Gas Station and Car Wash Green Tree & Hesperia

Noise Impact Study

City of Victorville, CA

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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 Gas Station and Car Wash project located at the southwest corner of Green Tree Boulevard and Hesperia Road, in the City of Victorville, CA. All noise projections were compared to the Victorville City noise ordinance and General Plan as well as the existing ambient condition. The Project proposes to construct an 83'-8" car wash tunnel, a 16-pump fueling station, 2 EV charging spaces, a 5,785-square-foot convenience store, and approximately 9 vacuum bays.

1.1 Findings and Conclusions

Three (3) baseline 15-minute ambient measurements were performed at or near the Project site and represent the current operational noise and ambient levels within the Project vicinity. The predominant source of noise impacting the existing site is traffic noise propagating from Green Tree Boulevard and Hesperia Road.

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 be up to 64 dBA Leq at the residential receptors. Project plus ambient noise level projections will increase the ambient noise level by up to 4 decibels at the residential receptors and do not exceed the City's noise level limits outlined in the City's Municipal Code (see Section 4.3). This assessment evaluates the baseline noise condition and compares the Project's worst-case operational noise level to the measured noise level (during the Project's proposed hours of operation).

The following outlines the project design features:

1. The Project will incorporate a 12 Motor City blower system 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 B), including the exit wall and ceiling.

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 located at the southwest corner of Green Tree Boulevard and Hesperia Road, in the City of Victorville, CA as shown in Exhibit A. The land uses directly surrounding the project site are commercial to the north, east, and south, and residential to the west. Green Tree Boulevard is to the north, and Hesperia Road is to the east.

2.3 Proposed Project Description

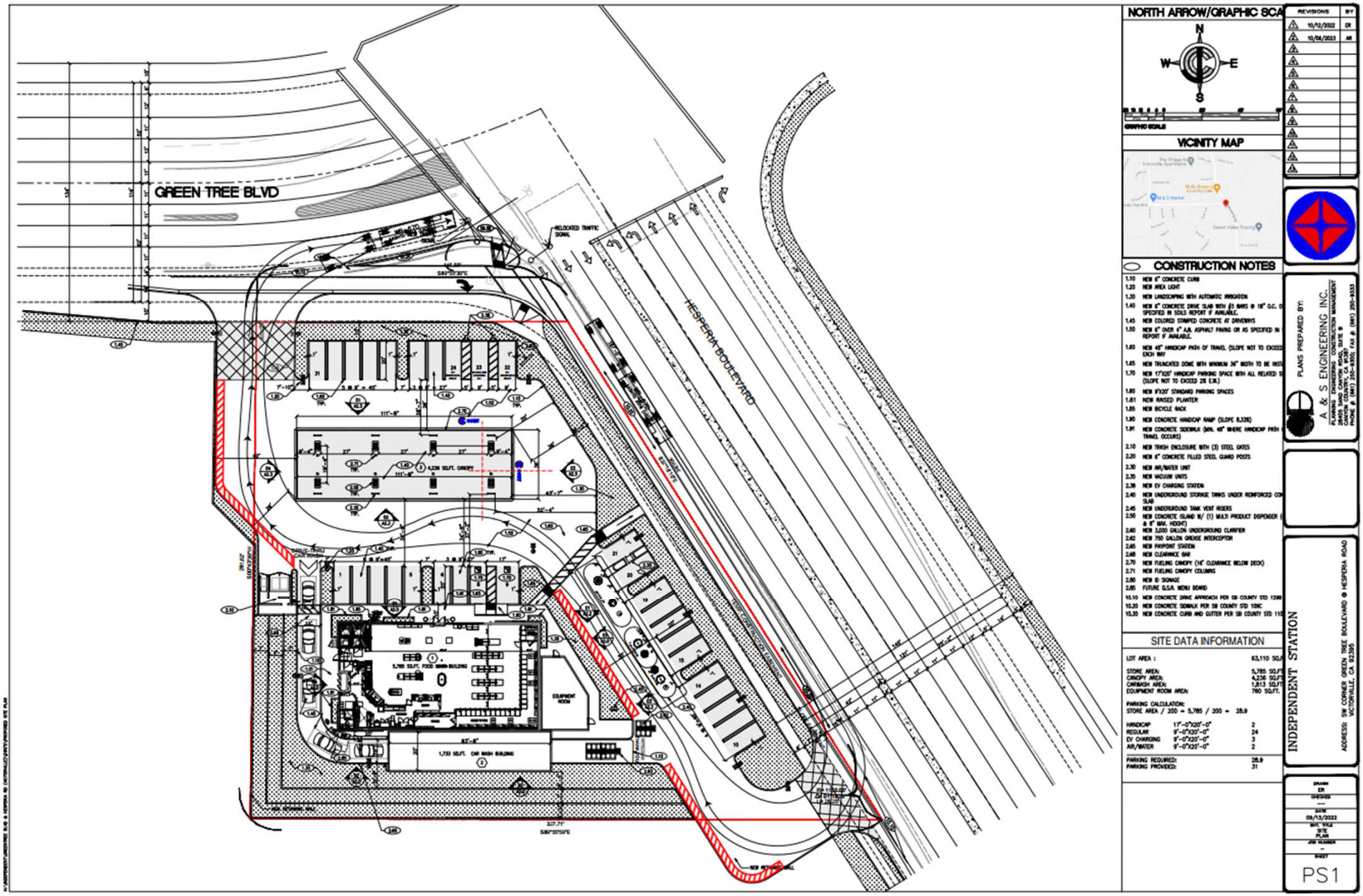
The Project proposes to develop an 83'-8" car wash tunnel, a 16-pump fueling station, 2 EV charging spaces, a 5,785-square-foot convenience store, and approximately 9 vacuum bays. This noise study has been prepared to identify the Project's potential impact to the adjacent uses and compares the noise 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



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.

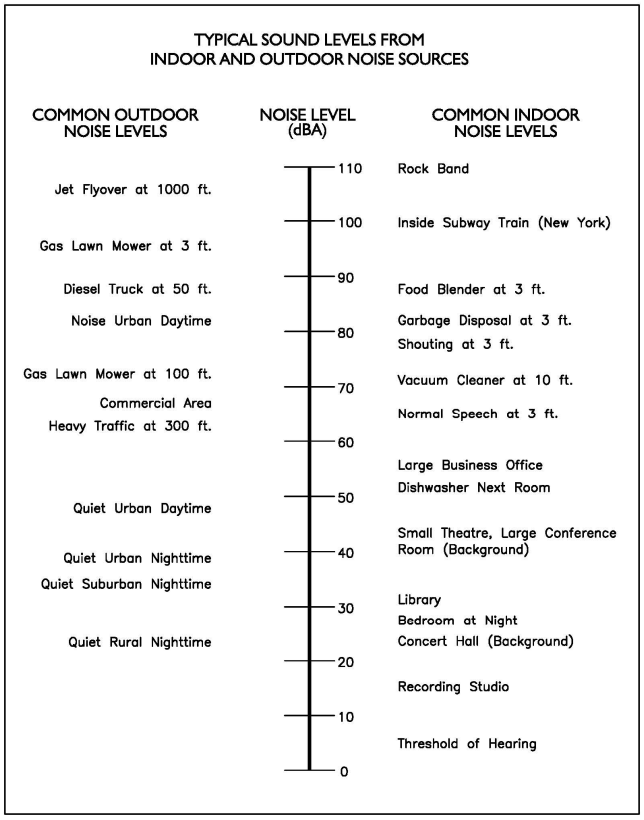
3.1 Sound, Noise and Acoustics

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 its loudness. The loudness of sound increases or decreases as the amplitude increases or decreases. Sound pressure amplitude is measured 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 reference 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 the addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after the 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 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 significantly affect noise levels when noise receivers are located 200 feet or more from a noise source. Wind, temperature, air humidity and turbulence can further impact have far sound can travel.

4.0 Regulatory Setting

The proposed Project is City of Victorville, 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 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 the compatibility of sensitive uses with various incremental levels of noise.

The State of California has established noise insulation standards as outlined in Title 24 and the Uniform Building Code (UBC) which in some cases requires acoustical analyses to outline exterior noise

levels and to ensure interior noise levels do not exceed the interior threshold. The State mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable as illustrated in Exhibit D and can be found in the City's General Plan Noise Element.

Exhibit D: Land Use Compatibility Guidelines

Table N-3
Victorville Land Use Compatibility Standards

	Community Noise Exposure Ldn or CNEL, dB						
Land Use Categories	55	60	65	70	75	80 +	
Residential - Low Density, Single Family, Duplex, Multi-family, Mobile Home	1	1	2	2	3	4	4
Transient Lodging - Motels, Hotels	1	1	2	2	3	3	4
Schools, Libraries, Churches, Hospitals, Nursing Homes	1	1	2	3	3	4	4
Auditoriums, Concert Halls, Amphitheaters	2	2	3	3	4	4	4
Sports Arena, Outdoor Spectator Sports	2	2	2	2	3	3	3
Playgrounds, Neighborhood Parks	1	1	1	2	3	3	3
Golf Courses, Riding Stables, Water Recreation, Cemeteries	1	1	1	2	2	4	4
Office Buildings, Business Commercial, Retail Commercial and Professional	1	1	1	2	2	3	3
Industrial, Manufacturing, Utilities	1	1	1	1	2	2	2
Agriculture	1	1	1	1	1	1	1

Legend:
1. NORMALLY ACCEPTABLE: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.
2. CONDITIONALLY ACCEPTABLE: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and Schools, Libraries, Churches, Hospitals, Nursing Homes 1 needed noise insulation features included in the design. Conventional construction, with closed windows and fresh air supply systems or air conditioning will normally suffice.
3. NORMALLY UNACCEPTABLE: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
4. CLEARLY UNACCEPTABLE: New construction or development should generally not be undertaken.

4.3 City of Victorville Noise Regulations

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

Stationary Noise Regulations

Applicable policies and standards governing environmental noise in the City are set forth in the General Plan Noise Element, and Chapter 13.10 of the Victorville Municipal Code outlines the acceptable maximum noise standards. Section 13.01.040 defines base ambient levels for respective times and zones as shown in Table 1.

Table 1: Base Ambient Noise Levels

Zone	Time	Sound Level Decibels
All residential zones	10:00 p.m. — 7:00 a.m.	55 dB(A)
All residential zones	7:00 a.m. — 10:00 p.m.	65 dB(A)
All commercial zones	Anytime	70 dB(A)
All industrial zones	Anytime	75 dB(A)

If the ambient noise level exceeds the applicable limit as noted in the above table, the ambient noise level shall be the standard.

Construction Noise Regulations

Section 13.01.060(9) – Noise Source Exemptions
Construction activity on private properties that are determined by the director of building and safety to be essential to the completion of a project.

General Plan

The following are Goals, Objectives, and Polices from the General Plan Noise Element which relate to the project:

GOAL #1: **NOISE SENSITIVITY.** IDENTIFY SIGNIFICANT NOISE SOURCES THAT COULD ADVERSELY AFFECT COMMUNITY.

> **Objective 1.1**: Locate noise sensitive land uses away from existing excessive noise sources, and locate new excessive noise generators away from existing sensitive land uses.
>
> > **Policy 1.1.1**: Implement Table N-3 (Exhibit D in this report) regarding placement of new land uses.
> >
> > > **Implementation Measure 1.1.1.1**: Continue to assess projects through the subdivision, site plan, conditional use permit, and other development review

processes and incorporate conditions of approval which ensure noise compatibility where appropriate.

GOAL #2: NOISE CONTROL. MANAGE THE AFFECTS OF NOISE EMISSIONS TO HELP ENSURE REDUCTION OF ADVERSE AFFECTS ON THE COMMUNITY.

Objective 2.1: Ensure existing and future noise sources are properly attenuated.

Policy 2.1.1: Continue to implement acceptable standards for noise for various land uses throughout the City.

Implementation Measure 2.1.1.2: Monitor noise complaints and enforce provisions of the City noise ordinance.

Implementation Measure 2.1.1.5: Continue to restrict noise and require mitigation measures for any noise-emitting construction equipment or activity.

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

Noise monitoring locations were selected based on the nearest sensitive receptors relative to the proposed noise sources impacting the area. 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 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 (parking, fueling stations, and car wash blowers 27' from the exit).

The blowers (a total of 12 Motor City Blowers) were modeled at 10 feet high as a point source. The Blowers will be located approximately 27 feet inside the exit of the tunnel. The reference equipment sound level data is provided in Appendix B. Parking and fueling noise were modeled as one movement per hour.

The model assumes that the car wash tunnel is made of solid materials, is approximately 83'-8" long, and has openings approximately 12 feet tall by 12 feet wide.

The SP model assumes parking activities and the dryer system are operating simultaneously (worst-case scenario) when the noise will, in reality, be intermittent and lower in noise level. All other noise-producing equipment (e.g., compressors and pumps) will be housed within mechanical equipment rooms.

The following outlines the project design features:

1. The Project will incorporate a 12 Motor City blower system 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), including the exit wall and ceiling.

5.4 FHWA Traffic Noise Prediction Model

Traffic noise from vehicular traffic was projected using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) standards. The FHWA model arrives at the predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Roadway volumes and percentages correspond to the county traffic counts and the ITE Trip Generation Manual. The referenced traffic data was applied to the model and is in Appendix D. The following outlines the key adjustments made to the REMEL for the roadway inputs:

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

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

Table 2: Roadway Parameters and Vehicle Distribution

Roadway	Segment	Existing ADT[1]	Existing + Project ADT[1]	Speed (MPH)	Site Conditions
Green Tree Blvd	W of Hesperia Rd	15,800	16,700	50	Hard
Vehicle Distribution and Mix[2]					
Motor-Vehicle Type		**Daytime % (7AM to 7 PM)**	**Evening % (7 PM to 10 PM)**	**Night % (10 PM to 7 AM)**	**Total % of Traffic Flow**
Automobiles		77.5	12.9	9.6	97.4
Medium Trucks		84.8	4.9	10.3	1.8
Heavy Trucks		86.5	2.7	10.8	0.7

Notes:
[1] Existing ADT from County of San Bernardino and Project ADT provided by Integrated Engineering Group..
[2] Typical California Vehicle Distribution and Mix.

To determine the project's noise impact to the surrounding land uses, MD generated noise contours for projected traffic conditions. Noise contours are used to provide a characterization of sound levels experienced at a set distance from the centerline of a subject roadway. They are intended to represent a worst-case scenario and do not take into account structures, sound walls, topography, and/or other sound attenuating features which may further reduce the actual noise level. Noise contours are developed for comparative purposes and are used to demonstrate potential increases/decreases along subject roadways because of a project.

5.5 Construction Noise Modeling

Construction noise associated with the proposed project was calculated utilizing methodology presented in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018) together with several key construction parameters including distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site. Construction activities are anticipated to include four phases site preparation, grading, building construction, and paving.

Construction noise levels were calculated for each phase based on default CalEEMod Air Quality Model assumptions. All equipment was assumed to be situated at the center of the project site. Construction worksheets are provided in Appendix E.

6.0 Existing Noise Environment

Three (3) short-term 15-minute measurements were performed at or near the project site vicinity to determine the existing ambient noise levels. Noise data indicates that traffic along Green Tree Boulevard and Hesperia Road is the primary source of noise impacting the site and surrounding area.

6.1 Short-Term Noise Measurement Results

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

Table 3: Short-Term Noise Measurement Data[1]

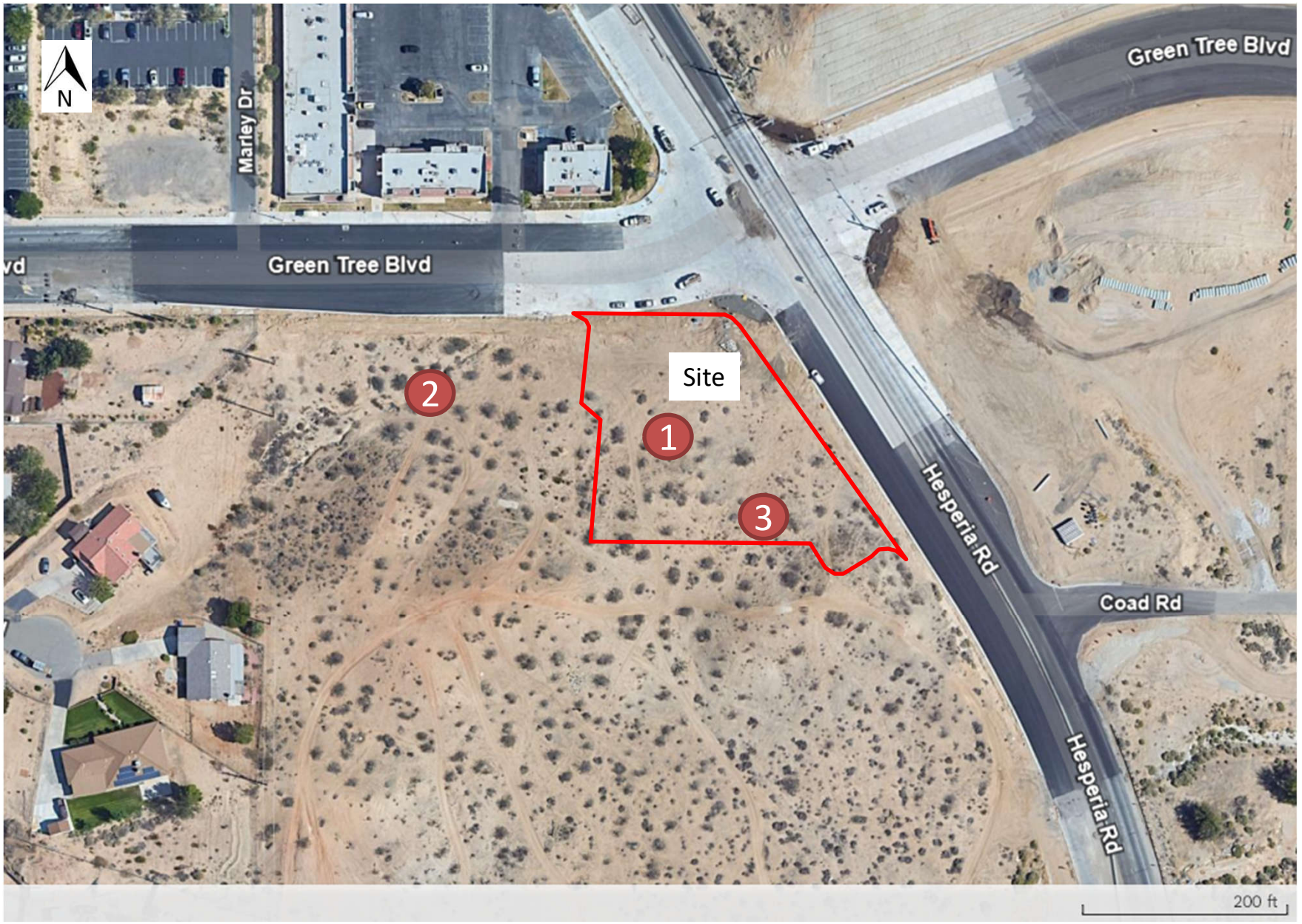
Location	Start Time	Stop Time	Leq	Lmax	Lmin	L(2)	L(8)	L(25)	L(50)	L(90)
NM1	9:56 AM	10:11 AM	62.9	75.7	52.8	69.2	65.8	63.4	61.4	57.4
NM2	10:31 AM	10:46 AM	61.2	77.6	49.0	68.5	63.8	60.3	58.0	53.9
NM3	10:13 AM	10:28 AM	64.0	74.5	52.7	71.5	67.9	64.7	61.4	57.2
Notes: 1. Short-term noise monitoring locations are illustrated in Exhibit E.										

For this evaluation, MD has utilized the measured ambient noise levels of 61 to 64 dBA Leq for the surrounding land uses. Additional field notes and photographs are provided in Appendix A.

X = Measurement 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 affected by Project operational noise include existing residential uses to the west. 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.

A total of five (5) receptors (R1 – R5) were modeled to evaluate the proposed Project's operational impact. Exhibit F shows the "Project-Only" noise levels and contours at the nearest sensitive receptors. These receptors include the nearest residential and commercial property lines. Table 4 shows the project-only operational noise level projections and the Project plus ambient noise level projections for daytime operation.

Table 4: Worst-Case Predicted Operational Noise Levels (dBA)

Receptor[1]	Existing Ambient Noise Level (dBA, Leq)[2]	Project Noise Level (dBA, Leq)[3]	Daytime (7:00 a.m. - 10:00 p.m.) Stationary Noise Limit (dBA, Leq)	Total Combined Noise Level (dBA, Leq)	Change in Noise Level as Result of Project
1	64	68	**70**	69	5
2	63	62	**70**	66	3
3	64	57	**70**	65	1
4	61	41	**65**	61	0
5	64	43	**70**	64	0

Notes:
[1.] Receptors 1,2,3,5 represent commercial uses, and receptor 4 represents residential use.
[2.] See Appendix A for the ambient noise measurement.
[3.] See Exhibit F for the operational noise level projections at said receptors.

The model indicates that the project-only daytime noise level will be 41 dBA Leq at the residential receptor and 43 to 68 dBA Leq at the commercial receptors. The project plus ambient noise does not exceed 65 dBA Leq at the residential receptor and 70 dBA Leq at the commercial receptors. Thus, the Project meets the daytime standards set in the City's Municipal Code, and the impact is less than significant.

The following outlines the project design features:

1. The Project will incorporate a 12 Motor City blower system 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 B), including the exit wall and ceiling.

7.2 Traffic Noise

The potential off-site noise impacts caused by the increase in vehicular traffic as a result of the project were calculated at the distance of the nearest residential developments from the centerline of the roadway. The distance to the 55, 60, 65, and 70 dBA CNEL noise contours are also provided for reference.

Table 5: Existing/Existing + Project Scenario – Noise Levels Along Roadways (dBA CNEL)

Existing Exterior Noise Levels

Roadway	Segment	CNEL (dBA)	Distance to Contour (ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Green Tree Drive	W of Hesperia	71.5	71	226	2713	2256

Existing + Project Exterior Noise Levels

Roadway	Segment	CNEL (dBA)	Distance to Contour (ft)			
			70 dBA CNEL	65 dBA CNEL	60 dBA CNEL	55 dBA CNEL
Green Tree Drive	W of Hesperia	71.8	75	238	754	2385

Change in Noise Levels as a Result of Projects

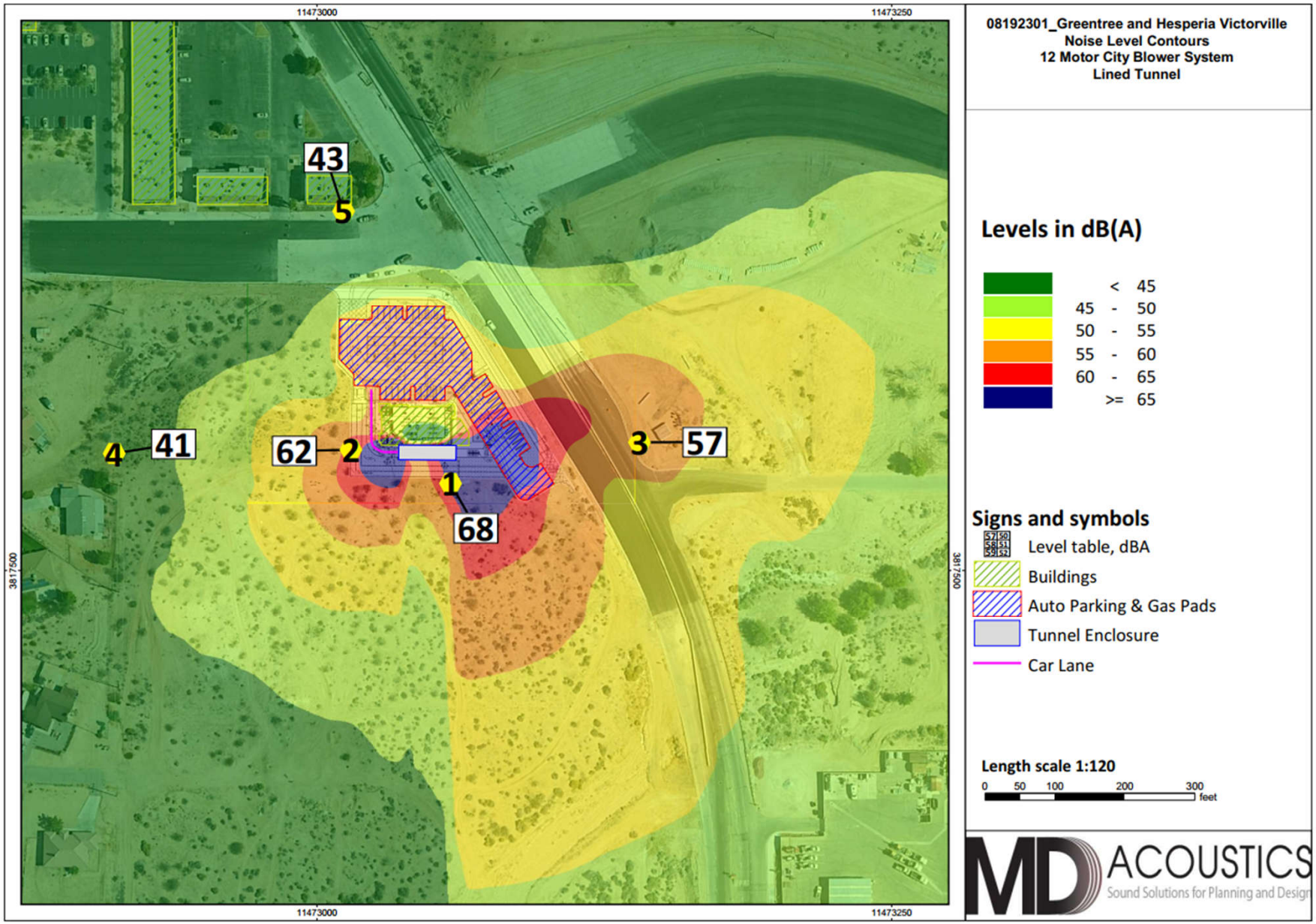
Roadway[1]	Segment	CNEL dBA[2]			
		Existing Without Project	Existing With Project	Change in Noise Level	Potential Significant Impact
Pacific Street.	W of Hesperia	71.5	71.8	0.3	No

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

Table 5 provides the Existing and Existing + Project noise conditions and shows the change in noise level because of the proposed project. As shown in Table 5, there will be a 0.3 dB increase in traffic noise as a result of the project, which is inaudible. The impact is less than significant, and no mitigation is required.

Exhibit F

Project Leq Operational Noise Levels



8.0 Construction Noise and Vibration Impacts

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities. Project construction will occur in four phases: grading, building construction, paving, and architectural coating. This section discusses noise and ground-borne vibration modeling efforts, impact analysis, and mitigation, if necessary.

8.1 Construction Noise

Typical construction equipment noise levels are presented in Table 6.

Table 6: Typical Construction Equipment Noise Levels[1]

EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES

Type	Noise Levels (dBA) at 50 Feet
Earth Moving	
Compactors (Ground)	80
Front Loaders	80
Backhoes	80
Tractors	84
Scrapers, Graders	85
Pavers	85
Trucks	84
Materials Handling	
Concrete Mixers	85
Concrete Pumps	82
Cranes	85
Stationary	
Pumps	77
Generators	82
Compressors	80

IMPACT EQUIPMENT

Type	Noise Levels (dBA) at 50 Feet
Concrete Saws	90
Vibratory Pile Driver	95

Notes:
[1] Referenced Noise Levels from the FHWA Construction Noise Handbook

Construction noise associated with each phase of the project was calculated at nearby sensitive receptors utilizing methodology presented in the Federal Highway Administration (FHWA) Construction Noise Model together with several key construction parameters including distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site.

Construction equipment typically moves back and forth across the site, and it is an industry standard to use the acoustical center of the site to model average construction noise levels.

Construction activities are anticipated to include five phases: site preparation, grading, building construction, paving, and architectural coating. Noise levels associated with each phase are shown in Table 7. The construction noise calculation output worksheet is located in Appendix D.

Table 7: Construction Noise Level by Phase (dBA, Leq)

Location	Phase	Construction Noise Level (dBA, Leq)
Residences 260 ft West	Prep	59
	Grade	60
	Build	59
	Paving	58
	Finish	49

As shown in Table 7, project construction noise will range between 49 to 60 dBA Leq at the existing residential property line to the west of the Project site. The average noise level is below the ambient noise level of 61 dBA.

Per section 13.01.060(9) of the Victorville Municipal Code, the noise associated with the temporary construction work is exempt from the sound pressure level standards. Thus, the impact is less than significant.

8.2 Construction Vibration

Construction activities can produce vibration that may be felt by adjacent land uses. The proposed project would not require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. The primary vibration source during construction may be a vibratory roller. A vibratory roller has a vibration impact of 0.210 inches per second peak particle velocity (PPV) at 25 feet, which is perceptible but below any risk to architectural damage.

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

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

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

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

Table 8: Guideline Vibration Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

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

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

Table 9: Vibration Source Levels for Construction Equipment

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

Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2018.

The nearest existing building is 260 feet west of the project site. At this distance, a vibratory roller would yield a worst-case 0.016 PPV (in/sec) which would not be perceptible or result in architectural damage. The impact is not significant. No mitigation is required. The ground-borne vibration worksheet is provided in Appendix E.

9.0 References

City of Victorville, CA: Municipal Code.

City of Victorville, CA: General Plan, Noise Element

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:	Victorville Gas Station & Car Wash Noise	**Site Observations:**	
Project: #/Name:	0819-2023-001	79F sunny, wind 1-7MPH in gusts. The site is a hill overlooking a large valley.	
Site Address/Location:	Greentree & Hesperia		
Date:	05/29/2024		
Field Tech/Engineer:	Jason Schuyler/ Claire Pincock		
Sound Meter:	XL2, NTI	**SN:** A2A-08562-E0	
Settings:	A-weighted, slow, 1-sec, 15-minute interval		
Site Id:	NM1, NM2, NM3		

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15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name: Victorville Gas Station & Car Wash Noise

Site Address/Location: Greentree & Hesperia

Site Id: NM1, NM2, NM3

Figure 1: NM1

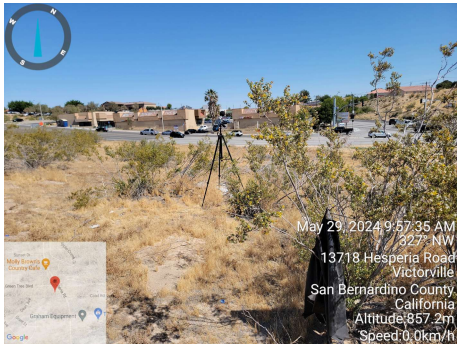


Figure 2: NM2

Figure 3: NM3

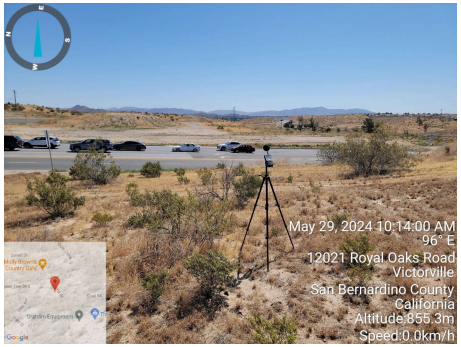
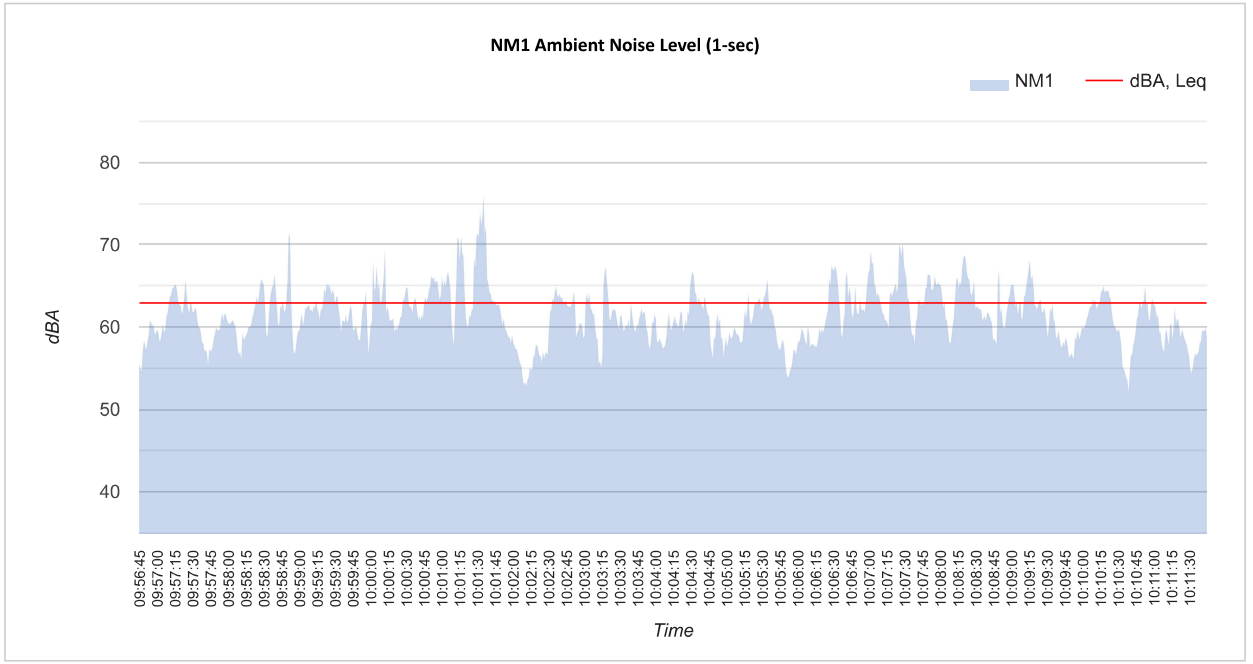


Table 1: Baseline Noise Measurement Summary

Location	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
NM1	9:56 AM	10:11 AM	62.9	75.7	52.8	69.2	65.8	63.4	61.4	57.4
NM2	10:31 AM	10:46 AM	61.2	77.6	49.0	68.5	63.8	60.3	58	53.9
NM3	10:13 AM	10:28 AM	64	74.5	52.7	71.5	67.9	64.7	61.4	57.2

15-Minute Continuous Noise Measurement Datasheet - Cont.

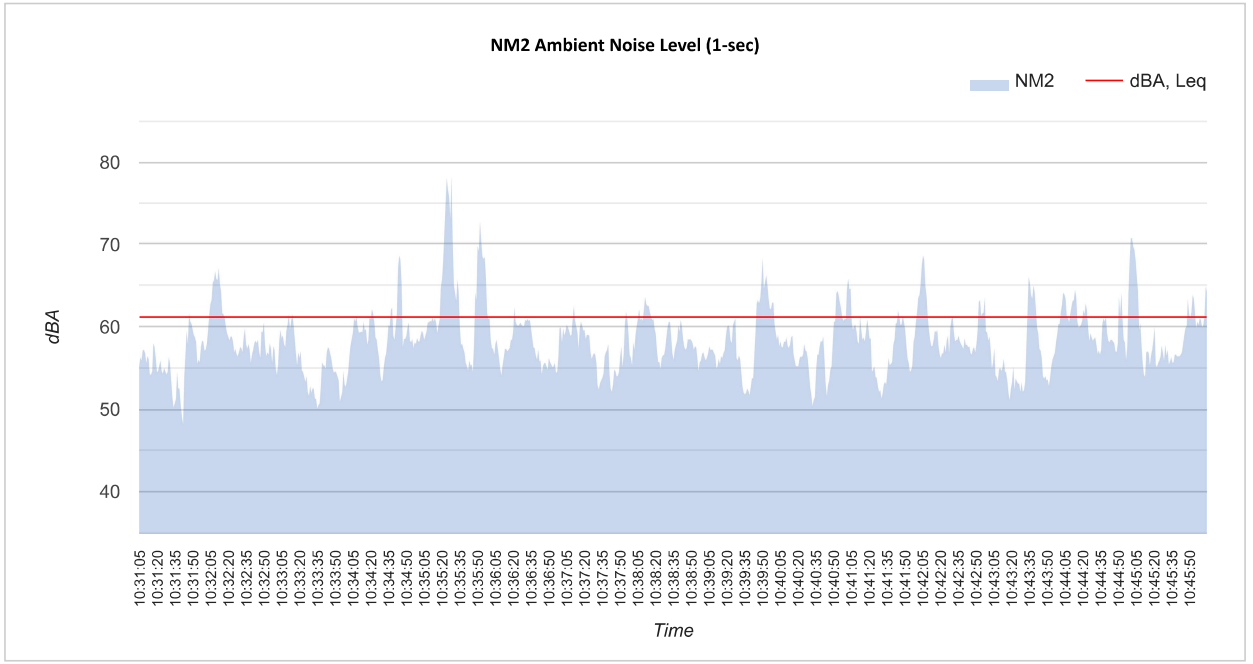
Project Name:	Victorville Gas Station & Car Wash Noise	**Site Topo:**	Hills and Valleys mostly open	**Noise Source(s) w/ Distance:**	
Site Address/Location:	Greentree & Hesperia	**Meteorological Cond.:**	79F Sunny winds 1-3MPH	Road and commercial noise	
Site Id:	NM1	**Ground Type:**	Sandy soil and clay		



MD ACOUSTICS

15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Victorville Gas Station & Car Wash Noise	**Site Topo:**	Hills and Valleys mostly open	**Noise Source(s) w/ Distance:**	
Site Address/Location:	Greentree & Hesperia	**Meteorological Cond.:**	79F Sunny winds 1-3MPH	Road and commercial noise	
Site Id:	NM2	**Ground Type:**	Sandy soil and clay		



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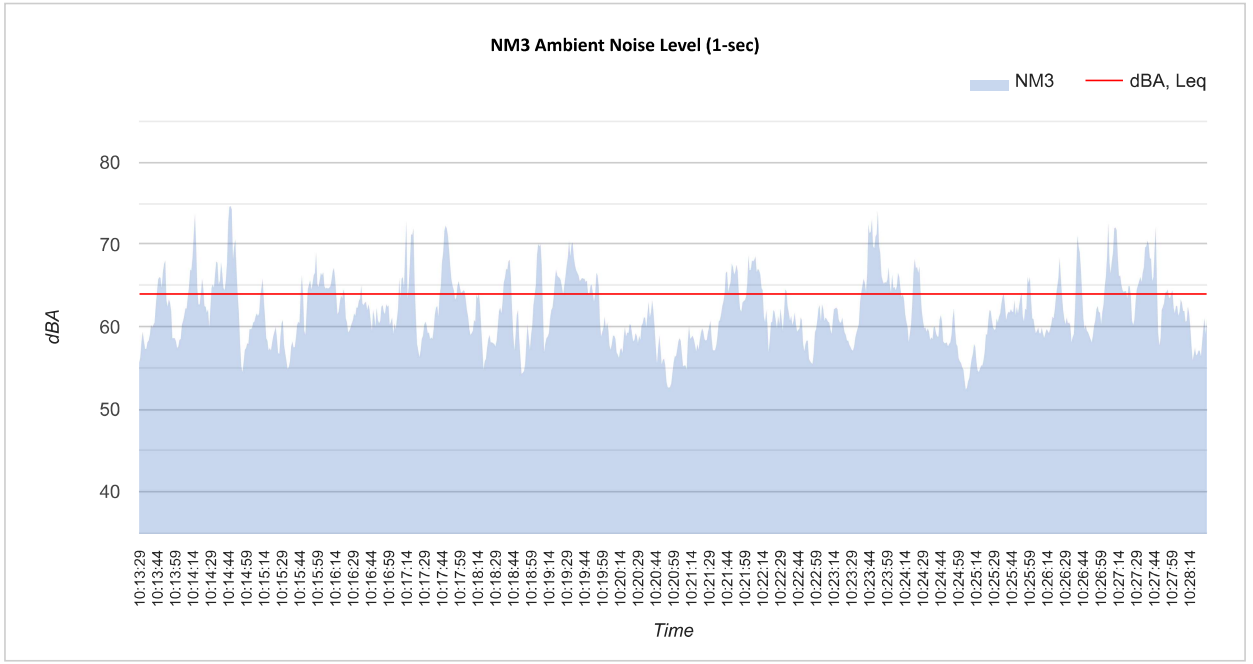
15-Minute Continuous Noise Measurement Datasheet - Cont.

Project Name:	Victorville Gas Station & Car Wash Noise	**Site Topo:**	Hills and Valleys mostly open	**Noise Source(s) w/ Distance:**	
Site Address/Location:	Greentree & Hesperia	**Meteorological Cond.:**	79F Sunny winds 1-3MPH	Road and commercial noise	
Site Id:	NM3	**Ground Type:**	Sandy soil and clay		



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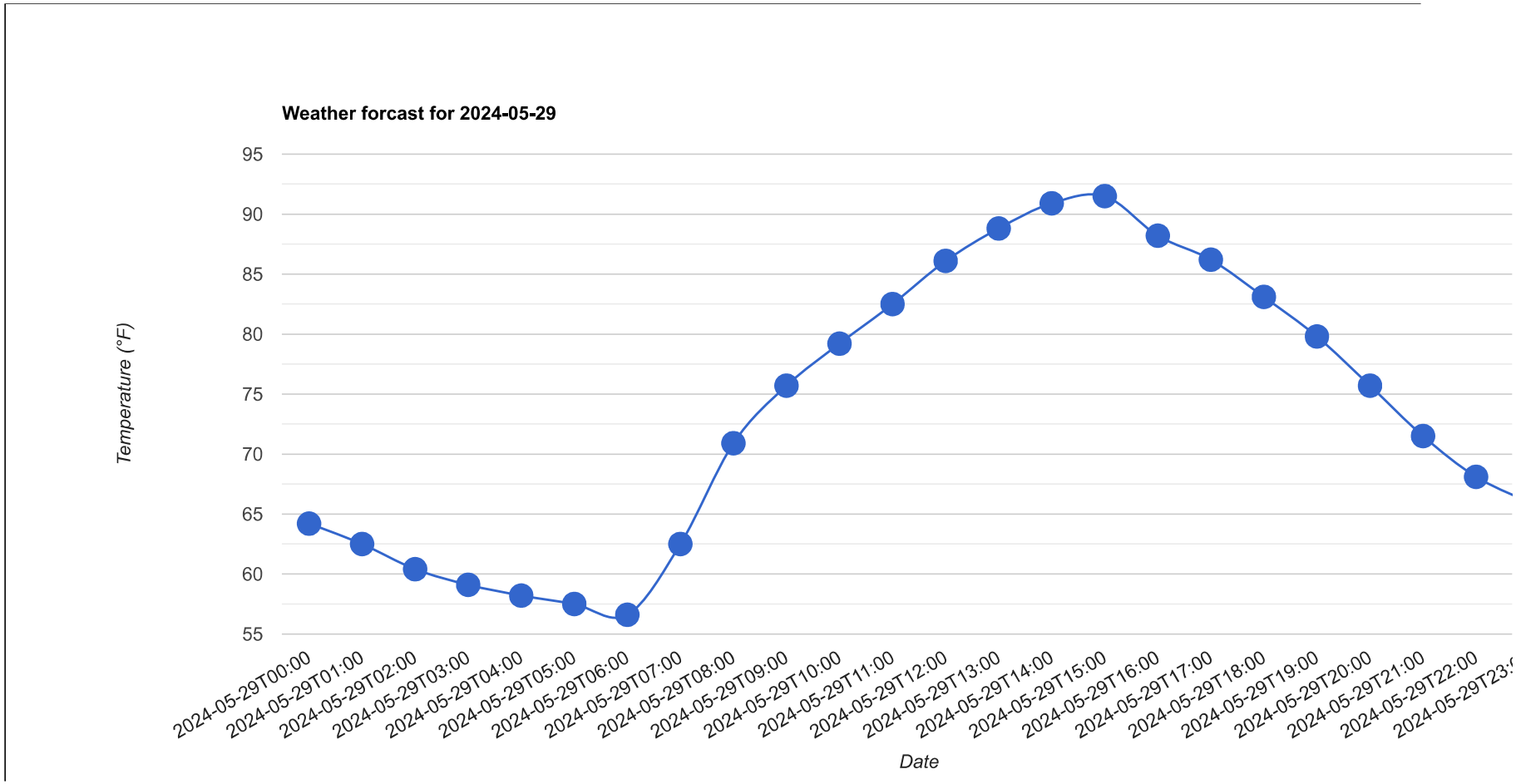
Weather forcast for 2024-05-29
Temperature (°F)
95
90
85
80
75
70
65
60
55
2024-05-29T00:00
2024-05-29T01:00
2024-05-29T02:00
2024-05-29T03:00
2024-05-29T04:00
2024-05-29T05:00
2024-05-29T06:00
2024-05-29T07:00
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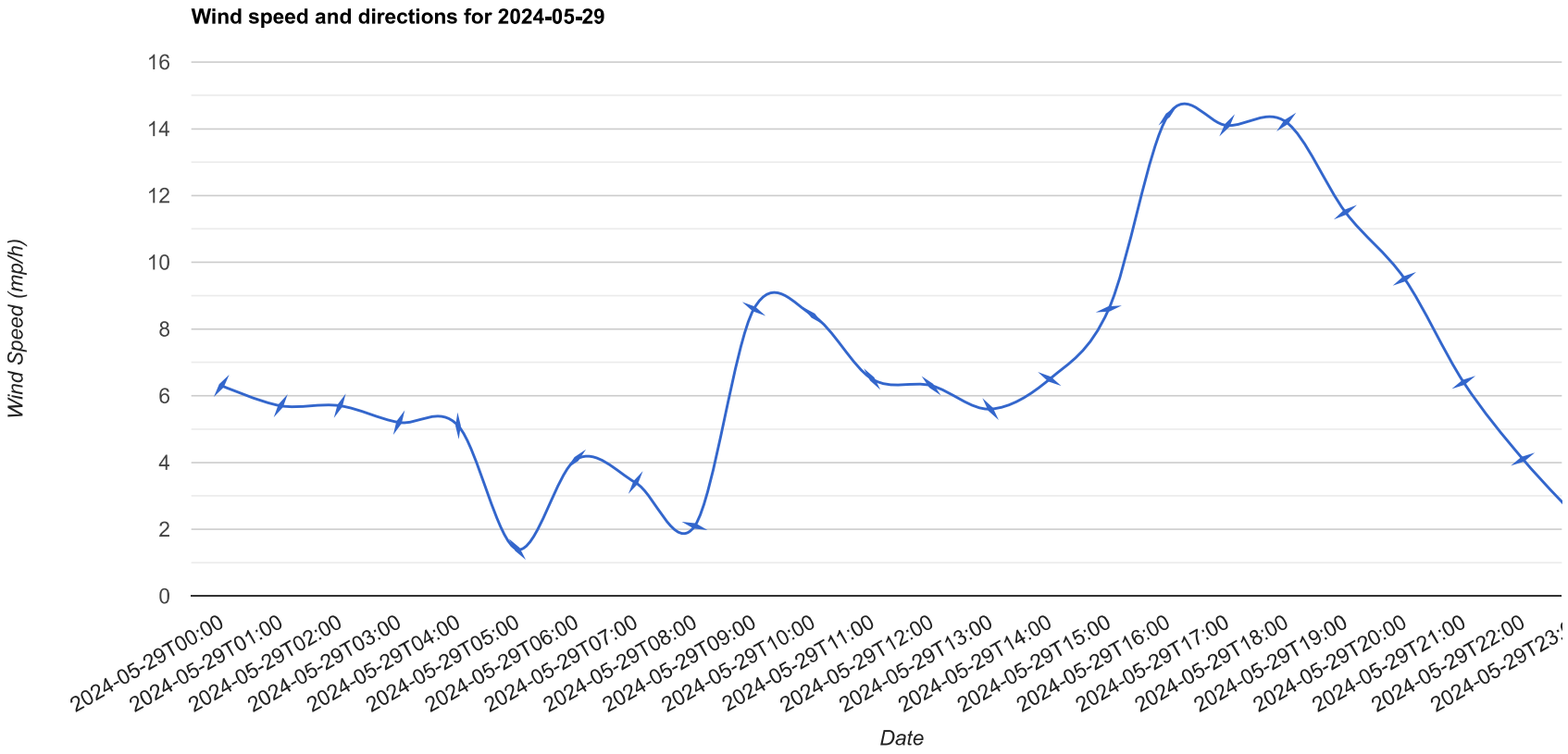

Source: Global Forecast System (GFS) weather forcast model

Appendix B:
Manufacturers Cut Sheet

MD ACOUSTICS
Sound Solutions for Planning and Design
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AZ Office
4960 S. Gilbert Rd, Ste 1-461
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: Z-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 threee (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 (Un Holstered)	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
Arth. Average Level*	Vacuum	71.2	11	21	25	32	36	39	43	45	47	48	52	53	51	51	55	53	55	55	56	58	59	59	61	62	59	56	55	53	51	47	40

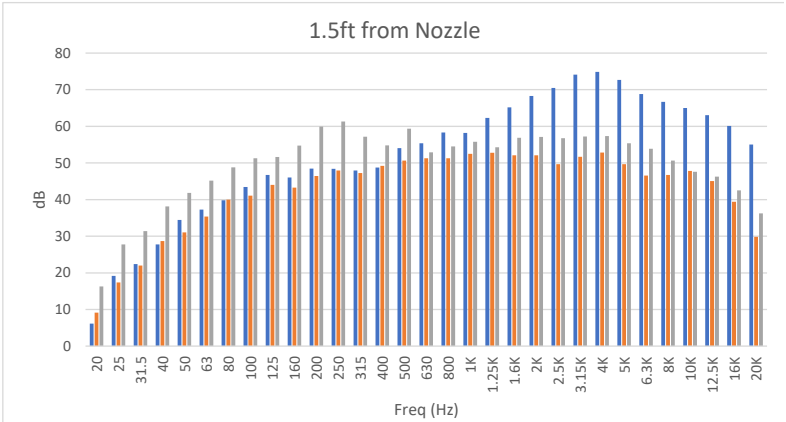
* Refers to the arthitmetic average of all measurements. This measurement represents an average of the multiple vacuum positions.

Figure 1: Example Measurement Position

Figure 1: Holstered

Figure 2: Un Holstered

Figure 3: Inside Car



Vacutech sound levels

Project: Motor City Dryer Systems - Surf Thru Car Wash
Job Number: 0000-2020-02
Site Address/Location: Oxnard, Ca
Date: 11/11/2020
Field Tech/Engineer: Mike Dickerson
Source/System: Motor City Dryer Systems x1

General Location: Measured @ 5'
Sound Meter: NTi XL2 **SN:** A2A-05967-E0
Settings: A-weighted, slow, 1-sec, 30-sec duration
Meteorological Cond.: NA

Site Observations:

Meter Positioned five (5) feet away from blower, Reading is for one (1) motor city Blowers

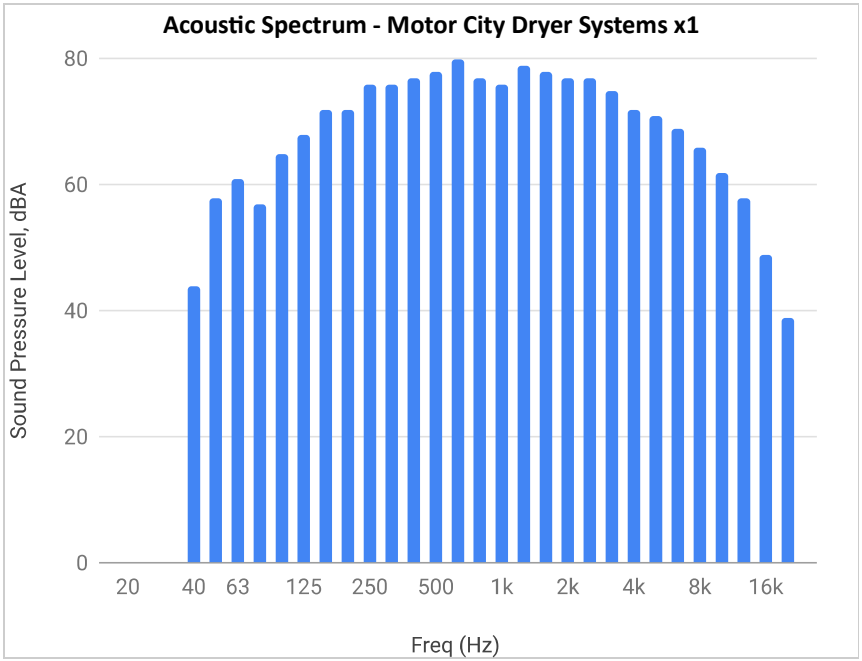
Leq	Lmin	Lmax
88.6	88.6	88.6

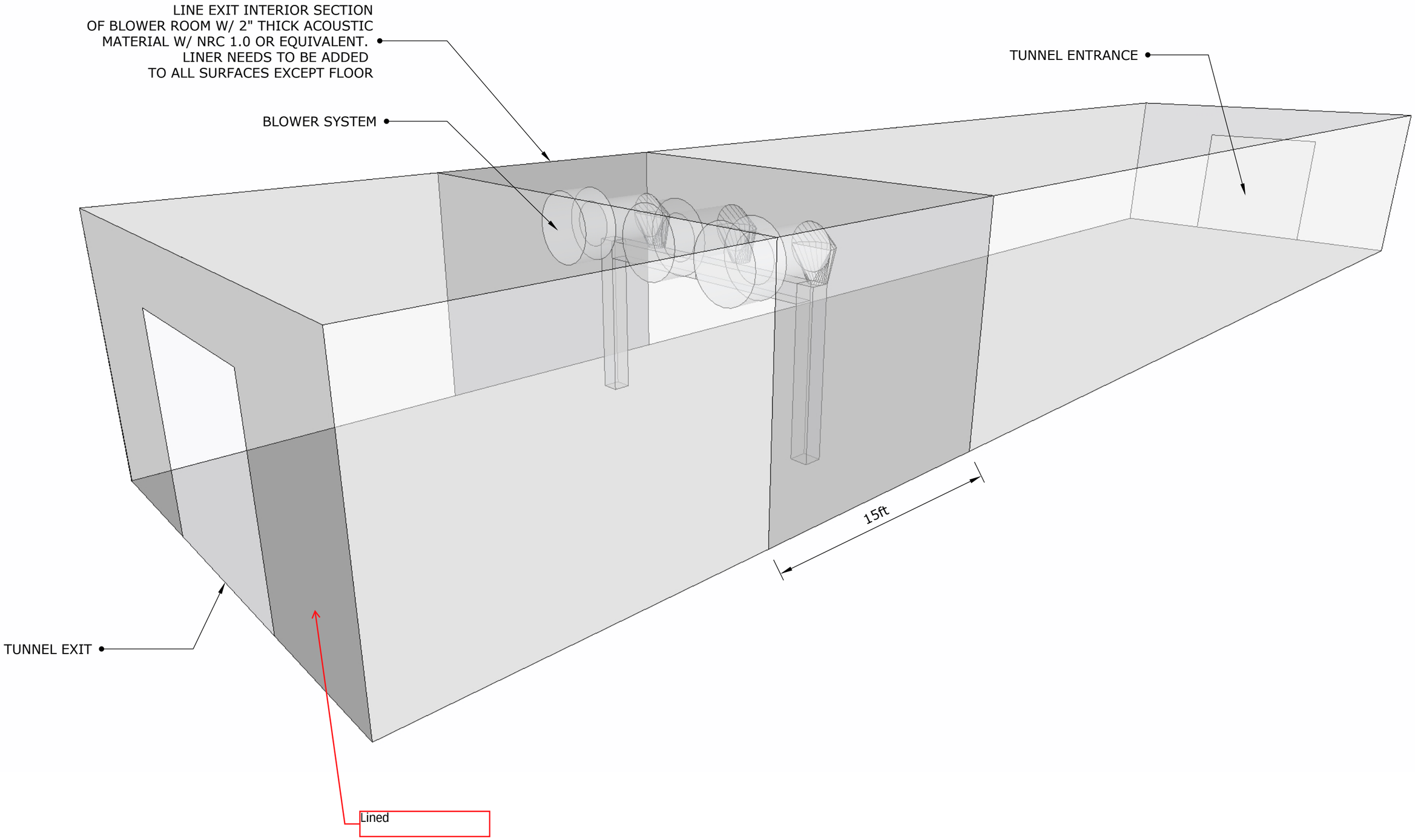
Ln 2	Ln 8	Ln 25	Ln 50	Ln 90	Ln 99
0.0	0.0	0.0	0.0	0.0	0.0

Table 1: Summary Measurement Data

Source/System	Overall Source	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	12.5k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	20k
Motor City Dryer Systems x1	Car Wash Dryer	88.6	0.0	0.0	0.0	44.0	58.0	61.0	57.0	65.0	68.0	72.0	72.0	76.0	76.0	77.0	78.0	80.0	77.0	76.0	79.0	78.0	77.0	77.0	75.0	72.0	71.0	69.0	66.0	62.0	58.0	49.0	39.0

Figure 1: Motor City Dryer Systems - Single





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ACOUSTIC TREATMENTS TO TUNNEL INTERIOR

FOR ILLUSTRATIVE PURPOSES ONLY

Appendix I

Acoustiblok® quieting the world

WORLDWIDE MADE IN USA

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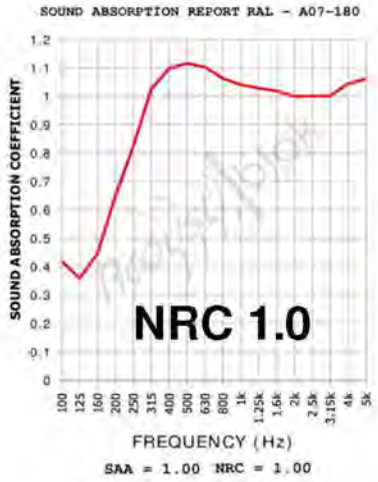
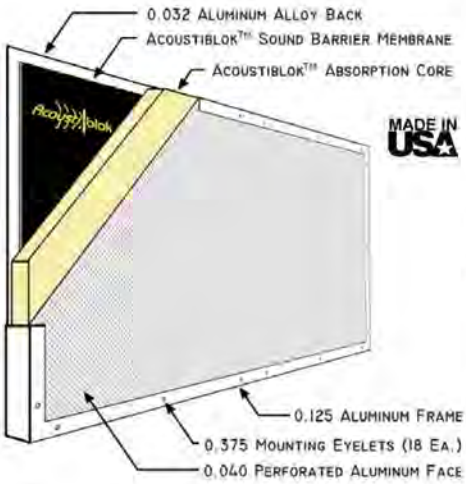
sales@acoustiblok.com

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

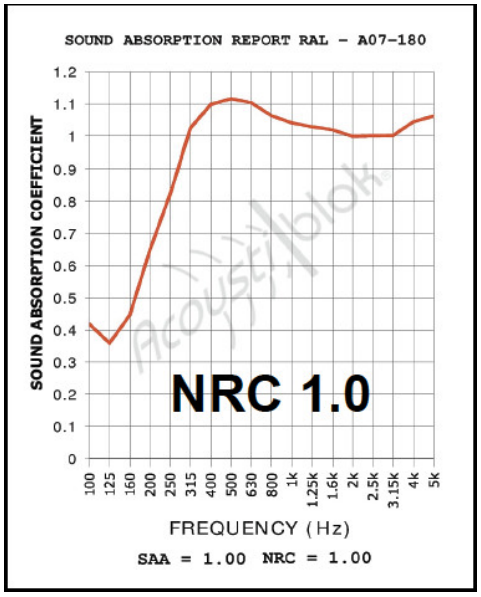
Product Name

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

Appendix C:

SoundPLAN Input/Outputs

Greentree and Hesperia Victorville
Contribution spectra - 002 - 12 Motor City - Lined: Outdoor SP

Time slice	Source	Sum dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)
Receiver R1 Fl G Lr,lim dB(A) Leq,d 68.0 dB(A) Sigma(Leq,d) 0.0 dB(A)								
Leq,d	Auto Parking & Gas Pad	36.8	31.8	23.3	27.9	28.2	29.6	27.2
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 01	30.9	26.4	27.0	23.9	14.4	10.3	2.5
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 02	22.7	19.1	18.3	14.8	4.8	-0.4	-9.6
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 03	13.5	11.3	8.9	1.0	-11.7	-17.1	-25.4
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 04	5.6	1.4	2.8	-4.9	-22.3		
Leq,d	001 - 12 Motor City - Lined Tunnel-Roof 01	22.3	18.4	18.8	13.9	2.3	-3.7	-13.6
Leq,d	001 - 12 Motor City - Lined Tunnel-Transmissive area 01	45.9	40.2	42.2	40.0	32.3	21.0	5.3
Leq,d	001 - 12 Motor City - Lined Tunnel-Transmissive area 01	68.0	59.7	60.0	62.5	61.5	59.8	52.7
Leq,d	Car Lane	25.5	14.9	13.4	15.2	18.5	19.5	14.4
Receiver R2 Fl G Lr,lim dB(A) Leq,d 62.0 dB(A) Sigma(Leq,d) 0.0 dB(A)								
Leq,d	Auto Parking & Gas Pad	38.0	32.0	21.7	27.5	31.2	32.1	28.4
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 01	18.0	15.3	13.0	8.9	-1.2	-7.0	-16.9
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 02	2.7	0.7	-2.7	-8.7	-20.4	-26.4	
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 03	10.9	8.1	6.7	0.4	-11.8	-17.4	-26.4
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 04	16.9	11.2	14.3	9.6	-4.9	-18.8	
Leq,d	001 - 12 Motor City - Lined Tunnel-Roof 01	17.8	13.5	14.3	9.9	-1.2	-6.7	-16.3
Leq,d	001 - 12 Motor City - Lined Tunnel-Transmissive area 01	61.8	52.5	56.7	58.0	53.0	43.7	29.8
Leq,d	001 - 12 Motor City - Lined Tunnel-Transmissive area 01	43.5	38.8	35.8	36.3	35.2	34.4	28.2
Leq,d	Car Lane	45.0	30.2	31.8	35.4	38.7	40.6	36.7
Receiver R3 Fl G Lr,lim dB(A) Leq,d 57.4 dB(A) Sigma(Leq,d) 0.0 dB(A)								
Leq,d	Auto Parking & Gas Pad	37.0	32.6	17.9	24.5	29.8	30.7	26.3
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 01	6.3	3.8	0.7	-2.1	-10.9	-16.7	-27.8
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 02	8.6	5.1	3.1	2.0	-5.2	-9.5	-19.0
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 03	7.0	3.4	3.3	-2.2	-14.5	-21.0	
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 04	-12.2	-16.1	-15.2	-23.5			
Leq,d	001 - 12 Motor City - Lined Tunnel-Roof 01	7.4	3.4	3.9	-1.0	-12.8	-19.0	
Leq,d	001 - 12 Motor City - Lined Tunnel-Transmissive area 01	27.1	20.6	23.4	21.7	14.2	4.2	-11.8
Leq,d	001 - 12 Motor City - Lined Tunnel-Transmissive area 01	57.3	44.9	44.5	50.3	52.1	52.4	46.0
Leq,d	Car Lane	11.3	1.2	-1.1	-1.0	1.9	2.5	-4.3
Receiver R4 Fl G Lr,lim dB(A) Leq,d 40.7 dB(A) Sigma(Leq,d) 0.0 dB(A)								
Leq,d	Auto Parking & Gas Pad	27.0	22.7	10.8	18.0	19.7	19.8	12.1
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 01	-1.8	-5.0	-5.9	-11.0	-23.2		
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 02	-9.2	-12.0	-13.5	-19.3			
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 03	-3.4	-6.4	-7.3	-13.3	-25.8		
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 04	-3.4	-9.4	-5.8	-10.9	-27.7		
Leq,d	001 - 12 Motor City - Lined Tunnel-Roof 01	5.1	0.4	1.7	-2.2	-13.0	-18.0	
Leq,d	001 - 12 Motor City - Lined Tunnel-Transmissive area 01	40.0	31.1	35.1	36.8	28.4	16.8	-1.7
Leq,d	001 - 12 Motor City - Lined Tunnel-Transmissive area 01	30.7	24.3	24.1	24.2	22.8	22.3	14.2
Leq,d	Car Lane	19.6	6.2	6.9	10.1	14.1	14.8	7.4
Receiver R5 Fl G Lr,lim dB(A) Leq,d 43.0 dB(A) Sigma(Leq,d) 0.0 dB(A)								
Leq,d	Auto Parking & Gas Pad	40.4	36.0	21.2	28.2	33.2	34.0	29.6
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 01	-0.2	-2.4	-5.0	-12.2	-24.8		
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 02	-3.0	-5.4	-7.7	-14.0	-26.7		
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 03	9.7	5.7	6.1	1.2	-10.5	-16.4	-27.8
Leq,d	001 - 12 Motor City - Lined Tunnel-Facade 04	-1.9	-7.8	-4.0	-10.6	-27.6		
Leq,d	001 - 12 Motor City - Lined Tunnel-Roof 01	9.1	4.5	5.7	1.7	-9.1	-14.2	-25.1
Leq,d	001 - 12 Motor City - Lined Tunnel-Transmissive area 01	35.1	29.1	31.9	29.0	19.4	7.5	-9.6
Leq,d	001 - 12 Motor City - Lined Tunnel-Transmissive area 01	37.2	32.4	30.8	30.2	28.1	27.4	19.8
Leq,d	Car Lane	27.1	13.9	8.9	12.2	20.6	23.7	18.5

Greentree and Hesperia Victorville
Contribution level - 002 - 12 Motor City - Lined: Outdoor SP

Source	Source ty	Leq,d dB(A)	
Receiver R1 Fl G Lr,lim dB(A) Leq,d 68.0 dB(A) Sigma(Leq,d) 0.0 dB(A)			
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	68.0	
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	45.9	
Auto Parking & Gas Pad	PLot	36.8	
001 - 12 Motor City - Lined Tunnel-Facade 01	Area	30.9	
Car Lane	Line	25.1	
001 - 12 Motor City - Lined Tunnel-Facade 02	Area	22.7	
001 - 12 Motor City - Lined Tunnel-Roof 01	Area	22.3	
001 - 12 Motor City - Lined Tunnel-Facade 03	Area	13.5	
001 - 12 Motor City - Lined Tunnel-Facade 04	Area	5.6	
Receiver R2 Fl G Lr,lim dB(A) Leq,d 62.0 dB(A) Sigma(Leq,d) 0.0 dB(A)			
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	61.8	
Car Lane	Line	44.9	
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	43.5	
Auto Parking & Gas Pad	PLot	38.0	
001 - 12 Motor City - Lined Tunnel-Facade 01	Area	18.0	
001 - 12 Motor City - Lined Tunnel-Roof 01	Area	17.8	
001 - 12 Motor City - Lined Tunnel-Facade 04	Area	16.9	
001 - 12 Motor City - Lined Tunnel-Facade 03	Area	10.9	
001 - 12 Motor City - Lined Tunnel-Facade 02	Area	2.7	
Receiver R3 Fl G Lr,lim dB(A) Leq,d 57.4 dB(A) Sigma(Leq,d) 0.0 dB(A)			
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	57.3	
Auto Parking & Gas Pad	PLot	37.0	
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	27.1	
Car Lane	Line	10.2	
001 - 12 Motor City - Lined Tunnel-Facade 02	Area	8.6	
001 - 12 Motor City - Lined Tunnel-Roof 01	Area	7.4	
001 - 12 Motor City - Lined Tunnel-Facade 03	Area	7.0	
001 - 12 Motor City - Lined Tunnel-Facade 01	Area	6.3	
001 - 12 Motor City - Lined Tunnel-Facade 04	Area	-12.2	
Receiver R4 Fl G Lr,lim dB(A) Leq,d 40.7 dB(A) Sigma(Leq,d) 0.0 dB(A)			
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	40.0	
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	30.7	
Auto Parking & Gas Pad	PLot	27.0	
Car Lane	Line	19.4	
001 - 12 Motor City - Lined Tunnel-Roof 01	Area	5.1	
001 - 12 Motor City - Lined Tunnel-Facade 01	Area	-1.8	
001 - 12 Motor City - Lined Tunnel-Facade 03	Area	-3.3	
001 - 12 Motor City - Lined Tunnel-Facade 04	Area	-3.4	
001 - 12 Motor City - Lined Tunnel-Facade 02	Area	-9.2	
Receiver R5 Fl G Lr,lim dB(A) Leq,d 43.0 dB(A) Sigma(Leq,d) 0.0 dB(A)			
Auto Parking & Gas Pad	PLot	40.4	
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	37.2	
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	35.1	

Source	Source ty	Leq,d dB(A)	
Car Lane	Line	27.1	
001 - 12 Motor City - Lined Tunnel-Facade 03	Area	9.7	
001 - 12 Motor City - Lined Tunnel-Roof 01	Area	9.1	
001 - 12 Motor City - Lined Tunnel-Facade 01	Area	-0.2	
001 - 12 Motor City - Lined Tunnel-Facade 04	Area	-1.9	
001 - 12 Motor City - Lined Tunnel-Facade 02	Area	-3.0	

Greentree and Hesperia Victorville
Octave spectra of the sources in dB(A) - 002 - 12 Motor City - Lined: Outdoor SP

Name	Source type	l or A	Li	Rw	L'w	Lw	DO-Wall	Day histogram	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
		m,m²	dB(A)	dB	dB(A)	dB(A)	dB			dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Auto Parking & Gas Pad	PLot	2730.52			53.3	87.7	0	100%/24h	Typical spectrum	71.0	82.6	75.1	79.6	79.7	80.1	77.4	71.2
001 - 12 Motor City - Lined Tunnel-Facade 01	Area	149.63	91.4	57.0	41.3	63.0	3	100%/24h	113_Facade 01_		58.3	59.6	55.7	45.2	40.8	33.2	
001 - 12 Motor City - Lined Tunnel-Facade 02	Area	24.65	95.1	57.0	44.5	58.4	3	100%/24h	114_Facade 02_		53.8	54.7	51.4	41.4	37.2	29.6	
001 - 12 Motor City - Lined Tunnel-Facade 03	Area	149.63	91.4	57.0	41.3	63.0	3	100%/24h	116_Facade 03_		58.3	59.6	55.8	45.2	40.8	33.3	
001 - 12 Motor City - Lined Tunnel-Facade 04	Area	24.65	87.1	57.0	39.1	53.0	3	100%/24h	117_Facade 04		45.8	51.0	45.4	29.3	15.3	-1.3	
001 - 12 Motor City - Lined Tunnel-Roof 01	Area	158.05	91.9	57.0	41.8	63.8	0	100%/24h	108_Roof 01_		59.0	60.4	56.6	46.0	41.6	34.0	
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	13.38	87.0	0.0	87.0	98.2	3	100%/24h	118_Transmissive area 01		86.8	94.3	94.7	87.5	77.7	64.2	
001 - 12 Motor City - Lined Tunnel-Transmissive area 01	Area	13.38	94.9	0.0	94.9	106.2	3	100%/24h	115_Transmissive area 01		95.0	97.9	100.6	99.6	99.4	94.8	
Car Lane	Line	36.36			62.8	78.4	0	100%/24h	Drive-Thru - Idiling Car @ 6ft	62.4	63.9	67.4	71.1	72.0	73.2	69.7	61.5

Appendix D:
Traffic Calculation

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	GREEN TREE & HESPERIA CAR WASH	JOB #:	0819-2023-01
ROADWAY:	GREEN TREE DRIVE	DATE:	########
LOCATION:	WEST OF HESPERIA	ENGINEER:	C. Pincock

NOISE INPUT DATA - E

ROADWAY CONDITIONS

ADT =	15,800	
SPEED =	50	
PK HR % =	10	
NEAR LANE/FAR LANE DIS	48	
ROAD ELEVATION =	0.0	
GRADE =	1.0	%
PK HR VOL =	1,580	

RECEIVER INPUT DATA

RECEIVER DISTANCE =	50		
DIST C/L TO WALL =	0		
RECEIVER HEIGHT =	5.0		
WALL DISTANCE FROM RECEIVER	50		
PAD ELEVATION =	0.5		
ROADWAY VIEW:		LF ANGLE=	-90
		RT ANGLE=	90
		DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	44.00	- -
MEDIUM TRUCKS	4.0	43.89	- -
HEAVY TRUCKS	8.0	43.93	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	71.2	69.3	67.5	61.5	70.1	70.7
MEDIUM TRUCKS	61.6	60.1	53.8	52.2	60.7	60.9
HEAVY TRUCKS	61.9	60.5	51.4	52.7	61.0	61.2
NOISE LEVELS (dBA)	72.1	70.3	67.8	62.4	71.0	71.5

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	71.2	69.3	67.5	61.5	70.1	70.7
MEDIUM TRUCKS	61.6	60.1	53.8	52.2	60.7	60.9
HEAVY TRUCKS	61.9	60.5	51.4	52.7	61.0	61.2
NOISE LEVELS (dBA)	72.1	70.3	67.8	62.4	71.0	71.5

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	71	226	713	2256
LDN	63	200	632	1999

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT:	GREEN TREE & HESPERIA CAR WASH	JOB #:	0819-2023-01
ROADWAY:	GREEN TREE DRIVE	DATE:	########
LOCATION:	WEST OF HESPERIA	ENGINEER:	C. Pincock

NOISE INPUT DATA - E+P

ROADWAY CONDITIONS

ADT =	16,700	
SPEED =	50	
PK HR % =	10	
NEAR LANE/FAR LANE DIS	48	
ROAD ELEVATION =	0.0	
GRADE =	1.0	%
PK HR VOL =	1,670	

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		0
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		50
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE=	90
	DF ANGLE=	180

SITE CONDITIONS

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

WALL INFORMATION

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

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9742
MEDIUM TRUCK	0.848	0.049	0.103	0.0184
HEAVY TRUCKS	0.865	0.027	0.108	0.0074

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	44.00	- -
MEDIUM TRUCKS	4.0	43.89	- -
HEAVY TRUCKS	8.0	43.93	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	71.4	69.5	67.8	61.7	70.3	70.9
MEDIUM TRUCKS	61.9	60.4	54.0	52.5	60.9	61.2
HEAVY TRUCKS	62.1	60.7	51.7	52.9	61.3	61.4
NOISE LEVELS (dBA)	72.3	70.5	68.0	62.7	71.3	71.8

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	71.4	69.5	67.8	61.7	70.3	70.9
MEDIUM TRUCKS	61.9	60.4	54.0	52.5	60.9	61.2
HEAVY TRUCKS	62.1	60.7	51.7	52.9	61.3	61.4
NOISE LEVELS (dBA)	72.3	70.5	68.0	62.7	71.3	71.8

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	75	238	754	2385
LDN	67	211	668	2113

Appendix E:
Construction Calculations

Receptor - Residences 150 ft to the northwest

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Edge of Site to Receptor, feet	Center of Site to Receptor, feet	Item Usage Percent[1]	Ground Factor[2]	Usage Factor	Receptor Item Lmax, dBA	Recptor. Item Leq, dBA
SITE PREP									
Grader	1	85	260	420	40	0.66	0.40	66.0	56.4
Tractor	1	84	260	420	40	0.66	0.40	65.0	55.4
Dozer	0	82	260	420	40	0.66	0.40	0.0	0.0
Scraper	0	84	260	420	40	0.66	0.40	0.0	0.0
							Log Sum	66.0	59.0
GRADE									
Dozer	1	82	260	420	40	0.66	0.40	63.0	53.4
Tractor	1	84	260	420	40	0.66	0.40	65.0	55.4
Grader	1	85	260	420	40	0.66	0.40	66.0	56.4
Excavator	0	81	260	420	40	0.66	0.40	0.0	0.0
Scraper	0	84	260	420	40	0.66	0.40	0.0	0.0
								66.0	60.0
BUILD									
Crane	1	81	260	420	16	0.66	0.16	62.0	48.5
Man lift	2	75	260	420	20	0.66	0.20	56.0	43.4
Tractor	2	84	260	420	40	0.66	0.40	65.0	55.4
Welder/Torch	0	74	260	420	40	0.66	0.40	0.0	0.0
Generator	0	81	260	420	50	0.66	0.50	0.0	0.0
								65.0	59.1
PAVE									
Paver	1	77	260	420	50	0.66	0.50	58.0	49.4
Concrete Mixer Truck	4	79	260	420	40	0.66	0.40	60.0	50.4
Roller	1	80	260	420	20	0.66	0.20	61.0	48.4
Tractor	1	84	260	420	40	0.66	0.40	65.0	55.4
Compactor (ground)	0	83	260	420	20	0.66	0.20	0.0	0.0
								65.0	57.8
ARCH COAT									
Compressor (air)	1	78	260	420	40	0.66	0.40	59.0	49.4
								59.0	49.4

[1]FHWA Construction Noise Handbook: Table 9.1 RCNM Default Noise Emission Reference Levels and Usage Factors

VIBRATION LEVEL IMPACT

Project:	C-Store, Gas Station, and Car Wash	Date: 5/31/24
Source:	Large Bulldozer	
Scenario:	Unmitigated	
Location:	Adjacent residences	
Address:	100 East H Street	

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

DATA INPUT

Equipment = Type	1	Vibratory Roller	INPUT SECTION IN BLUE
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	260.00	Distance from Equipment to Receiver (ft)	
n =	1.10	Vibration attenuation rate through the ground	

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

DATA OUT RESULTS

PPV =	**0.016**	IN/SEC	OUTPUT IN RED