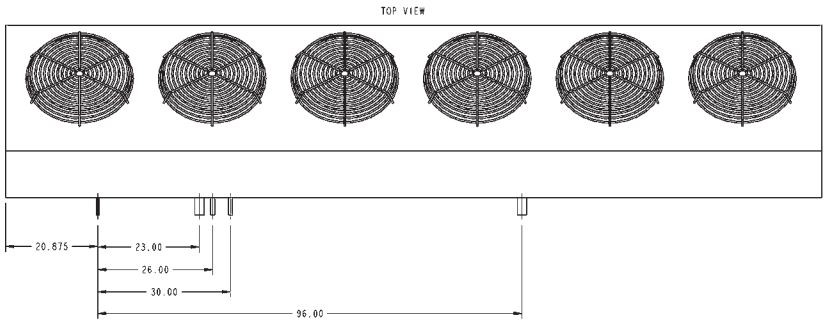
LISTED

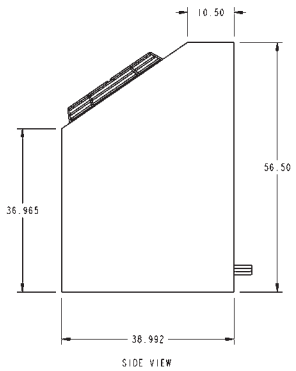


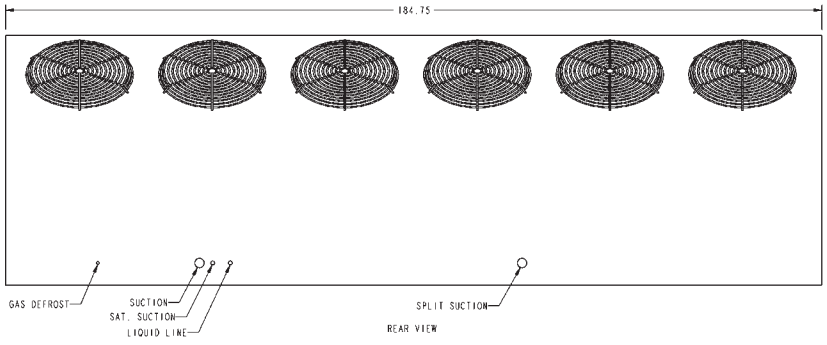












HUSSMANN®

Hussmann Corporation
12999 St. Charles Rock Rd.
Bridgeton, MO 63044-2483
Ph: 314.291.2000

www.hussmann.com

Appendix F

Construction Noise Modeling Outputs

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 05/16/2019
Case Description: Palo Alto Mercedes/Audi

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Property Plane	Commercial	110.0	70.0	70.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	10.0	0.0
Dozer	No	40		81.7	10.0	0.0
Grader	No	40	85.0		10.0	0.0
Backhoe	No	40		77.6	10.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Excavator	94.7	90.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	95.6	91.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	99.0	95.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Backhoe	91.5	87.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	99.0	98.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A