Quick Quack Car Wash (Store #44-325)

Noise Impact Study

City of San Bernardino, CA

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Date: 10/11/2023

MD ACOUSTICS
Sound Solutions for Planning and Design

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1.0 Executive Summary

This report has been prepared to provide the calculated noise projections from the proposed Quick Quack Car Wash project at 950 Hospitality Lane in the City of San Bernardino, CA. All noise projections were compared to the City of San Bernardino's noise ordinance, Noise Element policies as well as the existing ambient condition.

1.1 Findings and Conclusions

MD measured the ambient noise data at or near the project site which indicates the existing noise level ranges between 56-65 dBA, Leq and has provided noise projections based on the equipment and tunnel design.

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

Project only operational noise levels are anticipated to range between 50 to 64 dBA Leq, depending on the location of the receptor. Project plus ambient noise level projections are anticipated to be from 58 to 68 dBA at adjacent receptors. This assessment evaluates the baseline noise condition and compares the project's worst-case operational noise level to the existing noise levels (during the project's proposed hours of operation).

The project as designed (see project design features (PDFs) in Section 7.2 of the report) meets the City's noise ordinance and policies within the General Plan Noise Element. No additional noise mitigation measures are required.

The following project design features are provided to ensure compliance with the noise ordinance:

1. The project will incorporate 12 Sonny with the silencer package installed or equivalent to meet these acoustical benchmarks.
2. An acoustic liner (Acoustiblok perforated metal panels or equivalent) will line 15' of the exit (see Appendix C).

2.0 Introduction

2.1 Purpose of Analysis and Study Objectives

The purpose of this noise impact study is to evaluate the potential noise impacts for the project study area and to recommend noise mitigation measures, if necessary, to minimize the potential noise impacts. The assessment was conducted and compared to potentially applicable noise standards set-forth by the State and/or Local agencies. Consistent with the City's Noise Guidelines, the project must demonstrate compliance to the applicable noise zoning ordinance and sound attenuation requirements.

The following is provided in this report:

- A description of the study area and the proposed project
- Information regarding the fundamentals of noise
- A description of the local noise guidelines and standards
- An evaluation of the existing ambient noise environment
- An analysis of stationary noise impact (e.g. blowers and vacuums) from the project site to adjacent land uses

2.2 Site Location and Study Area

The project site is approximately 1.04 acres and is located at 950 Hospitality Lane in San Bernardino, California as shown in Exhibit A. The land uses directly surrounding the project site include commercial to the north, south, east, and west.

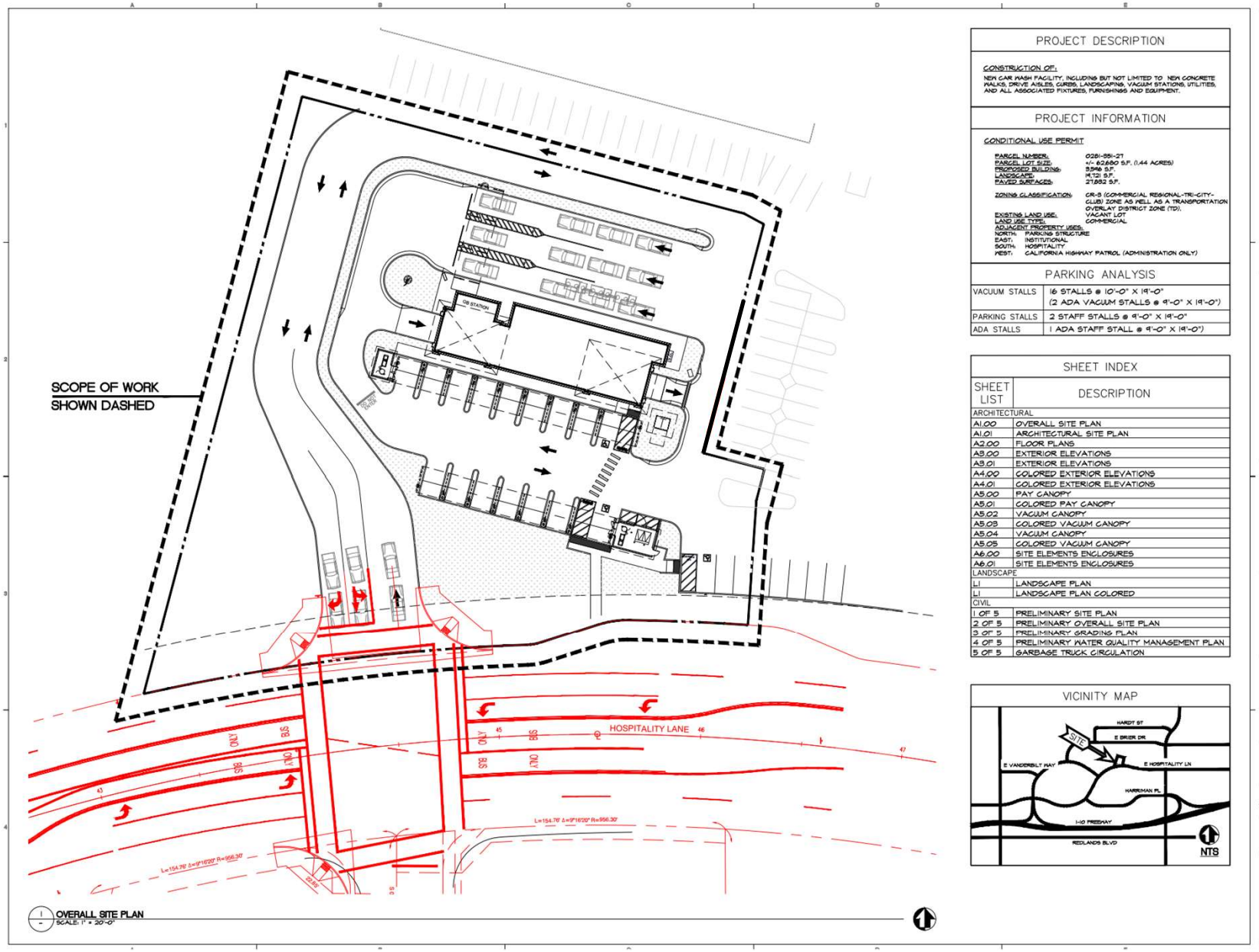
2.3 Proposed Project Description

The project proposes to develop an automatic car wash with a 108-foot tunnel and approximately 16 vacuum bays. This noise study has been prepared which identifies the Project's potential impact to the adjacent uses and compares the noise level projections to the City's applicable noise ordinance and regulations. The site plan used for this is illustrated in Exhibit B.

Exhibit A
Location Map

Exhibit B

Site Plan



PROJECT DESCRIPTION

CONSTRUCTION OF:
NEW CAR WASH FACILITY, INCLUDING BUT NOT LIMITED TO NEW CONCRETE WALKS, DRIVE AISLES, CURBS, LANDSCAPING, VACUUM STATIONS, UTILITIES, AND ALL ASSOCIATED FIXTURES, FURNISHINGS AND EQUIPMENT.

PROJECT INFORMATION

CONDITIONAL USE PERMIT

PARCEL NUMBER:	0281-551-27
PARCEL LOT SIZE:	+/- 62,680 S.F. (1.44 ACRES)
PROPOSED BUILDING:	3,594 S.F.
LANDSCAPE:	14,121 S.F.
PAVED SURFACES:	27,882 S.F.
ZONING CLASSIFICATION:	CR-3 (COMMERCIAL REGIONAL-TRI-CITY-CLUB) ZONE AS WELL AS A TRANSPORTATION OVERLAY DISTRICT ZONE (TD).
EXISTING LAND USE:	VACANT LOT
LAND USE TYPE:	COMMERCIAL
ADJACENT PROPERTY USES:	
NORTH:	PARKING STRUCTURE
EAST:	INSTITUTIONAL
SOUTH:	HOSPITALITY
WEST:	CALIFORNIA HIGHWAY PATROL (ADMINISTRATION ONLY)

PARKING ANALYSIS

VACUUM STALLS	16 STALLS @ 10'-0" X 19'-0" (2 ADA VACUUM STALLS @ 9'-0" X 19'-0")
PARKING STALLS	2 STAFF STALLS @ 9'-0" X 19'-0"
ADA STALLS	1 ADA STAFF STALL @ 9'-0" X 19'-0")

SHEET INDEX

SHEET LIST	DESCRIPTION
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A1.01	ARCHITECTURAL SITE PLAN
A2.00	FLOOR PLANS
A3.00	EXTERIOR ELEVATIONS
A3.01	EXTERIOR ELEVATIONS
A4.00	COLORED EXTERIOR ELEVATIONS
A4.01	COLORED EXTERIOR ELEVATIONS
A5.00	PAY CANOPY
A5.01	COLORED PAY CANOPY
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A5.05	COLORED VACUUM CANOPY
A6.00	SITE ELEMENTS ENCLOSURES
A6.01	SITE ELEMENTS ENCLOSURES
LANDSCAPE	
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L1	LANDSCAPE PLAN COLORED
CIVIL	
1 OF 5	PRELIMINARY SITE PLAN
2 OF 5	PRELIMINARY OVERALL SITE PLAN
3 OF 5	PRELIMINARY GRADING PLAN
4 OF 5	PRELIMINARY WATER QUALITY MANAGEMENT PLAN
5 OF 5	GARBAGE TRUCK CIRCULATION

VICINITY MAP

Quick Quack Car Wash
1380 LEAD HILL BLVD., STE. 260, ROSEVILLE, CA 95661

QUICK QUACK
STORE #44-325
E HOSPITALITY LANE
AND TIPPECANOE AVE
SAN BERNARDINO, CA

REVISIONS
#	DATE	DESCRIPTION
1	-	-

TAIT
SINCE 1964
1621 Lampton Lane
Norco, CA 92860
P: 951.479.7200
www.tait.com

OVERALL SITE PLAN

DATE: AUGUST 2023
TAIT JOB #: QQ0040

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PLANNING PACKAGE

A1.00

3.0 Fundamentals of Noise

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

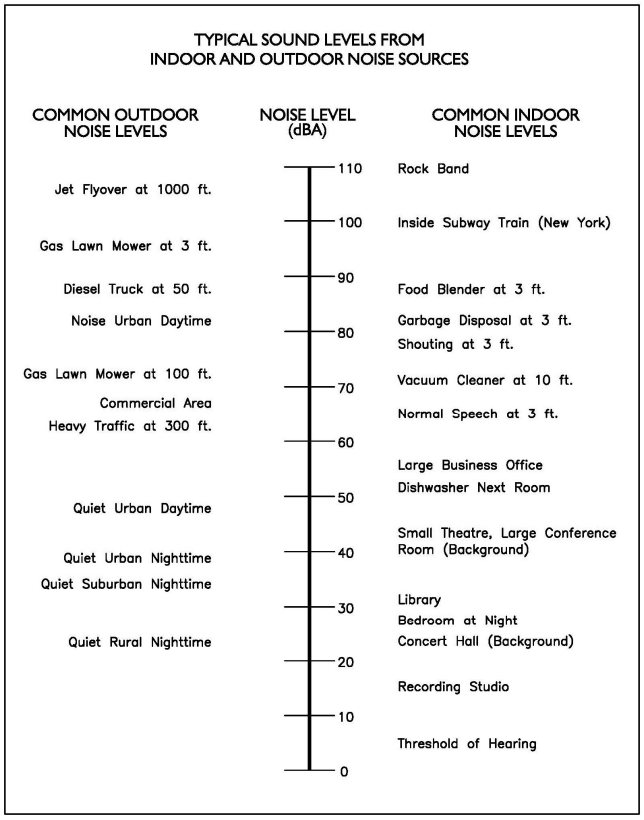
3.1 Sound, Noise and Acoustics

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

3.2 Frequency and Hertz

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

Exhibit C: Typical A-Weighted Noise Levels



3.3 Sound Pressure Levels and Decibels

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

3.4 Addition of Decibels

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

3.5 Human Response to Changes in Noise Levels

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

3.6 Noise Descriptors

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

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

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

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

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

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

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

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

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

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

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

Percent Noise Levels: See L(n).

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

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

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

3.7 Traffic Noise Prediction

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

3.8 Sound Propagation

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

spreading versus a spherical spreading that results from a point source. The sound level attenuates for a line source at a rate of 3 dB per doubling of distance.

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

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

4.0 Regulatory Setting

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

4.1 Federal Regulations

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

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

The Federal Office of Noise Abatement and Control (ONAC) originally was tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows: The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies. The Federal Aviation Agency (FAA) is responsible for regulating noise from aircraft and airports. The Federal Highway Administration (FHWA) is responsible for regulating noise from the interstate highway system. The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers. The Housing and Urban Development (HUD) is responsible for establishing noise regulations as it relates to exterior/interior noise levels for new HUD-assisted housing developments near high noise areas.

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

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

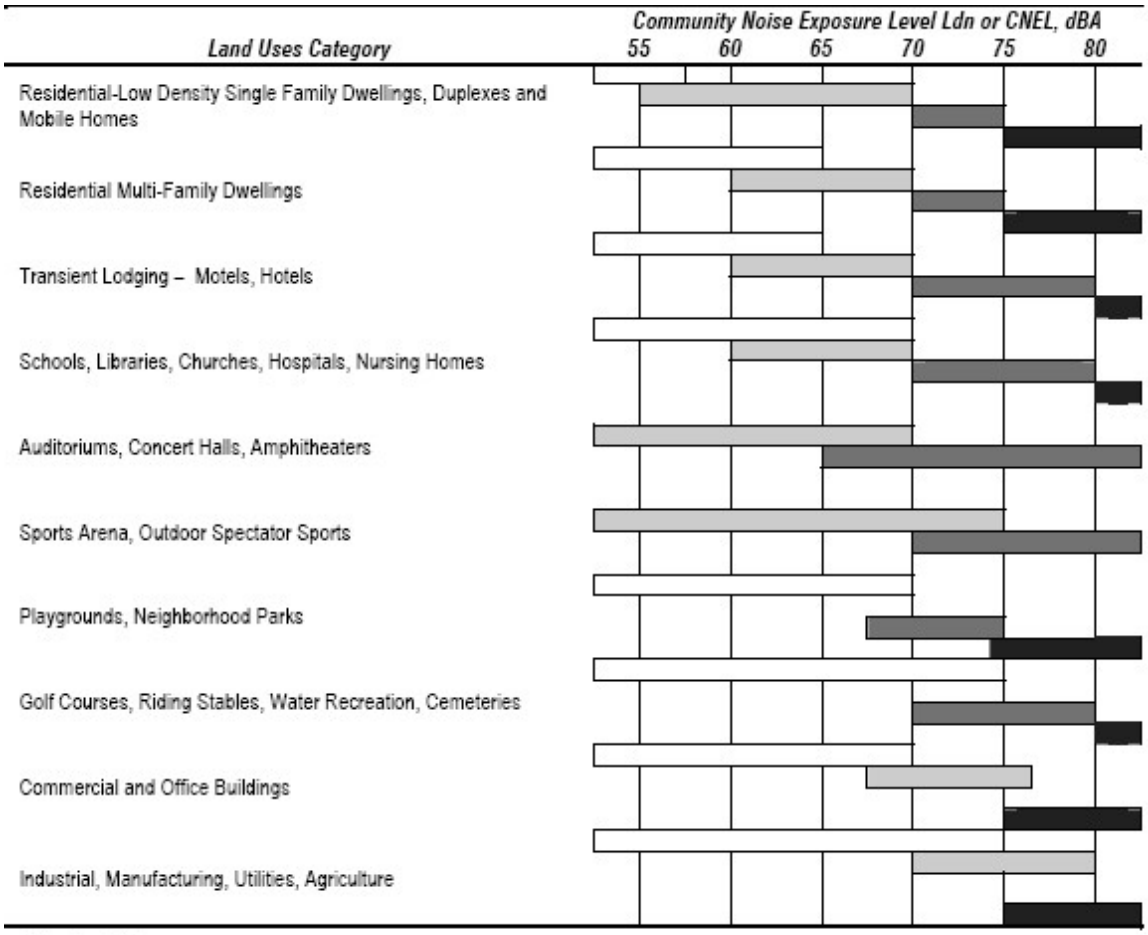
4.2 State Regulations

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

The State of California has established noise insulation standards as outlined in Title 24 which in some cases requires acoustical analyses to outline exterior noise levels and to ensure interior noise levels do

not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable as illustrated in Exhibit D.

Exhibit D: Land Use Compatibility Guidelines



Source: California Office of Noise Control

4.3 City of San Bernardino Noise Regulations

City of San Bernardino General Plan Noise Element

The City outlines their noise goals, policies and standards within the General Plan Noise Element. The following outlines the polices relevant to the proposed project:

Goal 14.1: Ensure that residents are protected from excessive noise through careful land planning.

Policy

14.1.4: Prohibit the development of new or expansion of existing industrial, commercial, or other uses that generate noise impacts on housing, schools, health care facilities or other sensitive uses above a Ldn of 65 dB(A). (LU-1).

Goal 14.3: Protect residents from the negative effects of "spill over" or nuisance noise.

Policy

14.3.3: Adopt and enforce a standard for exterior noise levels for all commercial uses that prevents adverse levels of discernible noise on adjoining residential properties. (A-1).

14.3.4: Adopt and enforce a standard for exterior noise levels from the use of leaf blowers, motorized lawn mowers, parking lot sweepers, or other high-noise equipment on commercial properties if their activity will result in noise that adversely affects abutting residential parcels. (A-1)

14.3.6: Ensure that buildings are constructed soundly to prevent adverse noise transmission between differing uses located in the same structure and individual residences in multi-family buildings. (LU-1)

14.3.8. Require common walls and floors between commercial and residential uses be constructed to minimize the transmission of noise and vibration. (LU-1)

City of San Bernardino Municipal Code

Section 19.20.030.15 – Noise.

19.20.030.15 Noise.

A. In residential areas, no exterior noise level shall exceed 65dBA and no interior noise level shall exceed 45dBA.

B. All residential developments shall incorporate the following standards to mitigate noise levels:

1. Increase the distance between the noise source and receiver.
2. Locate land uses not sensitive to noise (i.e., parking lots, garages, maintenance facilities, utility areas, etc.) between the noise source and the receiver.
3. Bedrooms should be located on the side of the structure away from major rights-of-way.
4. Quiet outdoor spaces may be provided next to a noisy right-of-way by creating a U-shaped development which faces away from the right-of-way.

C. The minimum acceptable surface weight for a noise barrier is four pounds per square foot (equivalent to ¾-inch plywood). The barrier shall be of a continuous material which is resistant to sound including:

1. Masonry Block
2. Precast concrete
3. Earth berm or a combination of earth berm with block concrete.

D. Noise barriers shall interrupt the line-of-sight between noise source and receiver.

Section 8.54 Noise Control

8.54.020 Prohibited Acts.

It shall be unlawful for any person to engage in the following activities:

D. Using, operating, or permitting to be played, used or operated any radio receiving set, musical instrument, phonograph, or other sound amplification or production equipment for producing or reproducing sound in such a manner as to disturb the peace, quiet, or comfort of neighboring persons, or at any time with louder volume than is necessary for the convenient hearing of the person or persons who are in the room, vehicle, or other enclosure in which such machine or device is operated, and who are voluntary listeners thereto and that is:

1. Plainly audible across property boundaries;

2. Plainly audible through partitions common to two residences within a building;

3. Plainly audible at a distance of 50 feet in any direction from the source of the music or sound between the hours of 8:00 a.m. and 10:00 p.m.; or

4. Plainly audible at a distance of 25 feet in any direction from the source of the music or sound between the hours of 10:00 p.m. and 8:00 a.m.

I. The creation of loud and excessive noise in connection with the loading or unloading of motor trucks and other vehicles.

K. The doing of automobile, automotive body or fender repair work, or other work on metal objects and metal parts in a residential district so as to cause loud and excessive noise which disturbs the peace, quiet, and repose of any person occupying adjoining or closely situated property or neighborhood.

L. The operation or use between the hours of 10:00 p.m. and 8:00 a.m. of any pile driver, steam shovel, pneumatic hammers, derrick, steam or electric hoist, power driven saw, or any other tool or apparatus, the use of which is attended by loud and excessive noise, except with the approval of the City.

M. Creating excessive noise adjacent to any school, church, court, or library while the same is in use, or adjacent to any hospital or care facility, which unreasonably interferes with the workings of such institution, or which disturbs or unduly annoys patients in the hospital, provided conspicuous signs are displayed in such streets indicating the presence of a school, institution of learning, church, court, or hospital.

N. Making or knowingly and unreasonably permitting to be made any unreasonably loud, unnecessary, or unusual noise that disturbs the comfort, repose, health, peace and quiet, or which causes discomfort or annoyance to any reasonable person of normal sensitivity. The characteristics and conditions that may be considered in determining whether this section has been violated include, but are not limited to, the following:

1. The level of noise;
2. The level of background noise;
3. The proximity of the noise to sleeping facilities;
4. The nature and zoning of the areas within which the noise emanates;
5. The density of the inhabitation of the area within which the noise emanates;
6. The time of the day or night the noise occurs;
7. The duration of the noise;
8. Whether the noise is recurrent, intermittent, or constant; and
9. Whether the noise is produced by a commercial or noncommercial activity.

8.54.050 Controlled Hours of Operation

It shall be unlawful for any person to engage in the following activities other than between the hours of 8:00 a.m. and 8:00 p.m. in residential zones and other than between the hours of 7:00 a.m. and 8:00 p.m. in all other zones:

A. Operate or permit the use of powered model vehicles and planes.

B. Load or unload any vehicle, or operate or permit the use of dollies, carts, forklifts, or other wheeled equipment that causes any impulsive sound, raucous, or unnecessary noise within one thousand (1,000) feet of a residence.

C. Operate or permit the use of domestic power tools, or machinery or any other equipment or tool in any garage, workshop, house, or any other structure.

D. Operate or permit the use of gasolines or electric powered leaf blowers, such as commonly used by gardeners and other persons for cleaning lawns, yards, driveways, gutters, and other property.

E. Operate or permit the use of privately operated street/parking lot sweepers or vacuums, except that emergency work and/or work necessitated by unusual conditions may be performed with the written consent of the City Manager.

F. Operate or permit the use of electrically operated compressor, fan, and other similar devices.

Section 8.54.060 Exemptions

The following activities and noise sources shall be exempt from the provisions of this chapter:

B. Such noises as are an accompaniment and effect of a lawful business, commercial or industrial enterprise carried on in an area zoned for that purpose, except where there is evidence that such noise is a nuisance and that such a nuisance is a result of the employment of unnecessary and injurious methods of operation.

5.0 Study Method and Procedure

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

5.1 Noise Measurement Procedure and Criteria

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

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

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

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

5.2 Noise Measurement Locations

The noise monitoring locations were selected based on the nearest sensitive receptors relative to the proposed onsite noise sources. Three (3) short-term 15-minute noise measurements were conducted at or near the project site and are illustrated in Exhibit E. Appendix A includes photos, the field sheet, and measured noise data.

5.3 Interior Noise Modeling

The interior noise level is the difference between the projected exterior noise level at the structure’s facade and the noise reduction provided by the structure itself. Typical building construction will provide a conservative 12 dBA noise level reduction with a “windows open” condition and a very conservative 20 dBA noise level reduction with “windows closed”. MD estimated the interior noise level by subtracting the building shell design from the predicted exterior noise level.

For a "windows closed" condition, the project will require mechanical fresh air ventilation (e.g., air conditioning) to the habitable dwelling units.

5.4 Stationary Noise Modeling

SoundPLAN (SP) acoustical modeling software was utilized to model future worst-case stationary noise impacts to the adjacent land uses. SP is capable of evaluating multiple stationary noise source impacts at various receiver locations. SP's software utilizes algorithms (based on the inverse square law and reference equipment noise level data) to calculate noise level projections. The software allows the user to input specific noise sources, spectral content, sound barriers, building placement, topography, and sensitive receptor locations.

The future worst-case noise level projections were modeled using referenced sound level data for the various stationary on-site sources (vacuums, vacuum turbine motors and car wash blowers at the exit).

The blowers (a total 12 Sonny Blowers with silencers) were modeled at 10 to 12 feet high as point sources. The Sonny Blowers will be located approximately 5 to 10 feet inside the exit of the tunnel. The reference equipment sound level data is provided in Appendix B.

The SP model assumes a total of 16 vacuums and the dryer system are operating simultaneously (worst-case scenario), when the noise will in reality be intermittent and lower in noise level.

The project proposes to house the vacuum turbine motors inside a 4-sided 8-foot tall CMU enclosure with venting. The reference vacuum equipment sound level data is provided in Appendix B. All other noise producing equipment (e.g., compressors, pumps) will be housed within mechanical equipment rooms.

The following project design features are provided to ensure compliance with the noise ordinance:

1. The project will incorporate 12 Sonny with the silencer package installed or equivalent to meet these acoustical benchmarks.
2. An acoustic liner (Acoustiblok perforated metal panels or equivalent) will line 15' of the exit (see Appendix C).

6.0 Existing Noise Environment

Three (3) short-term 15-min measurements were performed at or near the project site vicinity. Noise measurements were taken to determine the existing ambient noise levels. Noise data indicates that traffic along Hospitality Lane is the primary source of noise impacting the site and surrounding area.

6.1 Short-Term Noise Measurements Results

The results of the short-term noise data are presented in Table 1.

Table 1: Short-Term Noise Measurement Data[1]

Location	Start Time	Stop Time	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)	L(90)
NM1	1:01 PM	1:16 PM	56.5	72.9	48.5	66.5	56.7	52.9	51.4	50.1
NM2	1:18 PM	1:33 PM	56.4	76.7	51.5	60.8	56.7	54.9	54	52.6
NM3	1:34 PM	1:49 PM	65.1	78.1	53.7	72.2	69.5	66	61.4	55.2

Notes:
1. Short-term noise monitoring locations are illustrated in Exhibit E.

Noise data indicates that the ambient noise level ranges from 56 to 65 dBA Leq at surrounding land uses. Additional field notes and photographs are provided in Appendix A.

For this evaluation, MD has utilized the equivalent noise level (measured during estimated hours of operation) and has compared the project's projected noise levels to the representative ambient level.

= Short-Term
Monitoring Location

Exhibit E

Measurement Locations

7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts as a result of the project. The analysis details the estimated exterior noise levels. Stationary noise impacts are analyzed from the noise sources on-site such as dryers/blowers and vacuums/compressed air systems.

7.1 Stationary Source Noise

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

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

Sensitive receptors that may be affected by project operational noise include surrounding commercial uses. The worst-case stationary noise was modeled using SoundPLAN acoustical modeling software. Worst-case assumes the blowers, vacuums and equipment are always operational when in reality the noise will be intermittent and cycle on/off depending on the customer usage. In addition, the modeling takes into account the proposed enclosure for the vacuum turbines.

A total of five (5) receptors R1 – R5 were modeled to evaluate the proposed project's operational noise impact. R1 through R5 represent commercial use. A receptor is denoted by a yellow dot. All yellow dots represent adjacent commercial uses. There are no outdoor sensitive uses.

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

Project Operational Noise Levels

Exhibit F shows the "project only" operational noise levels at the property lines and/or sensitive receptor area. Operational noise levels are anticipated to range between 50 dBA to 64 dBA at adjacent uses (depending on the location). Exhibit C provides a scale which illustrates loudness associated with common noise levels.

Project Plus Ambient Operational Noise Levels

Table 2 demonstrates the project plus the ambient (measured average level) noise levels. Project plus ambient noise level projections are anticipated to range between 58 to 68 dBA Leq at nearby receptors (R1 – R5).

Table 2: Worst-Case Predicted Operational Noise Levels (dBA)

Receptor[1]	Existing Ambient Noise Level (dBA, Leq)[2]	Project Noise Level (dBA, Leq)[3]	Total Combined Noise Level (dBA, Leq)	Change in Noise Level as Result of Project
1	65	64	68	3
2	59	64	65	6
3	57	50	58	1
4	56	63	64	8
5	56	53	58	2

Notes:
1. Receptors 1-5 represent commercial uses.
2. See Appendix A for the traffic ambient noise projections.
3. See Exhibit E for the operational noise level projections at said receptors.

As shown in Table 2, the project plus ambient noise level will increase the existing ambient level by 1 to 5 dB at the surrounding commercial receptors. Table 3 provides the characteristics associated with changes in noise levels.

Table 3: Change in Noise Level Characteristics

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud

https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm

It takes a change of 3 dB for the human ear to perceive a difference. Therefore, the change in noise level would be “Not Perceptible” at receptor R3 and R5, “Just Perceptible” at R1, and “Clearly Noticeable” at R2 and R4.

7.2 Project Design Features

The following project design features are provided to ensure compliance with the noise ordinance:

1. The project will incorporate 12 Sonny with the silencer package installed or equivalent to meet these acoustical benchmarks.
2. An acoustic liner (Acoustiblok perforated metal panels or equivalent) will line 15’ of the exit (see Appendix C).

7.3 Interior Noise Levels

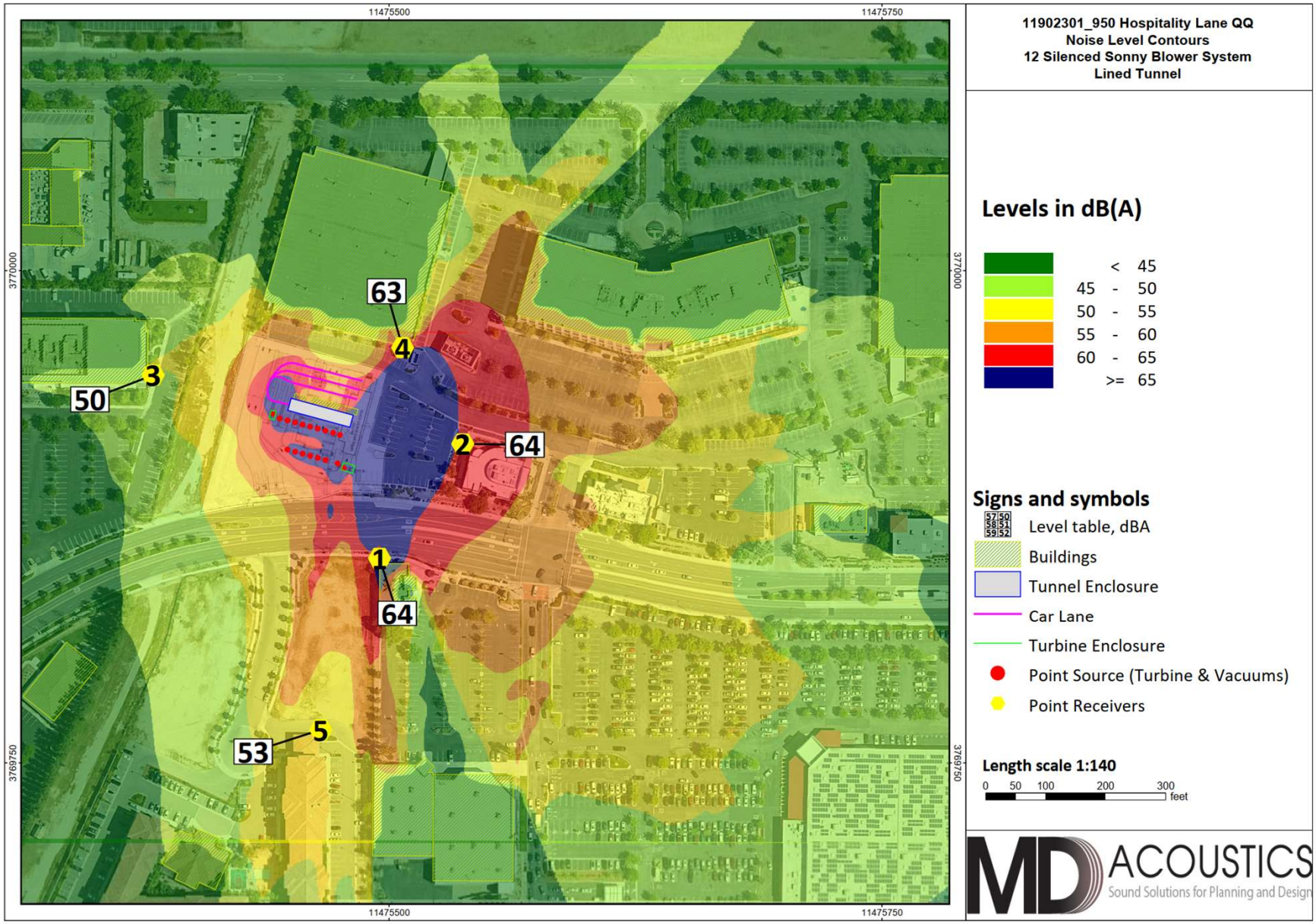
The future interior noise level was calculated for the sensitive receptor locations using a typical "windows open" and "windows closed" condition. A "windows open" condition assumes 12 dBA of noise attenuation from the exterior noise level. A "windows closed" condition assumes a minimum of 20 dBA of noise attenuation.

The interior noise level at receptor 1 as a result of the project is projected to be 44 dBA. The interior noise level at receptor 2 as a result of the project is projected to be 44 dBA. The interior noise level at receptor 3 as a result of the project is projected to be 30 dBA. The interior noise level at receptor 5 as a result of the project is projected to be 33 dBA.

The typical commercial and office interior limit from outside sources is 50 dBA Leq. The impact is therefore less than significant.

Exhibit F

Operational Noise Level Contours



8.0 References

City of San Bernardino CA: Municipal Code. Chapter 19.20 Noise.

City of San Bernardino CA: Municipal Code. Chapter 8.54 Noise Control.

City of San Bernardino, CA: General Plan, Chapter 14 Noise.

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

Federal Highway Administration. Noise Barrier Design Handbook. June 2017.

Federal Transit Administration. Transit Noise and Vibration Impact Assessment Manual. September 2018.

Appendix A:

Field Measurement Data

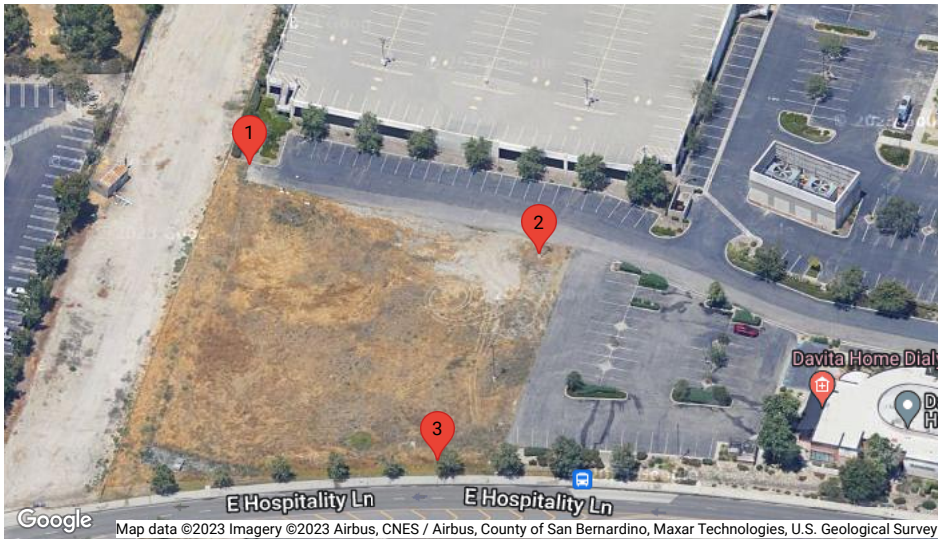
15-Minute Continuous Noise Measurement Datasheet

Project Name:	QQ 44-325 950 E Hospitality Lane
Project: #/Name:	1190-2023-001
Site Address/Location:	950 E Hospitality Lane
Date:	09/26/2023
Field Tech/Engineer:	Jason Schuyler/ Claire Pincock

Site Observations:

Sunny Temps in the mid 80's F. Winds 1-3MPH. The site is surrounded by a parking lot and some other retail stores and offices. The site is open cleared flat.

Sound Meter:	XL2, NTI	**SN:**	A2A-08562-E0
Settings:	A-weighted, slow, 1-sec, 15-minute interval		
Site Id:	NM1, NM2, NM3		



MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: QQ 44-325 950 E Hospitality Lane

Site Address/Location: 950 E Hospitality Lane

Site Id: NM1, NM2, NM3

Figure 1: NM1

Figure 2: NM2

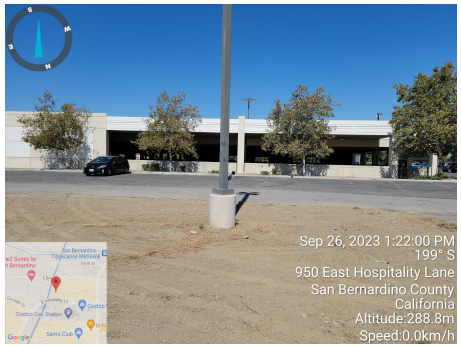


Figure 3: NM3

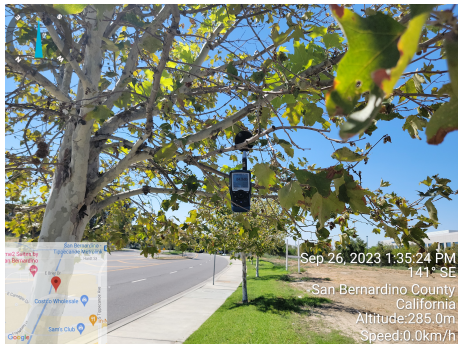
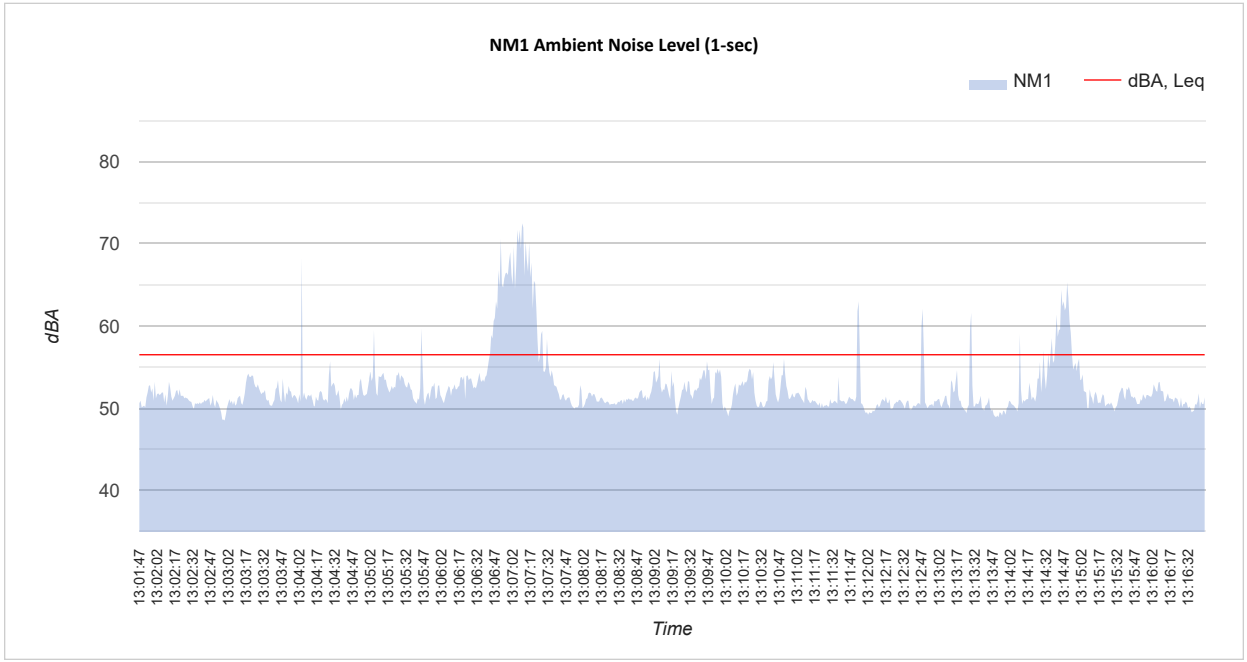


Table 1: Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
NM1	1:01 PM	1:16 PM	56.5	72.9	48.5	66.5	56.7	52.9	51.4	50.1
NM2	1:18 PM	1:33 PM	56.4	76.7	51.5	60.8	56.7	54.9	54	52.6
NM3	1:34 PM	1:49 PM	65.1	78.1	53.7	72.2	69.5	66	61.4	55.2

15-Minute Continuous Noise Measurement Datasheet - Cont.

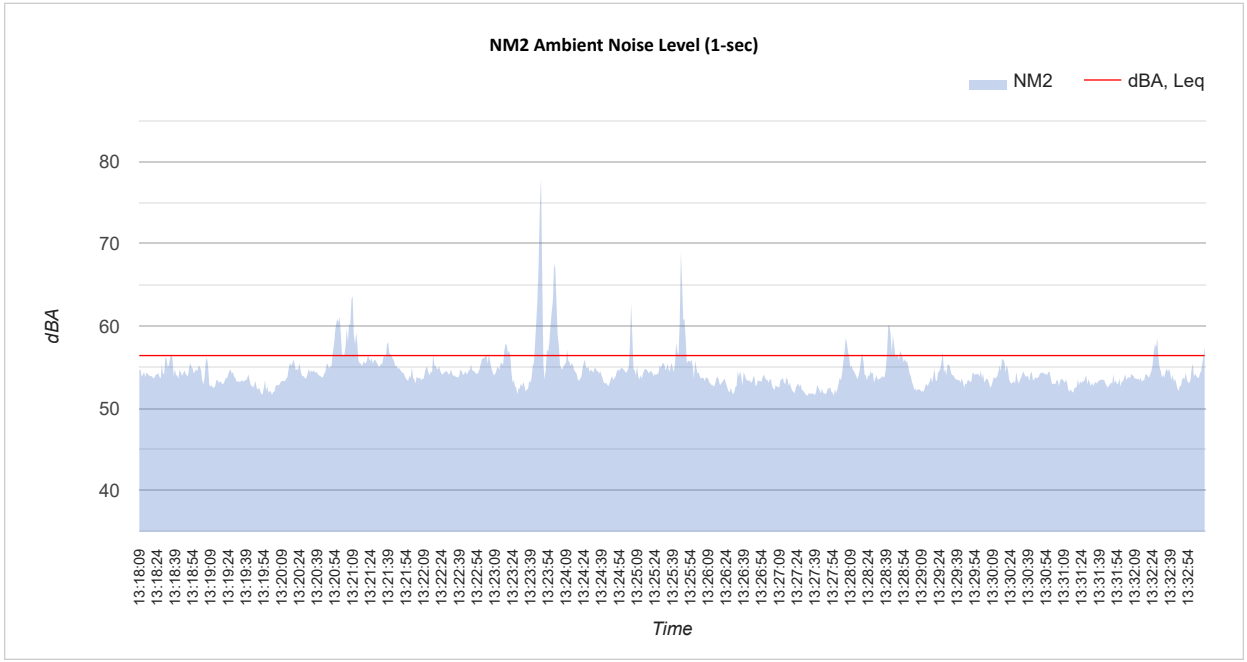
Project Name:	QQ 44-325 950 E Hospitality Lane	**Site Topo:**	Buildings 1-2 stories tall site	**Noise Source(s) w/ Distance:**
Site Address/Location:	950 E Hospitality Lane	**Meteorological Cond.:**	87F Sunny winds 0-1MPH	Road and commercial noise
Site Id:	NM1	**Ground Type:**	buildings and asphalt sandy soil	



MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont.

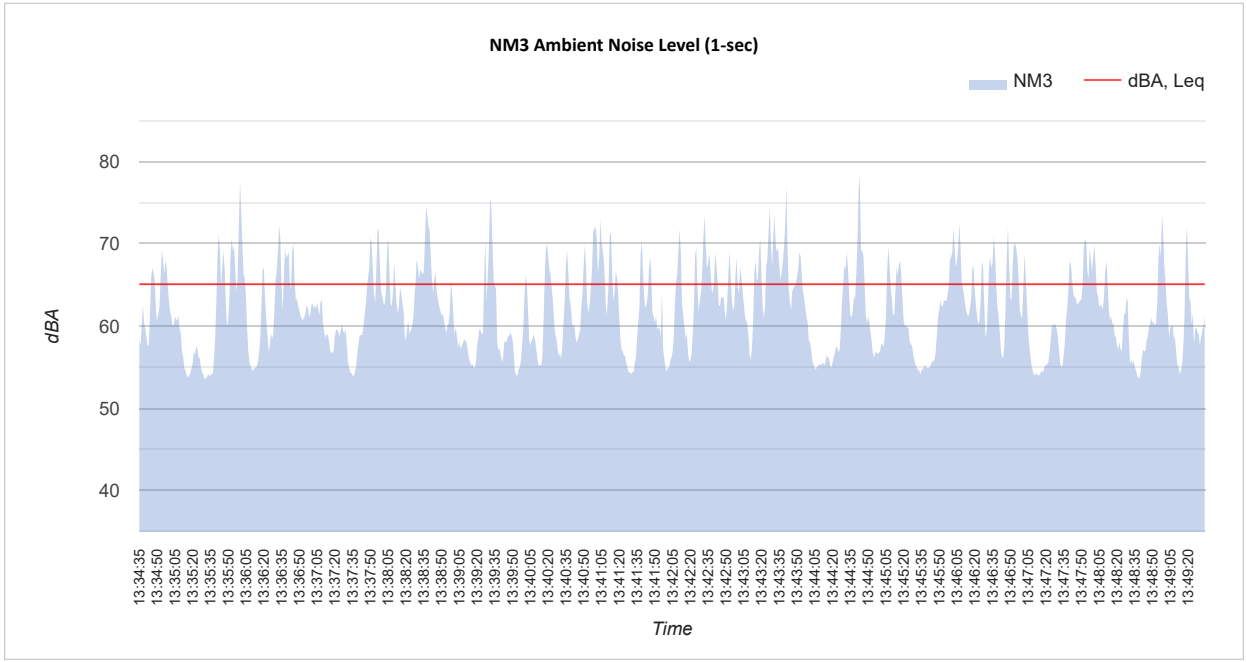
Project Name:	QQ 44-325 950 E Hospitality Lane	**Site Topo:**	Buildings 1-2 stories tall site	**Noise Source(s) w/ Distance:**
Site Address/Location:	950 E Hospitality Lane	**Meteorological Cond.:**	87F Sunny winds 0-1MPH	Road and commercial noise
Site Id:	NM2	**Ground Type:**	buildings and asphalt sandy soil	



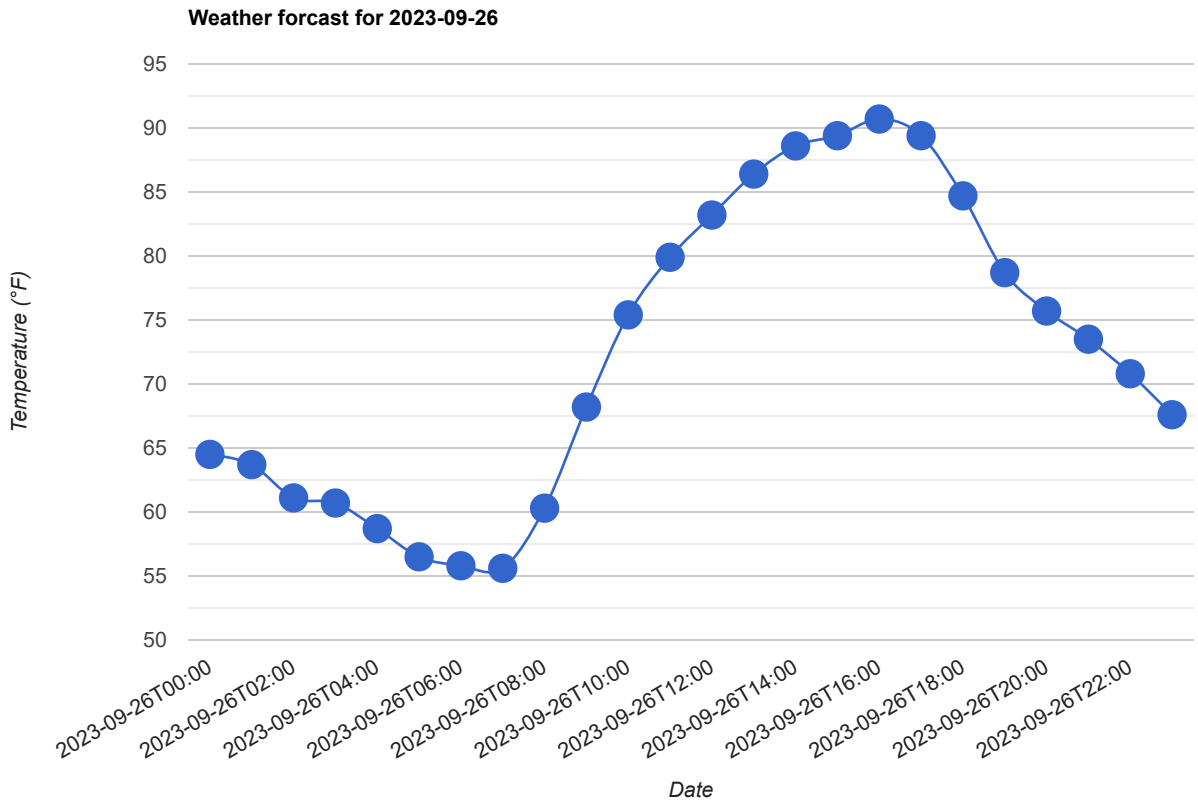
MD ACOUSTICS

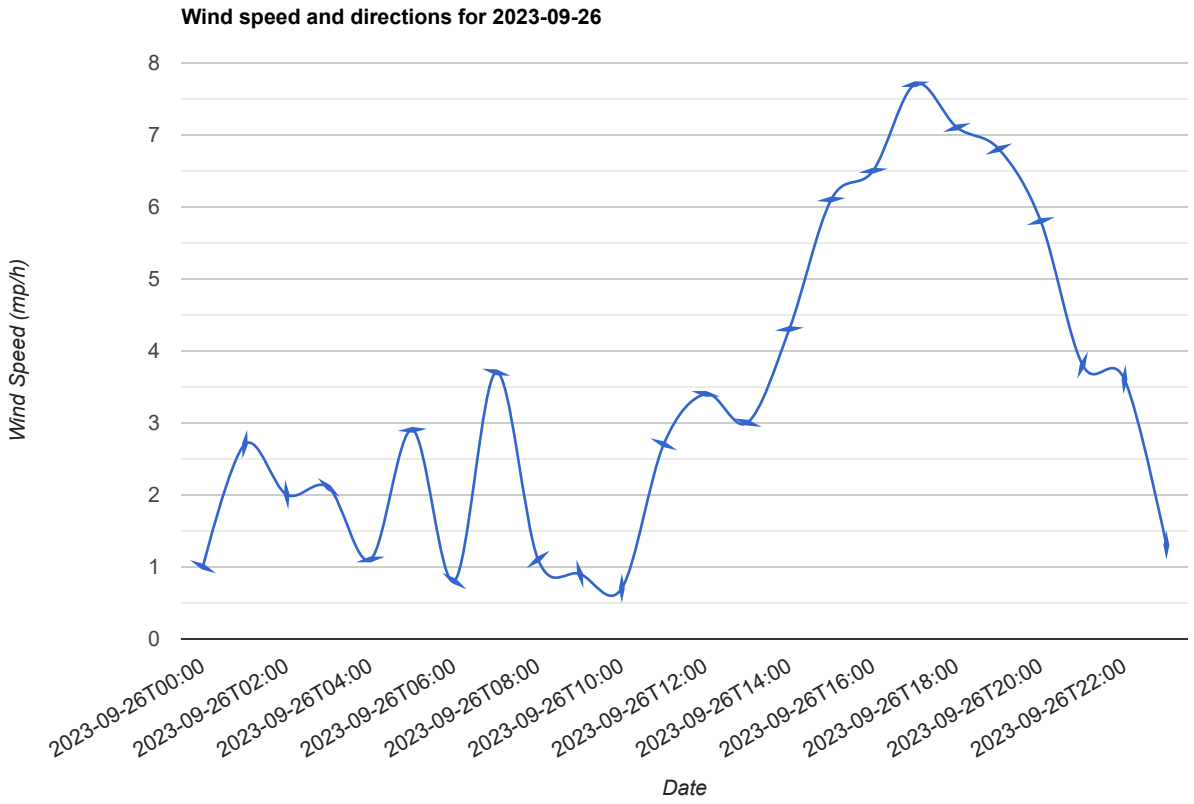
15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	QQ 44-325 950 E Hospitality Lane	**Site Topo:**	Buildings 1-2 stories tall site	**Noise Source(s) w/ Distance:**
Site Address/Location:	950 E Hospitality Lane	**Meteorological Cond.:**	87F Sunny winds 0-1MPH	Road and commercial noise
Site Id:	NM3	**Ground Type:**	buildings and asphalt	



MD ACOUSTICS

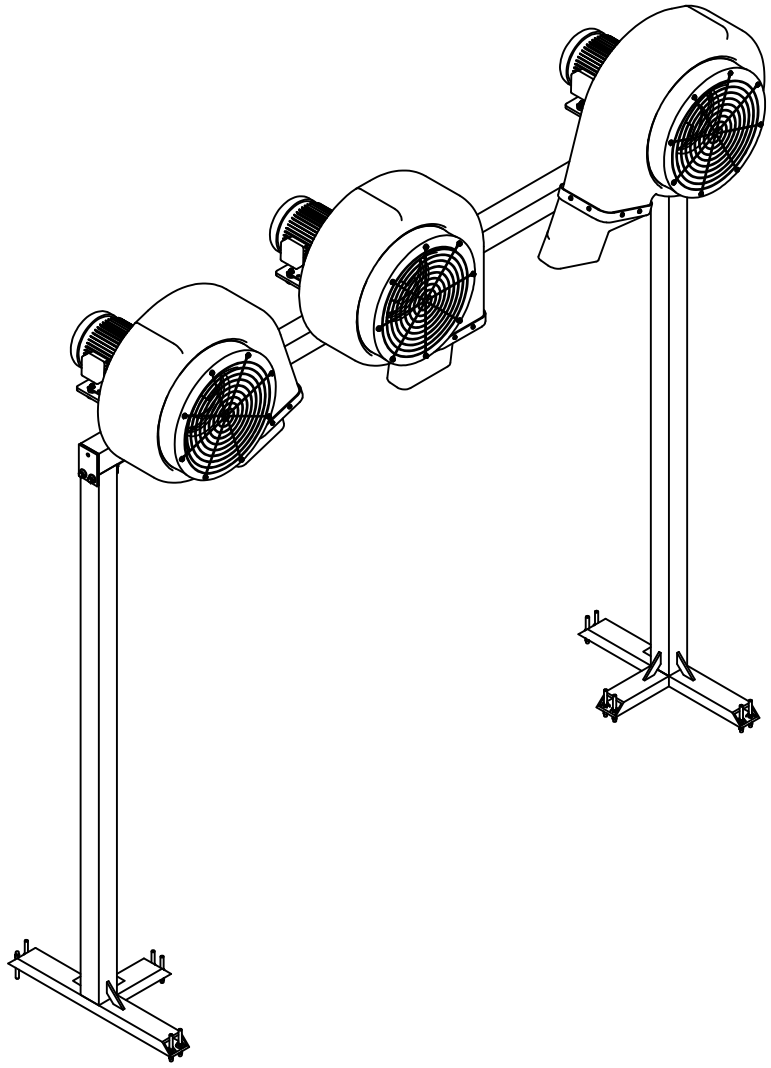

Weather forcast for 2023-09-26
95
90
85
80
75
70
65
60
55
50
Temperature (°F)
2023-09-26T00:00
2023-09-26T02:00
2023-09-26T04:00
2023-09-26T06:00
2023-09-26T08:00
2023-09-26T10:00
2023-09-26T12:00
2023-09-26T14:00
2023-09-26T16:00
2023-09-26T18:00
2023-09-26T20:00
2023-09-26T22:00
Date

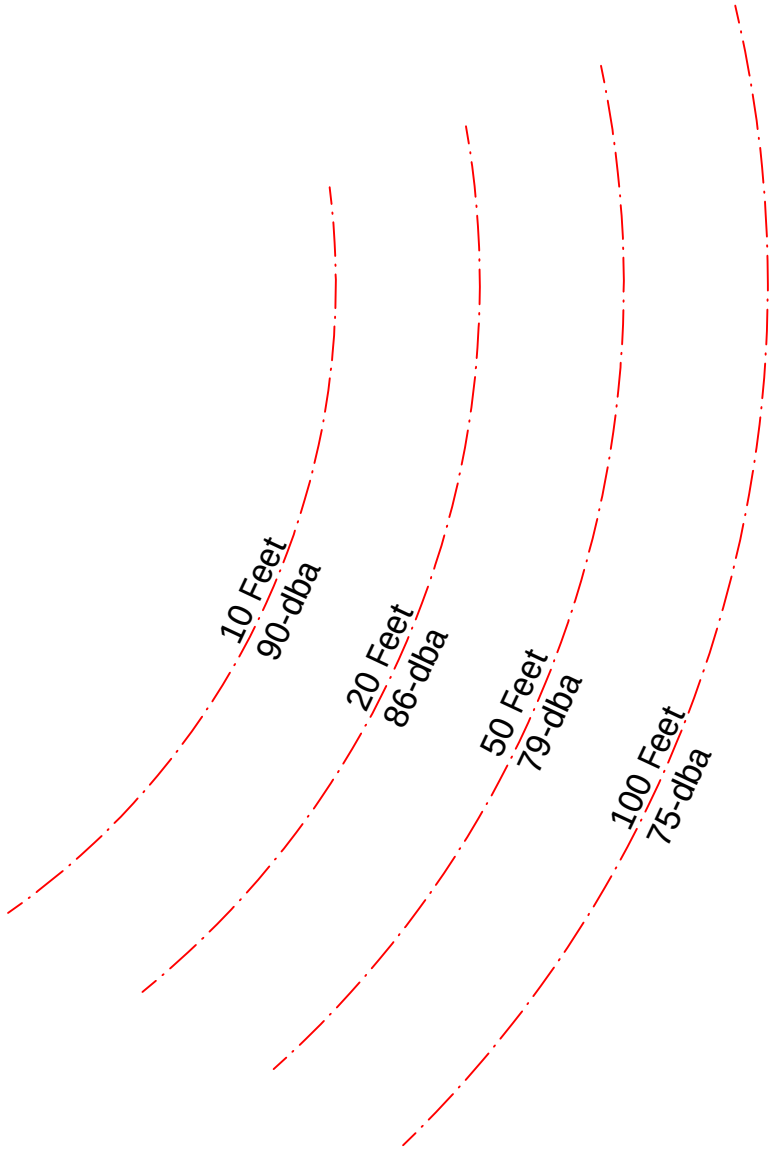

Wind speed and directions for 2023-09-26
Wind Speed (mp/h)
8
7
6
5
4
3
2
1
0
2023-09-26T00:00
2023-09-26T02:00
2023-09-26T04:00
2023-09-26T06:00
2023-09-26T08:00
2023-09-26T10:00
2023-09-26T12:00
2023-09-26T14:00
2023-09-26T16:00
2023-09-26T18:00
2023-09-26T20:00
2023-09-26T22:00
Date

Appendix B:

Manufacturers Cut Sheet

Enviromental Noise with Dryer OFF: 70 dba





THIRD ANGLE PROJECTION	*MACHINING TOLERANCES*	DRAWN LVerdecia	8/26/2011
BREAK ALL SHARP CORNERS. PART TO BE FREE OF BURRS.	FRACTION± 1/16"	APPROVED	8/1/2012
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES	.XX DECIMAL ± 0.030	CATEGORY BLOWER	
MATERIAL	.XXX DECIMAL ± 0.005		
	ANGULARITY ± 2°		
	FINISH 125		

SONNY'S ENTERPRISES
THE CARWASH FACTORY

DESCRIPTION	BLOWER ASSEMBLY, ONE ARCH 45HP		
PART NUMBER	BL1-45HP-1		
SHEET 2 OF 2	SIZE A	SCALE N.T.S.	

Product Features

- Gain flexibility in complying with noise ordinances that limit the allowable noise levels in some zoned areas.
- Blower Inlet Silencer retrofits to an existing Sonny's blower to reduce noise level by up to 7 decibels at 50 feet (depending on site specific architecture and other variables).
- Available in three colors: **Blue (# 20018006), Black (# 20018005)** and **Red (# 20018008)**



Note: Hardware is not included. Order a self-tapping screw kit (# **10013134**) for each silencer.

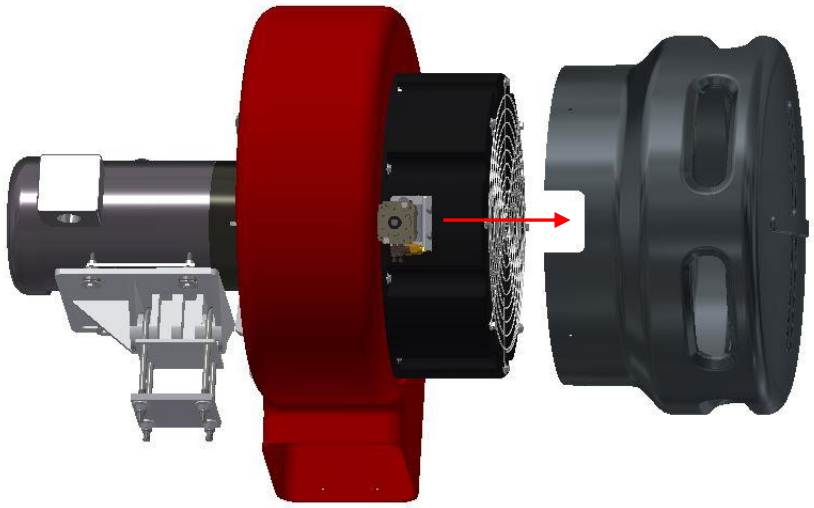
INSTALLATION

Tools
1. Safety Glasses
2. Cordless Drill
3. Drive Socket Set
4. 8' Ladder

Consumables
None

Work Force
Two (2) persons

Time (assuming no problems)
15 - 30 minutes



Caution: You must shut off all power to the conveyor and lock out the Motor Control Center before starting this install.

1. Shut off all power to the conveyor, blowers and lock out the Motor Control Center.
2. Insert the silencer over the venturi. For the gator silencer option, align notches to the gator actuator bracket (as pictured above).
3. Using the existing holes on the Silencer housing, affix the silencer to the gator housing using (8) of the provided self-tapping screws **(# 10013134**).
4. Avoid over-torqueing the self-tapping screws to prevent stripping the plastic housing.

Appendix I

Acoustiblok® quieting the world

WORLDWIDE MADE IN USA

MOLD PROOF 100% CERTIFIED

100% Recyclable

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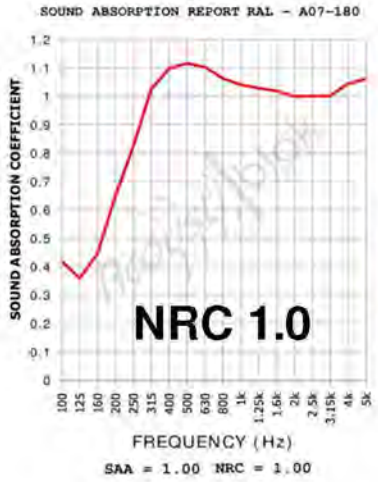
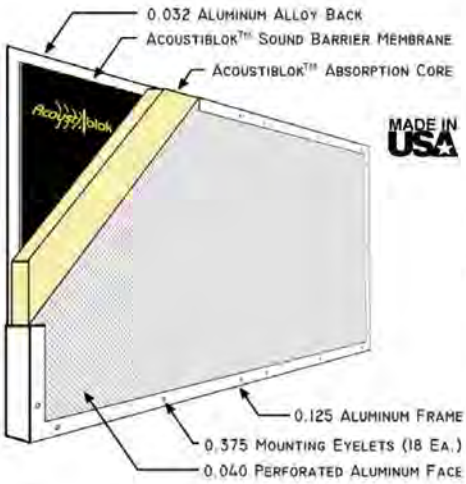
Tampa, FL 33616 USA
Phone: 813-980-1400
Fax: 813-549-2653
www.acoustiblok.com
sales@acoustiblok.com

Industrial Model All Weather Sound Panel™ (Pat. Pend)
Technical Data





Acoustiblok All Weather Sound Panels™ achieve high STC and NRC ratings. They have been specifically designed to withstand outdoor exposure in full sunlight, extreme weather conditions, and harsh industrial environments. (NRC of 1.0 is the highest sound absorption rating possible)

All Weather Sound Panels include an internal layer of U.L. classified Acoustiblok sound isolation material plus a specifically engineered 2" thick weather proof sound absorbing material.

Specifications:		
NRC (Noise Reduction Coefficient):	1.00 *	Gross dimensions: up to 48" x 120"x 2.423", ± 0.125" custom sizes available on special order.
STC (Sound Transmission Class):	29 *	Frame construction: 0.125" welded corrosion resistant 6063-T5 aluminum, mill finish, eyelets: 0.375" (18 ea.)
Weight: (8' panel)	104 lbs	Front face: 0.040 corrosion resistant 5052-H32 aluminum alloy, 3/32" round holes staggered on 5/32" centers.
UL Std 723 fire resistance: Flame spread 0, smoke developed 0.		Back face: 0.032 corrosion resistant 5052-H32 aluminum alloy, mill finish.
UV tolerant, animal resistant, washable, does not support mold growth.		

* Independent Testing by accredited NVLAP testing facility in compliance with ASTM E90, E 413, and other applicable industry standards.

Subject to change without notice, contact Acoustiblok for details.

Product Data Sheet

Product Name

QuietFiber® Hydrophobic Noise Absorption Material – QF2

For Manufacturer Info:

Contact:
Acoustiblok, Inc.
6900 Interbay Boulevard
Tampa, FL 33616
Call - (813) 980-1400
Fax - (813)849-6347
Email - sales@acoustiblok.com
www.acoustiblok.com

Product Description

Basic Use

QuietFiber hydrophobic noise absorption material is an easily installed solution to many noise problems. It is engineered specifically for maximum noise absorption and is used extensively for industrial and commercial applications and is now being successfully introduced into non-industrial environments where reverberant sound and echo is a problem.

QuietFiber® QF2

QuietFiber is rated at the highest noise reduction level – NRC 1.00. Areas of high noise levels including sound reverberation can be resolved easily and economically by introducing QuietFiber into as much of the area as possible. The amount of noise reduction in highly reflective rooms will be directly relative to how much of the QuietFiber material can be installed into the room.

Unlike other fibrous materials which do not have the same high NRC ratings, QuietFiber is hydrophobic, meaning it will not absorb nor combine with water. Marine noise reduction applications are endless.

QuietFiber® QF2

- Highest noise absorption rating of NRC 1.00
- Non Silica
- Virtually fireproof – Class A fire rating
  - 0 Smoke + 0 Flame Development
- Hydrophobic – will not combine with water
- Will not support mold or mildew growth
- Available in plain, black or white face
- Full outdoor weather and U.V. tolerant
- Significant sound benefit v. fiberglass
- Install on top of acoustical ceiling tiles
- High temperature capable
- Comprised of up to 90% recycled material
- 100% recyclable

Product Data Sheet

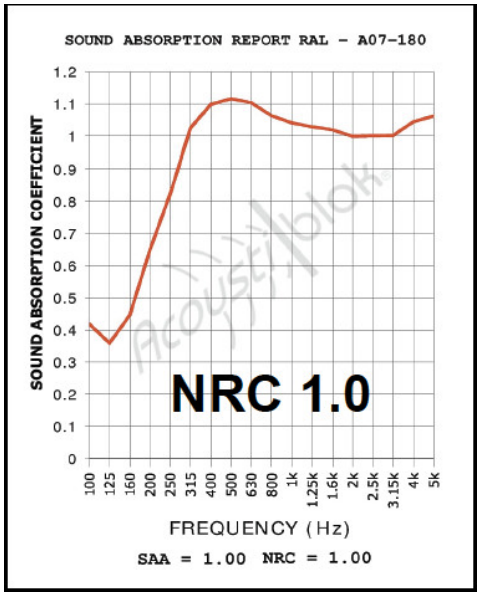
Product Name

QuietFiber® Hydrophobic Noise Absorption Material – QF2

NRC 1.0 Rated	125hz	250hz	500hz	1000hz	2000hz	4000hz
	0.36	0.79	1.15	1.04	1.01	1.04

Technical Data:

- ASTM C 423 – NRC 1.00
- ASTM E 84 – Class 1, 0 Flame 0 Smoke
- ASTM C 518 – R 4.2 per inch
- ASTM C 518 – 0.24 @ 75°F (24°C)



Standards Compliance:

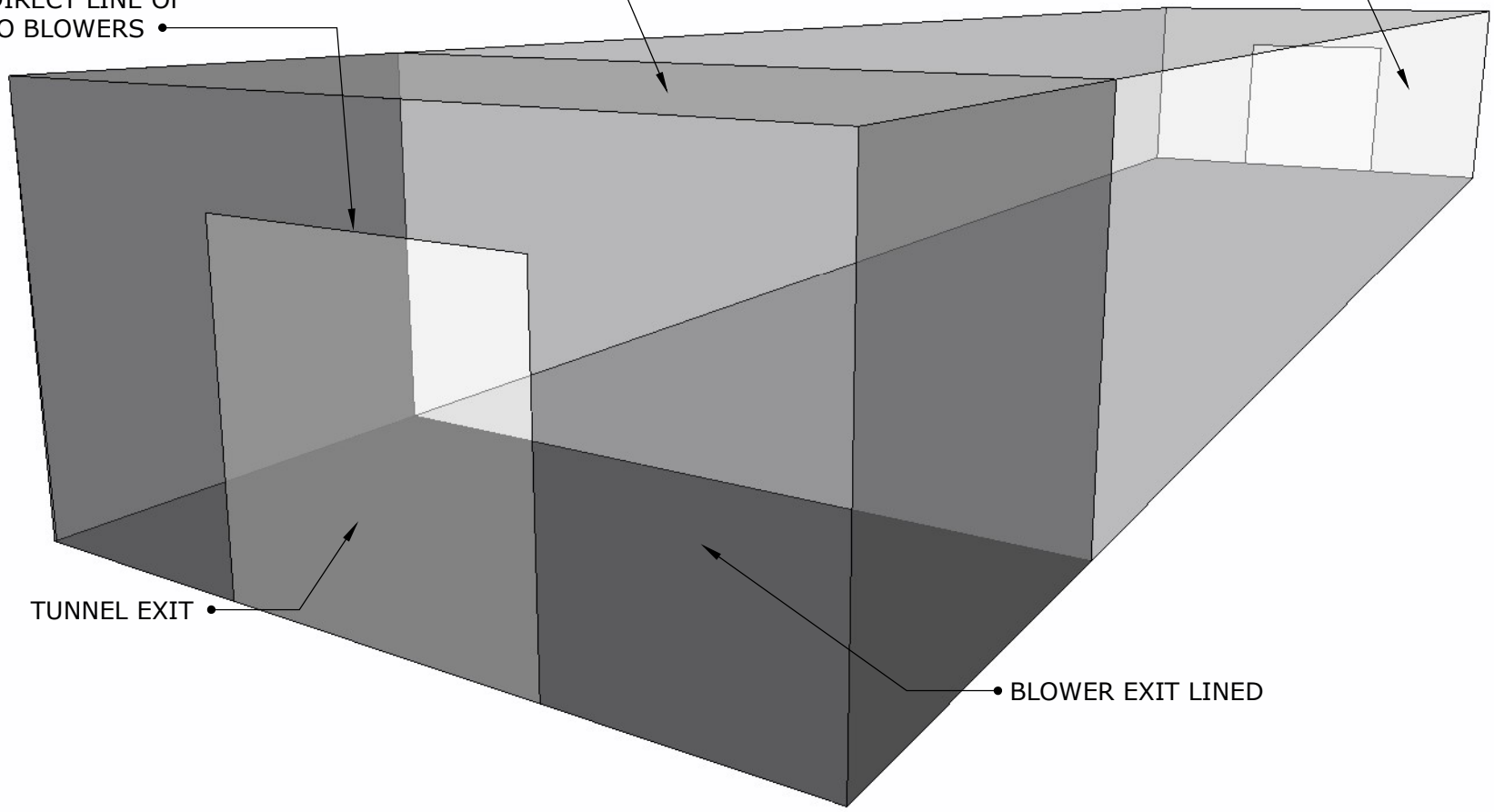
- ASTM C 665 Non-Corrosive Type I
- ASTM C 612 1A, 1B, II, III
- ASTM E 136 Rated Non-combustible per NFPA Standard 220
- ASTM C 1104 Absorption less than 1% by volume
- ASTM C 356 Linear shrinkage <2% @ 1200°F (650°C)

6900 Interbay Blvd
Tampa, Florida USA 33616
Telephone: (813)980-1440
www.Acoustiblok.com
sales@acoustiblok.com

LINE EXIT INTERIOR SECTION
OF BLOWER ROOM W/ 2" THICK ACOUSTIC
MATERIAL W/ NRC 1.0 OR EQUIVALENT.
LINER NEEDS TO BE ADDED
TO ALL SURFACES EXCEPT FLOOR

TUNNEL ENTRANCE

TUNNEL EXIT MUST
BLOCK DIRECT LINE OF
SIGHT TO BLOWERS



TUNNEL EXIT

BLOWER EXIT LINED

MD ACOUSTICS
Sound Solutions for Planning and Design

ACOUSTIC TREATMENTS TO TUNNEL INTERIOR

FOR ILLUSTRATIVE PURPOSES ONLY

MD ACOUSTICS
Sound Solutions for Planning and Design
www.mdacoustics.com

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Chandler, AZ 85249
p. (602) 774-1950

CA Office
1197 Los Angeles Ave, Ste C-256
Simi Valley, CA 93065
p. (805) 426-4477

Project: SuperStar Car Wash Chula Vista
Site Location: 1555 W Warner Rd, Gilbert, AZ 85233
Date: 4/5/2018
Field Tech/Engineer: Robert Pearson
Source/System: Vacutec System

Location: Vac Bay 1
Sound Meter: NTi XL2 **SN:** A2A-05967-E0
Settings: A-weighted, slow, 1-sec, 10-sec duration
Meteorological Cond.: 80 degrees F, 2 mph wind

Site Observations:
Clear sky, measurements were performed within 1.5ft of source. Measurements were performed while the vacuum was positiioned at three (3) different positions. Holstered, unholstered and inside a car. This data is utilized for acoustic modeling purposes and represents an average sound level at a vacuum station.

Table 1: Summary Measurement Data

Source	System	Overall dB(A)	3rd Octave Band Data (dBA)																														
			20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1K	1.25K	1.6K	2K	2.5K	3.15K	4K	5K	6.3K	8K	10K	12.5K	16K	20K
Vacutech (Holstered)	Vacuum	63.3	9	17	22	29	31	35	40	41	44	43	46	48	47	49	51	51	51	52	53	52	52	50	52	53	50	47	47	48	45	39	30
Vacutech (Unholstered)	Vacuum	80.7	6	19	22	28	34	37	40	43	47	46	48	48	48	49	54	55	58	58	62	65	68	70	74	75	73	69	67	65	63	60	55
Vacutech (Inside Car)	Vacuum	69.6	16	28	31	38	42	45	49	51	52	55	60	61	57	55	59	53	55	56	54	57	57	57	57	57	55	54	51	48	46	42	36
Average Level*	Vacuum	76.3	13	24	28	34	38	41	45	47	49	51	56	57	53	52	56	54	56	56	59	61	64	66	69	70	68	64	62	60	58	55	50

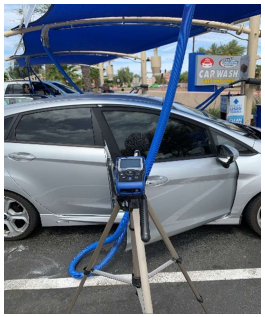
* Refers to the logarithmic average of all measurements. This measurement represents an average of the multiple vacuum positions.

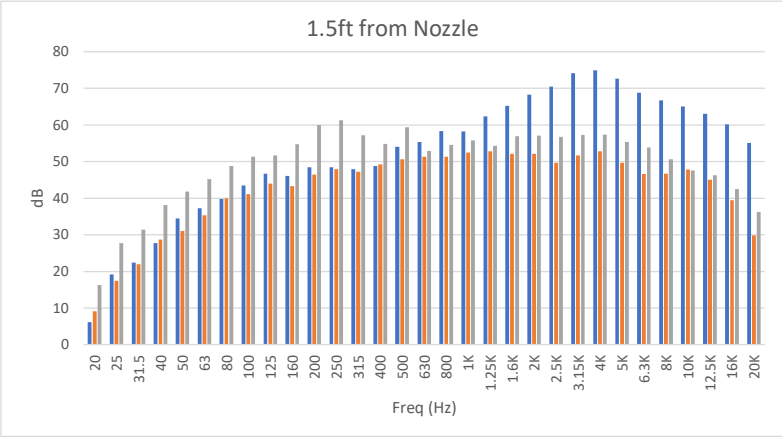
Figure 1: Example Measurement Position

Figure 1: Holstered

Figure 2: Unholstered

Figure 3: Inside Car





SOUND LEVEL METER READINGS

MODEL: FT-DD-T340HP4 (40hp VACSTAR TURBINE VACUUM PRODUCER)

READING ONE: 43 DB-A, 3 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING TWO: 36 DB-A, 10 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING THREE: 24 DB-A, 20 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING FOUR: 12 DB-A, 30 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

NOTE: THESE READINGS WERE TAKEN OUTSIDE OF 8'x10'x8' CINDER BLOCK ENCLOSURE WITH CONCRETE SLAB AND WOOD JOIST ROOF.

SOUND LEVEL METER USED:

SIMPSON MODEL #40003 – MSHA APPROVED.
MEETS OSHA & WALSH-HEALY REQUIREMENTS FOR NOISE CONTROL.
CONFORMS TO ANSI S1.4-1983, IEC 651 SPECS FOR METER TYPE.

Vacutech
1350 Hi-Tech Drive, Sheridan WY, 82801
PHONE: (800) 917-9444 FAX: (303) 675-1988
EMAIL: info@vacutechllc
WEB SITE: vacutechllc.com

Appendix C:
SoundPLAN Input/Outputs

950 Hospitality Lane QQ
Assessed receiver spectra in dB(A) - 002 - 12 Silenced Sonny - Lined: Outdoor SP

Time slice	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	16kHz dB(A)
Receiver R1 Fl G Lr,lim dB(A) Leq,d 61.2 dB(A) Sigma(Leq,d) 0.0 dB(A)									
Leq,d	29.2	37.4	42.0	50.4	57.1	57.8	48.5	26.5	4.5
Receiver R2 Fl G Lr,lim dB(A) Leq,d 57.5 dB(A) Sigma(Leq,d) 0.0 dB(A)									
Leq,d	26.4	34.6	43.0	50.2	52.4	53.8	44.5	23.3	-0.9
Receiver R3 Fl G Lr,lim dB(A) Leq,d 47.6 dB(A) Sigma(Leq,d) 0.0 dB(A)									
Leq,d	25.6	30.7	39.2	44.1	41.7	37.6	31.6	19.7	-3.6
Receiver R4 Fl G Lr,lim dB(A) Leq,d 60.5 dB(A) Sigma(Leq,d) 0.0 dB(A)									
Leq,d	26.6	35.4	42.5	50.8	54.3	57.9	49.2	22.8	5.7
Receiver R5 Fl G Lr,lim dB(A) Leq,d 50.3 dB(A) Sigma(Leq,d) 0.0 dB(A)									
Leq,d	24.1	30.1	34.1	41.5	46.3	46.3	35.4	15.4	-21.3

950 Hospitality Lane QQ
Contribution level - 002 - 12 Silenced Sonny - Lined: Outdoor

Source	Source type	Leq,d dB(A)	
Receiver R1 Fl G Lr,lim dB(A) Leq,d 61.2 dB(A) Sigma(Leq,d) 0.0 dB(A)			
001 - 12 Sonny - Standard Tunnel-Exit	Area	61.1	
Vac	Point	34.2	
Vac	Point	33.6	
001 - 12 Sonny - Standard Tunnel-Entrance	Area	33.5	
Vac	Point	33.4	
Vac	Point	32.6	
Vac	Point	32.1	
Vac	Point	32.1	
Vac	Point	32.0	
Vac	Point	31.8	
Vac	Point	31.5	
Vac	Point	31.5	
Vac	Point	31.4	
Vac	Point	31.3	
Vac	Point	31.3	
Vac	Point	31.1	
Vac	Point	29.8	
Vac	Point	28.7	
Car Lane	Line	26.8	
Car Lane	Line	24.2	
Car Lane	Line	22.4	
Turbine	Point	17.6	
Turbine	Point	11.0	
001 - 12 Sonny - Standard Tunnel-Facade 02	Area	6.3	
001 - 12 Sonny - Standard Tunnel-Facade 03	Area	6.0	
001 - 12 Sonny - Standard Tunnel-Roof 01	Area	4.0	
001 - 12 Sonny - Standard Tunnel-Facade 04	Area	-7.2	
001 - 12 Sonny - Standard Tunnel-Facade 01	Area	-15.5	
Receiver R2 Fl G Lr,lim dB(A) Leq,d 57.5 dB(A) Sigma(Leq,d) 0.0 dB(A)			
001 - 12 Sonny - Standard Tunnel-Exit	Area	57.4	
Car Lane	Line	30.6	
Vac	Point	30.5	
Car Lane	Line	30.5	
Vac	Point	30.5	
Vac	Point	29.9	
Car Lane	Line	29.7	
Vac	Point	29.6	
Vac	Point	29.5	
Vac	Point	29.4	
Vac	Point	28.9	
Vac	Point	28.9	
Vac	Point	28.6	
Vac	Point	28.6	

Source	Source type	Leq,d dB(A)	
Vac	Point	28.5	
Vac	Point	28.4	
Vac	Point	27.9	
Vac	Point	27.8	
Vac	Point	27.2	
001 - 12 Sonny - Standard Tunnel-Entrance	Area	26.9	
Vac	Point	26.7	
Turbine	Point	15.8	
001 - 12 Sonny - Standard Tunnel-Facade 03	Area	6.8	
Turbine	Point	2.7	
001 - 12 Sonny - Standard Tunnel-Roof 01	Area	2.6	
001 - 12 Sonny - Standard Tunnel-Facade 02	Area	1.1	
001 - 12 Sonny - Standard Tunnel-Facade 04	Area	-1.8	
001 - 12 Sonny - Standard Tunnel-Facade 01	Area	-20.4	
Receiver R3 Fl G Lr,lim dB(A) Leq,d 47.6 dB(A) Sigma(Leq,d) 0.0 dB(A)			
001 - 12 Sonny - Standard Tunnel-Entrance	Area	46.2	
001 - 12 Sonny - Standard Tunnel-Exit	Area	36.8	
Car Lane	Line	32.7	
Vac	Point	30.1	
Car Lane	Line	29.5	
Car Lane	Line	28.8	
Vac	Point	28.5	
Vac	Point	27.9	
Vac	Point	27.9	
Vac	Point	27.5	
Vac	Point	27.2	
Vac	Point	27.1	
Vac	Point	26.5	
Vac	Point	26.5	
Vac	Point	26.0	
Vac	Point	24.5	
Vac	Point	24.2	
Vac	Point	24.0	
Vac	Point	23.8	
Vac	Point	23.8	
Vac	Point	23.6	
Turbine	Point	13.9	
Turbine	Point	10.6	
001 - 12 Sonny - Standard Tunnel-Facade 02	Area	7.3	
001 - 12 Sonny - Standard Tunnel-Roof 01	Area	3.0	
001 - 12 Sonny - Standard Tunnel-Facade 01	Area	-3.2	
001 - 12 Sonny - Standard Tunnel-Facade 04	Area	-5.9	
001 - 12 Sonny - Standard Tunnel-Facade 03	Area	-10.7	
Receiver R4 Fl G Lr,lim dB(A) Leq,d 60.5 dB(A) Sigma(Leq,d) 0.0 dB(A)			

Source	Source type	Leq,d dB(A)	
001 - 12 Sonny - Standard Tunnel-Exit	Area	60.4	
Car Lane	Line	37.5	
Car Lane	Line	37.0	
Car Lane	Line	36.0	
Vac	Point	31.1	
001 - 12 Sonny - Standard Tunnel-Entrance	Area	29.6	
Vac	Point	25.8	
Vac	Point	23.7	
Vac	Point	21.7	
Vac	Point	20.1	
Vac	Point	19.7	
Vac	Point	19.3	
Vac	Point	19.0	
Vac	Point	18.8	
Vac	Point	18.3	
Vac	Point	17.7	
Vac	Point	17.5	
Vac	Point	17.1	
Vac	Point	16.8	
Vac	Point	16.7	
Vac	Point	16.7	
Turbine	Point	15.8	
001 - 12 Sonny - Standard Tunnel-Facade 03	Area	6.7	
001 - 12 Sonny - Standard Tunnel-Roof 01	Area	3.0	
Turbine	Point	2.7	
001 - 12 Sonny - Standard Tunnel-Facade 04	Area	1.7	
001 - 12 Sonny - Standard Tunnel-Facade 02	Area	-4.1	
001 - 12 Sonny - Standard Tunnel-Facade 01	Area	-14.9	
Receiver R5 Fl G Lr,lim dB(A) Leq,d 50.3 dB(A) Sigma(Leq,d) 0.0 dB(A)			
001 - 12 Sonny - Standard Tunnel-Exit	Area	50.0	
001 - 12 Sonny - Standard Tunnel-Entrance	Area	28.4	
Vac	Point	26.5	
Vac	Point	26.5	
Vac	Point	26.5	
Vac	Point	26.5	
Vac	Point	26.5	
Vac	Point	26.4	
Vac	Point	26.4	
Vac	Point	26.4	
Vac	Point	26.3	
Vac	Point	26.3	
Vac	Point	26.3	
Vac	Point	26.2	
Vac	Point	26.1	
Vac	Point	26.1	

Source	Source type	Leq,d dB(A)	
Vac	Point	25.6	
Vac	Point	23.4	
Car Lane	Line	20.5	
Car Lane	Line	18.3	
Car Lane	Line	17.1	
Turbine	Point	7.9	
Turbine	Point	6.3	
001 - 12 Sonny - Standard Tunnel-Facade 02	Area	0.4	
001 - 12 Sonny - Standard Tunnel-Roof 01	Area	-1.9	
001 - 12 Sonny - Standard Tunnel-Facade 03	Area	-2.6	
001 - 12 Sonny - Standard Tunnel-Facade 04	Area	-13.8	
001 - 12 Sonny - Standard Tunnel-Facade 01	Area	-19.1	

950 Hospitality Lane QQ
Octave spectra of the sources in dB(A) - 002 - 12 Silenced Sonny - Lined: Outdoor SP

Name	Source type	l or A	Li	R'w	L'w	Lw	KI	KT	LwMax	DO-Wall	Time histogram	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
		m,m²	dB(A)	dB	dB(A)	dB(A)	dB	dB	dB(A)	dB			dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
001 - 12 Sonny - Standard Tunnel-Entrance	Area	15.61	80.8	0.0	80.8	92.8	0.0	0.0		3	100%/24h	145_Entrance		71.7	85.7	90.4	85.6	75.8	59.7
001 - 12 Sonny - Standard Tunnel-Exit	Area	9.29	96.3	0.0	96.3	106.0	0.0	0.0		3	100%/24h	148_Exit		80.1	91.5	99.6	101.2	101.5	93.4
001 - 12 Sonny - Standard Tunnel-Facade 01	Area	19.05	80.8	57.0	30.4	43.2	0.0	0.0		3	100%/24h	144_Facade 01		28.9	40.6	39.2	25.5	11.6	-8.2
001 - 12 Sonny - Standard Tunnel-Facade 02	Area	179.18	87.9	57.0	33.2	55.7	0.0	0.0		3	100%/24h	146_Facade 02_		43.9	51.4	52.3	44.5	40.7	29.5
001 - 12 Sonny - Standard Tunnel-Facade 03	Area	25.37	94.5	57.0	39.1	53.1	0.0	0.0		3	100%/24h	147_Facade 03_		39.6	48.3	50.1	42.7	39.0	27.9
001 - 12 Sonny - Standard Tunnel-Facade 04	Area	179.18	87.9	57.0	33.2	55.7	0.0	0.0		3	100%/24h	149_Facade 04_		43.9	51.4	52.2	44.5	40.7	29.5
001 - 12 Sonny - Standard Tunnel-Roof 01	Area	205.30	88.3	57.0	33.6	56.7	0.0	0.0		0	100%/24h	137_Roof 01_		44.8	52.4	53.3	45.5	41.7	30.4
Car Lane	Line	68.58			62.8	81.2	0.0	0.0		0	100%/24h	Drive-Thru - Idiling Car @ 6ft	65.2	66.7	70.2	73.9	74.7	75.9	72.4
Car Lane	Line	46.08			62.8	79.4	0.0	0.0		0	100%/24h	Drive-Thru - Idiling Car @ 6ft	63.5	65.0	68.5	72.2	73.0	74.2	70.7
Car Lane	Line	51.07			62.8	79.9	0.0	0.0		0	100%/24h	Drive-Thru - Idiling Car @ 6ft	63.9	65.4	68.9	72.6	73.4	74.7	71.1
Turbine	Point				72.6	72.6	0.0	0.0		0	100%/24h	Vacutech Turbine	44.9	57.3	55.1	52.0	55.6	59.5	66.2
Turbine	Point				72.6	72.6	0.0	0.0		0	100%/24h	Vacutech Turbine	44.9	57.3	55.1	52.0	55.6	59.5	66.2
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6
Vac	Point				81.0	81.0	0.0	0.0		0	100%/24h	Vacutech - in car	61.6	69.0	76.6	72.9	71.4	73.2	72.6