RCC New Cosmetology Building Project

Noise and Vibration Impact Study

City of Riverside, CA

Prepared for:

Ms. Rachel Spellenberg
Terracon
145 W Walnut St.
Carson, CA 90248

Prepared by:

MD Acoustics, LLC
Bethany Wu, INCE-USA
Claire Pincock, INCE-USA
1197 Los Angeles Ave, Ste C-256
Simi Valley, CA 93065

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MD ACOUSTICS
Sound Solutions for Planning and Design

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1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

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

The following is provided in this report:

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

1.2 Site Location and Study Area

The Riverside Community College District (RCCD) – Riverside City College (RCC) campus is located within the western Riverside County sub-region of southern California. This area is generally south of downtown Riverside, southwest of the intersection of Interstate (I) 215 and Highway (Hwy) 94, and directly west of Hwy 94 near the 14th Street on-ramp (see Exhibit A).

The proposed Cosmetology Building will be located on the lower campus adjacent to the Ramona Street Entrance in Parking Lot G, on the northwest corner of Terracina Drive and Saunders Street, and south of the existing tennis courts. The new location will spur development of a new career technical education core of facilities on campus. Regional access to the project site is provided from Hwy 91, and the 14th Street off-ramp. From the 14th Street off-ramp, travel south on Olivewood Avenue, turn right on Ramona Boulevard (Blvd), then turn right at the first parking lot entrance (see Exhibit B).

The City of Riverside General Plan has designated the RCC parcel as Public Facility (PF) and zoned as PF as well. The City of Riverside General Plan designations for the land surrounding the RCC are for various density of multi-family housing.

1.3 Proposed Project Description

This project proposes to construct a new Cosmetology Building at RCC. The new facility will accommodate the College's enrollment by increasing instructional capacity for dedicated laboratory and faculty office space. The proposed Cosmetology building will encompass 35,086 Gross Square Feet (GSF) and consists of 23,171 Assignable Square Feet (ASF). Functional space within the building will include 18,675 ASF of laboratory space, 2,723 ASF of office, and 1,773 ASF of other support space. The proposed Cosmetology building will include modern technology and infrastructure compatible with specialized

equipment needs for the career technical education programs that the building houses. Increasing the number and size of dedicated Cosmetology laboratories with modern technology/equipment will improve student success, completion rates, and train students for gainful employment in their chosen career pathway.

The proposed Cosmetology building will have two floors, and the main pedestrian access will be in roughly the center of the building from both the north and south. From the north, new sidewalks would be installed leading from the surrounding areas to the main building entrance. From the south, sidewalks would lead from nearby vehicle parking to the secondary building entrance. Access to the second floor will be via either various stairways or by elevator.

Vehicle access to the area will remain on Saunders Street, and Terracina Drive, with Olivewood Avenue providing access from off campus. Parking is anticipated to remain north of the existing storm drain channel, and there will be limited street parking on Terracina Drive.

Exhibit A

Location Map



Exhibit B

Site Plan



Riverside CCD – Building Site Plan: Option 2

2.0 Fundamentals of Noise

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

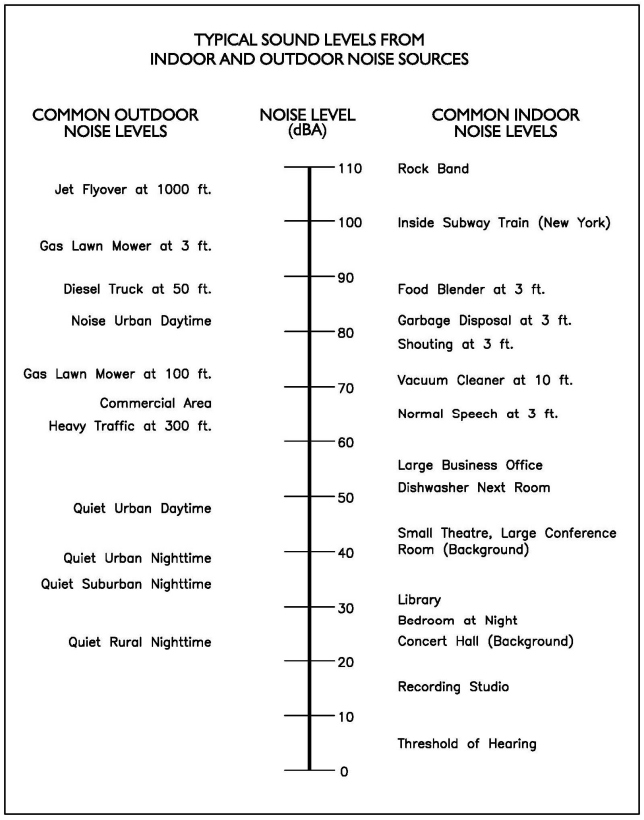
2.1 Sound, Noise, and Acoustics

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

2.2 Frequency and Hertz

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

Exhibit C: Typical A-Weighted Noise Levels



2.3 Sound Pressure Levels and Decibels

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

2.4 Addition of Decibels

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

2.5 Sensitive Receptors

Noise-sensitive land uses include residential (single and multi-family dwellings, mobile home parks, dormitories, and similar uses); transient lodging (including hotels, motels, and similar uses); hospitals, nursing homes, convalescent hospitals, and other facilities for long-term medical care; public or private educational facilities, libraries, churches, and places of public assembly.

2.6 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 a 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.

Table 1: Decibel Changes and Loudness

Changes in Intensity Level, dBA	Changes in Apparent Loudness
1	Not perceptible
3	Just perceptible
5	Clearly noticeable
10	Twice (or half) as loud
Source: https://www.fhwa.dot.gov/environMent/noise/regulations_and_guidance/polguide/polguide02.cfm	

2.7 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. This is 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 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 pressure wave. The range of sound audible to the average human (from the quietest to the loudest perceptible sound) is difficult to measure on a linear scale: imagine trying to measure something from inches to miles with the same ruler. Therefore, the convention is to use a logarithmic scale, measured in decibels. A decibel is a logarithmic expression comparing a pressure to a reference pressure (20 micro-pascals) that provides a useful way to compare sounds of differing amplitudes.

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

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

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

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

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

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

Percent Noise Levels: See L(n).

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

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

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

2.8 Traffic Noise Prediction

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

2.9 Sound Propagation

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

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

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

3.0 Ground-Borne Vibration Fundamentals

3.1 Vibration Descriptors

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

Several different methods are used to quantify vibration amplitude.

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

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

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

3.2 Vibration Perception

Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. These continuous vibrations are not noticeable to humans whose threshold of perception is around 65 VdB. Outdoor sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible ground-borne noise or vibration. To counter the effects of ground-borne vibration, the Federal Transit Administration (FTA) has published guidance relative to vibration impacts. According to the FTA, fragile buildings can be exposed to ground-borne vibration levels of 0.3 inches per second without experiencing structural damage. Although ground borne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors; therefore, the vibration level threshold is assessed at occupied structures. Therefore, all vibration impacts are assessed at the structure of an affected property.

There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wavefront, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wavefront. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wavefront. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation. As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this

drop-off rate can vary greatly depending on the soil but has been shown to be effective enough for screening purposes to identify potential vibration impacts that may need to be studied through actual field tests.

4.0 Regulatory Setting

The proposed project is located in the City of Riverside, 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 United States 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 developments in such a way that “noise sensitive” uses are either prohibited from being constructed adjacent to a highway or 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.

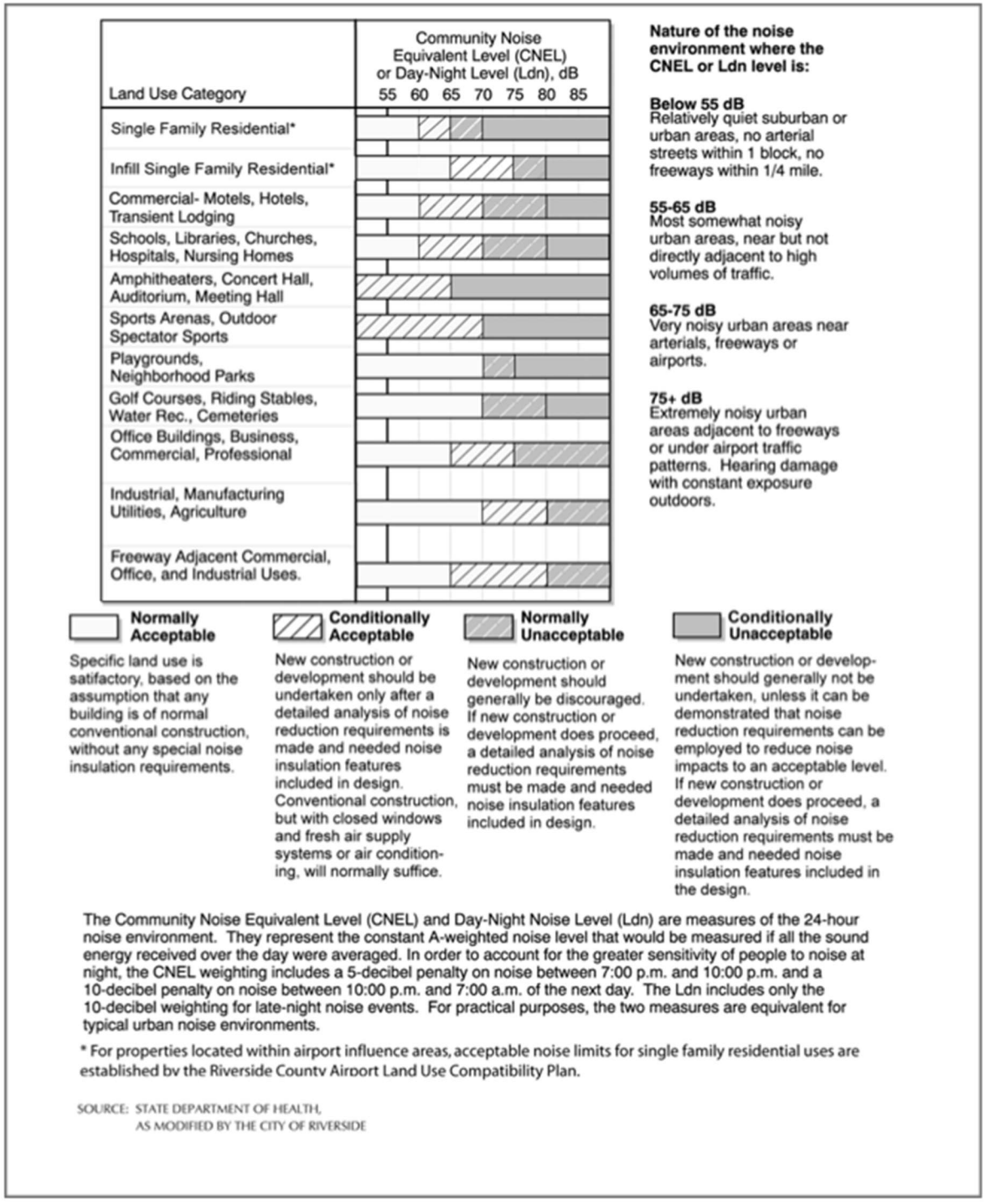
4.2 State Regulations

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 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 California Building Code (CBC) 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, which presents the City of Riverside's adaptation of these guidelines.

Exhibit D: Land Use Compatibility Guidelines



4.3 City of Riverside Noise Regulations

The City of Riverside outlines their noise regulations and standards within the Noise Element from the General Plan and Title 7 of the Municipal Code.

City of Riverside General Plan

Applicable policies and standards governing environmental noise in the City of Riverside are set forth in the Noise Element. The City has outlined objectives and policies to reduce potential noise impacts and are presented below:

Objectives and Policies

Objectives and policies from the Noise Element that would mitigate potential impacts on noise include the following.

Objective N-1: Minimize noise levels from point sources throughout the community and, wherever possible, mitigate the effects of noise to provide a safe and healthful environment.

Policy N–1.1: Continue to enforce noise abatement and control measures particularly within residential neighborhoods.

Policy N–1.2: Require the inclusion of noise-reducing design features in development consistent with standards in Figure N–10 (Noise/Land Use Compatibility Criteria) (Exhibit D of this report), Title 24 California Code of Regulations and Title 7 of the Municipal Code.

Policy N–1.3: Enforce the City of Riverside Noise Control Code to ensure that stationary noise and noise emanating from construction activities, private developments/residences and special events are minimized.

Policy N–1.4: Incorporate noise considerations into the site plan review process, particularly with regard to parking and loading areas, ingress/egress points and refuse collection areas.

Policy N–1-5: Avoid locating noise-sensitive land uses in existing and anticipated noise-impacted areas.

Policy N–1.6: Educate the public about City noise regulations.

Policy N–1.7: Evaluate noise impacts from roadway improvement projects by using the City's Acoustical Assessment Procedure.

Policy N–1.8: Continue to consider noise concerns in evaluating all proposed development decisions and roadway projects.

City of Riverside Municipal Code

Title 7 Noise Control of the City's Municipal Code outlines the City's noise ordinance.

Section 7.25.010 – Exterior sound level limits

A. Unless a variance has been granted as provided in this chapter, it shall be unlawful for any person to cause or allow the creation of any noise which exceeds the following:

   1. The exterior noise standard of the applicable land use category, up to five decibels, for a cumulative period of more than thirty minutes in any hour; or

   2. The exterior noise standard of the applicable land use category, plus five decibels, for a cumulative period of more than fifteen minutes in any hour; or

   3. The exterior noise standard of the applicable land use category, plus ten decibels, for a cumulative period of more than five minutes in any hour; or

   4. The exterior noise standard of the applicable land use category, plus fifteen decibels, for the cumulative period of more than one minute in any hour; or

   5. The exterior noise standard for the applicable land use category, plus twenty decibels or the maximum measured ambient noise level, for any period of time.

B. If the measured ambient noise level exceeds that permissible within any of the first four noise limit categories, the allowable noise exposure standard shall be increased in five decibel increments in each category as appropriate to encompass the ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

C. If possible, the ambient noise level shall be measured at the same location along the property line with the alleged offending noise source inoperative. If for any reason the alleged offending noise source cannot be shut down, then the ambient noise must be estimated by performing a measurement in the same general area of the source but at a sufficient distance that the offending noise is inaudible. If the measurement location is on the boundary between two different districts, the noise shall be the arithmetic mean of the two districts.

D. Where the intruding noise source is an air-conditioning unit or refrigeration system which was installed prior to the effective date of this title, the exterior noise level when measured at the property line shall not exceed 60 dBA for units installed before 1-1-80 and 55 dBA for units installed after 1-1-80.

Table 7.25.010A (Table 2 of this report) from the noise ordinance describes the exterior noise standards for emanations from a stationary noise source, as it affects adjacent properties:

Table 2: City Exterior Noise Level Standards

Land Use Category	Time Period	Noise Level
Residential	Night (10 p.m. to 7 a.m.)	45 dBA
	Day (7 a.m. to 10 p.m.)	55 dBA
Office/Commercial	Any time	65 dBA
Industrial	Any time	70 dBA
Community Support	Any time	60 dBA
Public Recreation Facility	Any time	65 dBA
Nonurban	Any time	70 dBA

Section 7.35.020 – Exemptions

G. *Construction.* Noise sources associated with construction, repair, remodeling, or grading of any real property; provided a permit has been obtained from the City as required; and provided said activities do not take place between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, between the hours of 5:00 p.m. and 8:00 a.m. on Saturdays, or at any time on Sunday or a federal holiday.

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

All measurements equipment meets American National Standards Institute (ANSI) specifications for sound level meters (S1.4-1983 identified in Chapter 19.68.020.AA). MD noise measurement procedures are presented below:

- The sound level meter was calibrated (Piccolo-II) before and after the 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 noise measurements were recorded on field data sheets
- Temperature and sky conditions were observed and documented

5.2 Noise Measurement Locations

The noise monitoring locations were selected to obtain a baseline of the existing noise environment. Two (2) 24-hour noise measurements were conducted at the Project site. Appendix A includes photos, the field sheet, and measured noise data. Exhibit E illustrates the location of the measurement.

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. See Appendix B for inputs and outputs.

The future worst-case daytime noise level projections were modeled using referenced sound level data for the various stationary on-site sources (HVAC, parking). The SP model assumes that every noise source is operating simultaneously (worst-case scenario) when the noise will, in reality, be intermittent and

lower in noise level. Measured and referenced sound level data was utilized to model the various stationary on-site noise sources associated with project operation as shown in Table 3 (see Appendix C).

Parking was modeled using the SoundPLAN parking tool. Daytime vehicle movements per hour for each parking lot area were estimated from the trip generation assessment (provided by Integrated Engineering Group) for the proposed project (i.e., 1 movement per parking spot per hour). A total of 5 HVAC units are assumed for the new Cosmetology building, each with a capacity of 12.5 tons. Each HVAC unit will have a sound power level of 83 dBA. The units were modeled as point sources located on the rooftop. As a worst-case scenario, the model assumes that all HVAC units are operating simultaneously and continuously. Appendix B provides the SoundPLAN inputs and outputs.

The future worst-case nighttime noise level projections were also modeled. The model assumes that HVAC units are operating throughout the night but that there is no parking lot traffic during nighttime hours.

Table 3: SoundPLAN Modeling Assumptions

Noise Source	Source Type	Reference Level	Descriptor
12.5-Ton HVAC Unit	Point Source	83	dBA, Lw
Parking	Area (Parking Tool)	1	Movement per hr
Source: See Appendix B.			

5.4 Traffic Noise Impact

Per the project's trip generation assessment, as prepared by Integrated Engineering Group, the project is not expected to generate more than 100 new vehicle trips. Therefore, the project is not expected to result in an increase in traffic and qualifies for an exemption from preparing a Transportation Impact Analysis by the City of Riverside. Thus, the traffic noise level projections were not analyzed for this project.

5.5 FHWA Roadway Construction Noise Model

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

The project was analyzed based on the different construction phases. The construction noise calculation output worksheet is in Appendix D.

6.0 Existing Noise Environment

Two (2) 24-hour noise measurements were conducted at the project site to document the existing noise environment. The measurements include the 1-hour Leq, Lmin, Lmax, and other statistical data (e.g. L2, L8). The results of the noise measurements are presented in Tables 4 and 5. Noise measurement field sheets are provided in Appendix A.

Table 4: Long-Term Noise Measurement Data for NM1 (dBA)[1]

Date	Start Time	Stop Time	1-Hour dB(A)							
			L_{EQ}	L_{MAX}	L_{MIN}	L_2	L_8	L_{25}	L_{50}	L_{90}
10/30/2025	2:00 PM	3:00 PM	63	90.7	48.1	70.4	66.8	61	57.9	55.2
10/30/2025	3:00 PM	4:00 PM	60.6	87.3	47.5	68.6	65.8	59.3	55.8	52.6
10/30/2025	4:00 PM	5:00 PM	61.2	90.3	48.1	68.2	63.5	58.1	55.7	53
10/30/2025	5:00 PM	6:00 PM	64.1	93.4	48	69.9	66.6	61.6	58.2	54.1
10/30/2025	6:00 PM	7:00 PM	61.5	83	49.9	70.6	64.6	59.5	57.5	54.4
10/30/2025	7:00 PM	8:00 PM	63.3	87.5	53.8	72.8	65.9	60.8	59.9	58.7
10/30/2025	8:00 PM	9:00 PM	61.9	82.4	55.3	68.7	64.8	61.6	60.2	58.2
10/30/2025	9:00 PM	10:00 PM	62.5	82.9	55.9	68.7	65.3	62.4	60.9	59.2
10/30/2025	10:00 PM	11:00 PM	60.9	75.9	55.5	65.1	64.4	61.1	59.4	57.9
10/30/2025	11:00 PM	12:00 AM	62.1	81.6	55.1	69.4	64.5	62.2	60.1	58.1
10/31/2025	12:00 AM	1:00 AM	59.8	77.5	54.1	63.5	61.9	60	59	56.9
10/31/2025	1:00 AM	2:00 AM	60	77.9	52.5	65.8	63.3	60	58.7	56.4
10/31/2025	2:00 AM	3:00 AM	62	76.8	55	67.9	65.4	62.7	60.7	57.8
10/31/2025	3:00 AM	4:00 AM	60.2	79.9	53.7	67.6	61.7	59.9	58.7	56.6
10/31/2025	4:00 AM	5:00 AM	61.3	77.6	55.8	65	62.9	61.7	60.7	59.2
10/31/2025	5:00 AM	6:00 AM	62.7	79.1	58.5	66.7	65.1	62.8	62.2	60.7
10/31/2025	6:00 AM	7:00 AM	62.1	71.8	58.4	64.8	63.3	62.4	62	60.8
10/31/2025	7:00 AM	8:00 AM	63.7	84.9	58.9	69.8	65.1	63.8	62.1	60.8
10/31/2025	8:00 AM	9:00 AM	61.5	81.2	54.7	66.8	64.5	61.2	59.8	57.8
10/31/2025	9:00 AM	10:00 AM	59.8	78.7	53.6	65.4	63.7	60.3	57.8	56.3
10/31/2025	10:00 AM	11:00 AM	58.6	82.7	51.2	64.7	62.2	58.4	56.2	54.8
10/31/2025	11:00 AM	12:00 PM	58.3	83.6	50.8	63.4	60.3	57.4	55.7	54
10/31/2025	12:00 PM	1:00 PM	59.4	81.8	50	65.9	62.8	58.4	56.6	54.5
10/31/2025	1:00 PM	2:00 PM	57.4	76.3	49.6	61.8	60.8	57.9	56.5	53.3
CNEL			68.1							

Notes:
[1.] Long-term noise monitoring location NM1 is illustrated in Exhibit E. The quietest hourly daytime noise interval is highlighted in yellow. The quietest nighttime noise interval is highlighted in blue.

Table 5: Long-Term Noise Measurement Data for NM2 (dBA)[1]

Date	Start Time	Stop Time	1-Hour dB(A)							
			L_{EQ}	L_{MAX}	L_{MIN}	L_2	L_8	L_{25}	L_{50}	L_{90}
10/30/2025	2:00 PM	3:00 PM	55.1	70.8	46.1	59.9	58.8	55.8	53.6	51.2
10/30/2025	3:00 PM	4:00 PM	54	71.1	47	56.4	55.7	54.4	53.7	51.7
10/30/2025	4:00 PM	5:00 PM	53.6	75.9	47	57.3	56	54	52.4	50.1
10/30/2025	5:00 PM	6:00 PM	53.1	68.3	45.7	57.7	57	53.9	51.8	48.5
10/30/2025	6:00 PM	7:00 PM	53.8	72.6	47	60.8	57.2	53.5	52	49.6
10/30/2025	7:00 PM	8:00 PM	54	69.6	49.9	58.2	56.4	54.2	53.1	52
10/30/2025	8:00 PM	9:00 PM	58.5	77.8	51.7	66.3	61.3	58	56.3	53.8
10/30/2025	9:00 PM	10:00 PM	58.8	78.6	52.6	65	59.5	58.2	57.1	55
10/30/2025	10:00 PM	11:00 PM	59.7	80	52.4	69.2	62.7	57.7	56.1	54.7
10/30/2025	11:00 PM	12:00 AM	63.1	87	52.7	70.9	66.7	62.4	57.6	55.5
10/31/2025	12:00 AM	1:00 AM	60.3	85.1	51.2	70.1	63.2	57.8	55.7	53.9
10/31/2025	1:00 AM	2:00 AM	61.3	84.9	51.4	70.5	63.3	57.6	56.4	54.7
10/31/2025	2:00 AM	3:00 AM	63	82.1	51.6	70.7	68.5	62.6	57.7	54.2
10/31/2025	3:00 AM	4:00 AM	58.9	80.4	48.9	68.5	62.6	56	55.1	52.4
10/31/2025	4:00 AM	5:00 AM	58.6	76.6	51.4	65.5	60	58.4	57.5	55.9
10/31/2025	5:00 AM	6:00 AM	59.2	79.3	54.8	64.2	60.6	58.6	57.8	56.6
10/31/2025	6:00 AM	7:00 AM	58.5	72.2	55.5	61.7	60	58.5	58	57.3
10/31/2025	7:00 AM	8:00 AM	61.3	80.2	55.6	67.9	66.7	60	58.6	57.4
10/31/2025	8:00 AM	9:00 AM	56.7	79.8	50.8	58.6	57.6	56.8	55.6	52.8
10/31/2025	9:00 AM	10:00 AM	59.1	77.1	49.6	65.5	62.8	60.3	57.4	52
10/31/2025	10:00 AM	11:00 AM	58.5	73.9	47.3	63.8	63.4	60.7	54.5	50.1
10/31/2025	11:00 AM	12:00 PM	51.7	70.1	46.3	57.9	53.9	51.2	50	49.2
10/31/2025	12:00 PM	1:00 PM	52.8	71.4	45.1	60.3	55.5	52.2	50.8	48.6
10/31/2025	1:00 PM	2:00 PM	50.4	74.1	43.4	57.9	54.4	49.4	47.5	46
CNEL			66.8							

Notes:
[1.] Long-term noise monitoring location NM2 is illustrated in Exhibit E. The quietest hourly daytime noise interval is highlighted in yellow. The quietest nighttime noise interval is highlighted in blue.

The data presented in Tables 4 and 5 indicate that ambient noise levels range between 57 and 64 dBA Leq at NM1 and 50 and 63 dBA Leq at NM2. The CNEL was measured as 68 dBA at NM1 and 67 dBA at NM2. The quietest daytime level ranged from 50 to 57 dBA Leq and is highlighted in yellow in each Table. The quietest nighttime level ranged from 59 to 60 dBA Leq and is highlighted in blue in each Table. The field data indicates that traffic along Terracina Drive and Ramona Drive, and noise from the college are the dominant noise sources.

X = Long-Term Measurement Location

Exhibit E

Measurement Locations



7.0 Future Noise Environment Impacts and Mitigation

This assessment analyzes future noise impacts to sensitive receptors and the project and compares the results to the City's Noise Standards. The analysis details the estimated exterior noise levels associated with traffic from adjacent roadway sources. The City has established different significance thresholds for different types of noise impacts.

7.1 Future Off-Site Exterior Noise

The exterior noise level off-site of the project will not be impacted by transportation-related sources, but will be impacted by stationary sources from the site. The following outlines the stationary impacts associated with exterior noise levels.

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

Sensitive receptors that may be affected by project operational noise include existing residences to the southwest. The worst-case stationary noise was modeled using SoundPLAN acoustical modeling software. Worst-case assumes that all equipment is always operational, when in reality, the noise will be intermittent and cycle on/off depending on customer usage.

A total of one (1) receptor was modeled to evaluate the proposed project's operational impact. Exhibit F shows the projected levels at this receptor. A receptor is denoted by a yellow dot. Receptor 1 represents the nearby residential uses.

This study compares the Project's operational plus ambient noise levels to the ambient only condition during daytime hours since the proposed building will be closed during nighttime hours.

Project-Only Levels

Exhibit F shows the daytime "Project-Only" noise levels and contours at the nearest sensitive receptors. Daytime operation assumes that HVAC equipment is operating simultaneously and continuously, and that the peak hour project-generated trips occur in each parking area.

The model indicates that the project-only noise levels during daytime operation are at most 50 dBA at the existing residential uses. The project-only noise level thus meets the City's daytime exterior noise level limit of 55 dBA Leq for residential uses.

Project Plus Ambient Operational Noise Levels

Table 6 presents the ambient noise level, the project's noise level, and the combined project plus ambient noise level condition for daytime hours. As a worst-case scenario, MD compared the project operational noise level to the quietest existing daytime hourly noise level (50 dBA Leq at 1 PM) to show the maximum potential noise impact due to the project.

Table 6: Worst-Case Predicted Daytime Operational Leq Noise Levels (dBA)

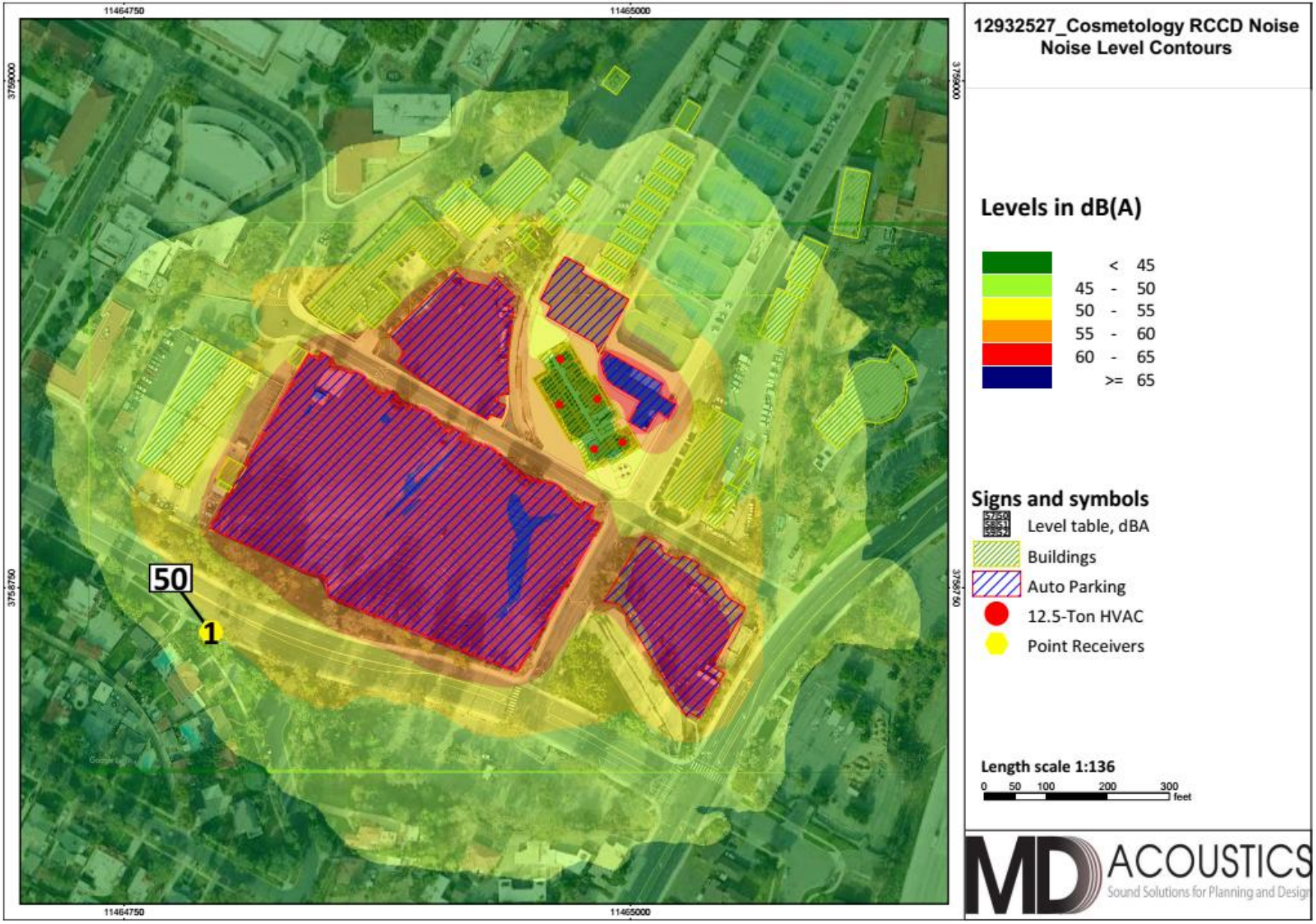
Receptor[1]	Existing Ambient Noise Level (dBA, Leq)[2]	Project Noise Level (dBA, Leq)[3]	Maximum Permitted Daytime Noise Level (dBA, Leq)[4]	Total Combined Noise Level (dBA, Leq)	Change in Noise Level as Result of Project
1	50	50	**55**	53	3

Notes:
[1.] Receptor 1 represents nearby residential uses.
[2.] See Appendix A for the ambient noise measurement.
[3.] See Exhibit F for the daytime operational noise level projections at said receptors.
[4.] See Table 7.25.010A of the City's Municipal Code.

As shown in Table 6, project-only noise levels will meet the daytime exterior noise limits for residential uses as defined in Table 7.25.010A (Table 2 of this report) of the City's Municipal Code. Project plus ambient noise will increase the existing ambient levels at the nearby residential uses by 3 dB, but will be below the maximum permitted daytime noise level at residential uses set forth by the City. Therefore, the change in noise level will comply with the City's noise standards.

Exhibit F

Daytime Operational Noise Levels dBA, Leq



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 six (6) phases: demolition, site preparation, grading, building construction, architectural coating, and trenching. This section summarizes and 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 7.

Table 7: 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

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 was modeled from the center of the proposed Cosmetology building to the nearest residential uses to the south. The trenching phase was modeled from the center of the closest trenching site to the same residential uses.

Noise levels associated with each of the six phases are shown in Table 8. The construction noise calculation output worksheet is located in Appendix D.

Table 8: Construction Noise Level by Phase (dBA, Leq)

Location	Phase	Construction Noise Level (dBA, Leq)
South Residential	Demo	64
	Prep	60.9
	Grade	62
	Build	61
	Arch Coat	51.3
	Trench	64.9

As shown in Table 8, project construction noise will range between 51 to 65 dBA Leq at the nearest sensitive receptors, which are the residential uses south of the project. Noise levels at other sensitive receptors will be insignificant due to increased distance.

The Project will be required to adhere to Section 7.35.020 of the City of Riverside Municipal Code which outlines the allowed times for construction. With adherence to the City's requirements on construction, the impact is less than significant.

8.2 Construction Vibration

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

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 9 (below) provides general thresholds and guidelines as to the vibration damage potential from vibratory impacts.

Table 9: 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 10 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

Table 10: 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 sensitive use buildings are 100 feet south of the edge of the project site's trenching areas. At this distance, a large bulldozer would yield a worst-case 0.019 PPV (in/sec), which is below the threshold for older residential structures and will not result in architectural damage. Therefore, the impact is not significant. The ground-borne vibration worksheet is provided in Appendix E.

9.0 CEQA Analysis

The California Environmental Quality Act Guidelines (Appendix D) establishes thresholds for noise impact analysis as presented below:

(a) Would the project result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise Code, or applicable standards of other agencies?

Transportation Noise Impacts

Per the project's trip generation assessment, as prepared by Integrated Engineering Group, the project is not expected to generate more than 100 new vehicle trips. Therefore, the project is not expected to result in an increase in traffic and qualifies for an exemption from preparing a Transportation Impact Analysis by the City of Riverside. Thus, the impact is less than significant.

Stationary Noise Sources

Stationary noise impacts would be considered significant if they result in exceedances specified by Table 7.25.010A of the City's Municipal Code. Implementation of the proposed project may result in stationary noise related to rooftop HVAC units and parking. All equipment is required to meet the stationary noise limits of 55 dBA Leq at the adjacent residential uses.

Operational noise levels at the residential uses are expected to reach up to 50 dBA Leq during the day. This noise level meets the City's daytime noise standard of 55 dBA. Therefore, the impact would be less than significant.

Construction Noise and Vibration

Construction noise will not be significant if construction activities follow established hours of operation in accordance with Section 7.35.020 of the City's Municipal Code.

The on-site trenching activities will generate the highest temporary noise levels. The loudest construction equipment on the site will be tractors, graders, scrapers, and dozers. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings. The maximum Leq level for the loudest phase of construction is expected to be 64.9 dBA Leq at the nearest existing residential uses to the south. These levels are below the FTA recommended limit of 80 dBA Leq for residential uses (refer to Table 7-3 of the FTA Noise and Vibration Manual).

b) Generate excessive ground-borne vibration or ground-borne noise levels?

There is no operational vibration.

Construction vibration will be significant if vibration exceeds levels that would result in structural damage to existing buildings. Construction activity could occur as close as 100 feet away from the nearest buildings, which are the residential buildings to the south. At 100 feet away, a large bulldozer would yield a worst-case 0.019 PPV (in/sec) which is below the threshold for older residential structures. Construction activity is not expected to fall within the limits of structural damage, and therefore, the impact is less than significant.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The project site is located over 2 miles from Flabob Airport and over 3 miles from the Riverside Municipal Airport, and is outside both airports' influence area boundaries. Therefore, no substantial noise exposure from airport noise would occur and it would have no impact.

10.0 References

City of Riverside
2025 General Policy Plan
2025 Municipal Code

California Department of Transportation (Caltrans)
2013 Transportation and Construction Induced Vibration Guidance Manual.
2018 Technical Noise Supplement to the Traffic Noise Analysis Protocol. Sept.

Federal Highway Administration (FHWA)
2006 Construction Noise Handbook

Federal Transit Administration (FTA)
2018 Transit Noise and Vibration Impact Assessment Manual

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

SoundPLAN International, LLC
2019 SoundPLAN Essential 8.1 Manual.

Appendix A:

Field Measurement Data

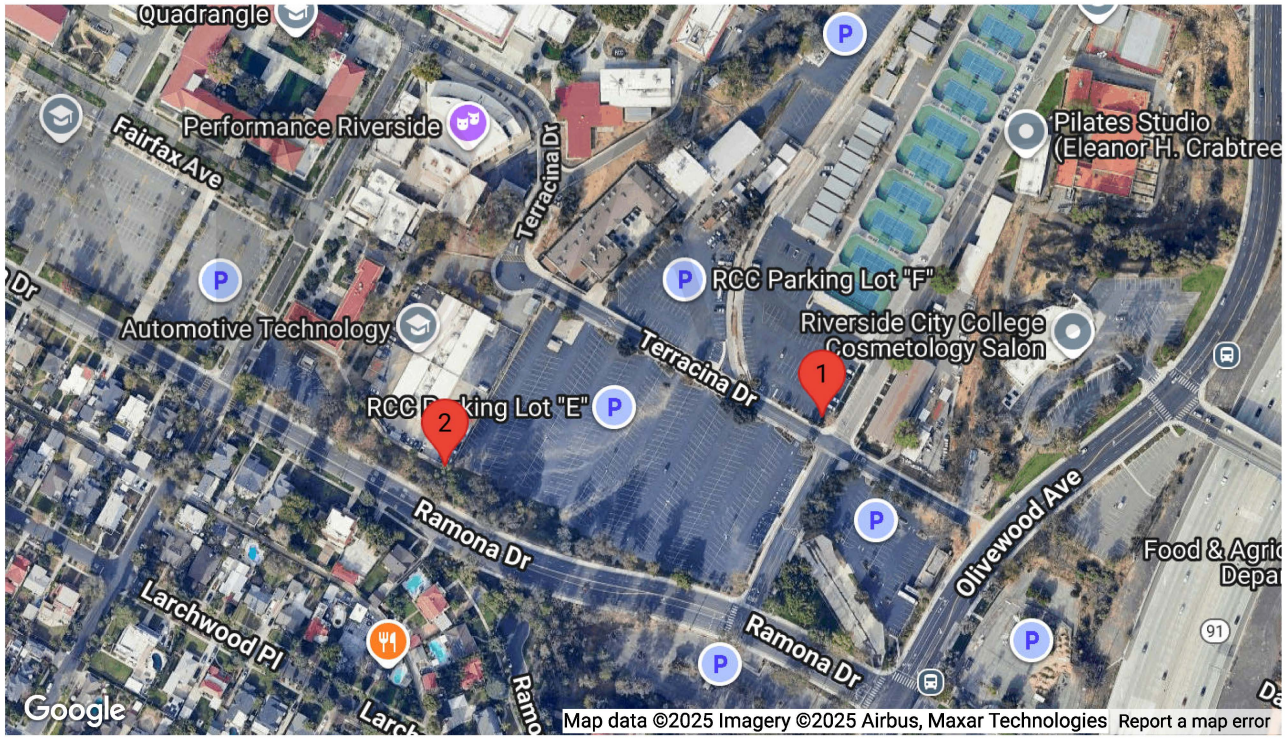
24-Hour Continuous Noise Measurement Datasheet - NM1, NM2

Project Name:	Cosmetology RCCD Noise
Project: #/Name:	1293-2025-027
Site Address/Location:	Riverside City College
Date:	10/30/2025
Field Tech/Engineer:	Jason Schuyler / Bethany Wu

Site Observations:

75F Sunny, winds 1-7MPH. The Primary noise source is traffic for NM1 and traffic with general college noise for NM2. As a note, on 10/31/2025, when I arrived, workers were installing a fence near NM2 and left at about 3 PM. Given that the primary noise from the workers was a cordless drill, I don't think that they made enough noise to invalidate the results.

Sound Meter:	Piccolo-II, Soft dB	**SN:**	PO222022803
Settings:	A-weighted, slow, 1-min, 24-hour duration		
Site Id:	NM1, NM2		



STICS

MD ACOUSTICS

24-Hour Continuous Noise Measurement Datasheet - Cont. - NM1, NM2

Project Name:	Cosmetology RCCD Noise	**Calibrator:**	Larson Davis Cal 200	
Site Address/Location:	Riverside City College	**Cal Check: Pre-test:**	.02 **Post Test:**	0
Site Id:	NM1, NM2			

Figure 1: NM1

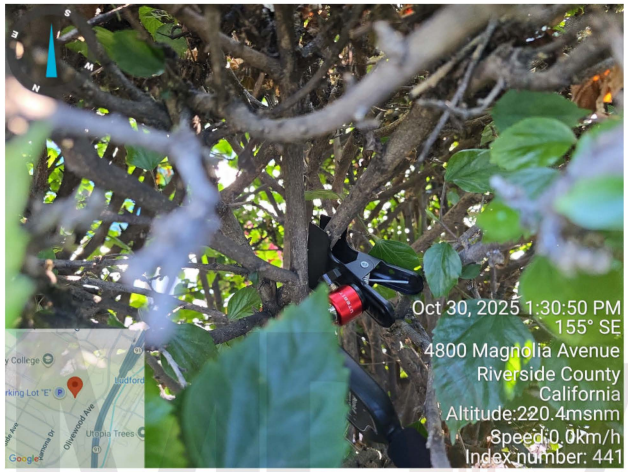


Figure 2: NM1



Figure 3: NM2



MD ACOUSTICS

24-Hour Continuous Noise Measurement Datasheet - Cont. - NM1

Project Name:	Cosmetology RCCD Noise	**Site Topo:**	Buildings 1-4 stories tall site	**Day:** 1 of 2	
Site Address/Location:	Riverside City College			**Noise Source(s) w/ Distance:**	
Site Id:	NM1	**Meteorological Cond.:**	75F Sunny winds 0-7MPH	Road and college student noise	
		Ground Type:	Asphalt and Buildings		

Table 1: Baseline Noise Measurement Summary

Date	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
10/30/2025	2:00 PM	3:00 PM	63	90.7	48.1	70.4	66.8	61	57.9	55.2
10/30/2025	3:00 PM	4:00 PM	60.6	87.3	47.5	68.6	65.8	59.3	55.8	52.6
10/30/2025	4:00 PM	5:00 PM	61.2	90.3	48.1	68.2	63.5	58.1	55.7	53
10/30/2025	5:00 PM	6:00 PM	64.1	93.4	48	69.9	66.6	61.6	58.2	54.1
10/30/2025	6:00 PM	7:00 PM	61.5	83	49.9	70.6	64.6	59.5	57.5	54.4
10/30/2025	7:00 PM	8:00 PM	63.3	87.5	53.8	72.8	65.9	60.8	59.9	58.7
10/30/2025	8:00 PM	9:00 PM	61.9	82.4	55.3	68.7	64.8	61.6	60.2	58.2
10/30/2025	9:00 PM	10:00 PM	62.5	82.9	55.9	68.7	65.3	62.4	60.9	59.2
10/30/2025	10:00 PM	11:00 PM	60.9	75.9	55.5	65.1	64.4	61.1	59.4	57.9
10/30/2025	11:00 PM	12:00 AM	62.1	81.6	55.1	69.4	64.5	62.2	60.1	58.1
10/31/2025	12:00 AM	1:00 AM	59.8	77.5	54.1	63.5	61.9	60	59	56.9
10/31/2025	1:00 AM	2:00 AM	60	77.9	52.5	65.8	63.3	60	58.7	56.4
10/31/2025	2:00 AM	3:00 AM	62	76.8	55	67.9	65.4	62.7	60.7	57.8
10/31/2025	3:00 AM	4:00 AM	60.2	79.9	53.7	67.6	61.7	59.9	58.7	56.6
10/31/2025	4:00 AM	5:00 AM	61.3	77.6	55.8	65	62.9	61.7	60.7	59.2
10/31/2025	5:00 AM	6:00 AM	62.7	79.1	58.5	66.7	65.1	62.8	62.2	60.7
10/31/2025	6:00 AM	7:00 AM	62.1	71.8	58.4	64.8	63.3	62.4	62	60.8
10/31/2025	7:00 AM	8:00 AM	63.7	84.9	58.9	69.8	65.1	63.8	62.1	60.8
10/31/2025	8:00 AM	9:00 AM	61.5	81.2	54.7	66.8	64.5	61.2	59.8	57.8
10/31/2025	9:00 AM	10:00 AM	59.8	78.7	53.6	65.4	63.7	60.3	57.8	56.3
10/31/2025	10:00 AM	11:00 AM	58.6	82.7	51.2	64.7	62.2	58.4	56.2	54.8
10/31/2025	11:00 AM	12:00 PM	58.3	83.6	50.8	63.4	60.3	57.4	55.7	54
10/31/2025	12:00 PM	1:00 PM	59.4	81.8	50	65.9	62.8	58.4	56.6	54.5
10/31/2025	1:00 PM	2:00 PM	57.4	76.3	49.6	61.8	60.8	57.9	56.5	53.3

			DNL	67.8	CNEL	68.1

MD ACOUSTICS

24-Hour Continuous Noise Measurement Datasheet - Cont. - NM2

Project Name:	Cosmetology RCCD Noise	**Site Topo:**	Buildings 1-4 stories tall site	**Day:** 2 of 2
Site Address/Location:	Riverside City College			**Noise Source(s) w/ Distance:**
Site Id:	NM2	**Meteorological Cond.:**	75F Sunny winds 0-7MPH	Road and college student noise
		Ground Type:	buildings and asphalt on a hillside	

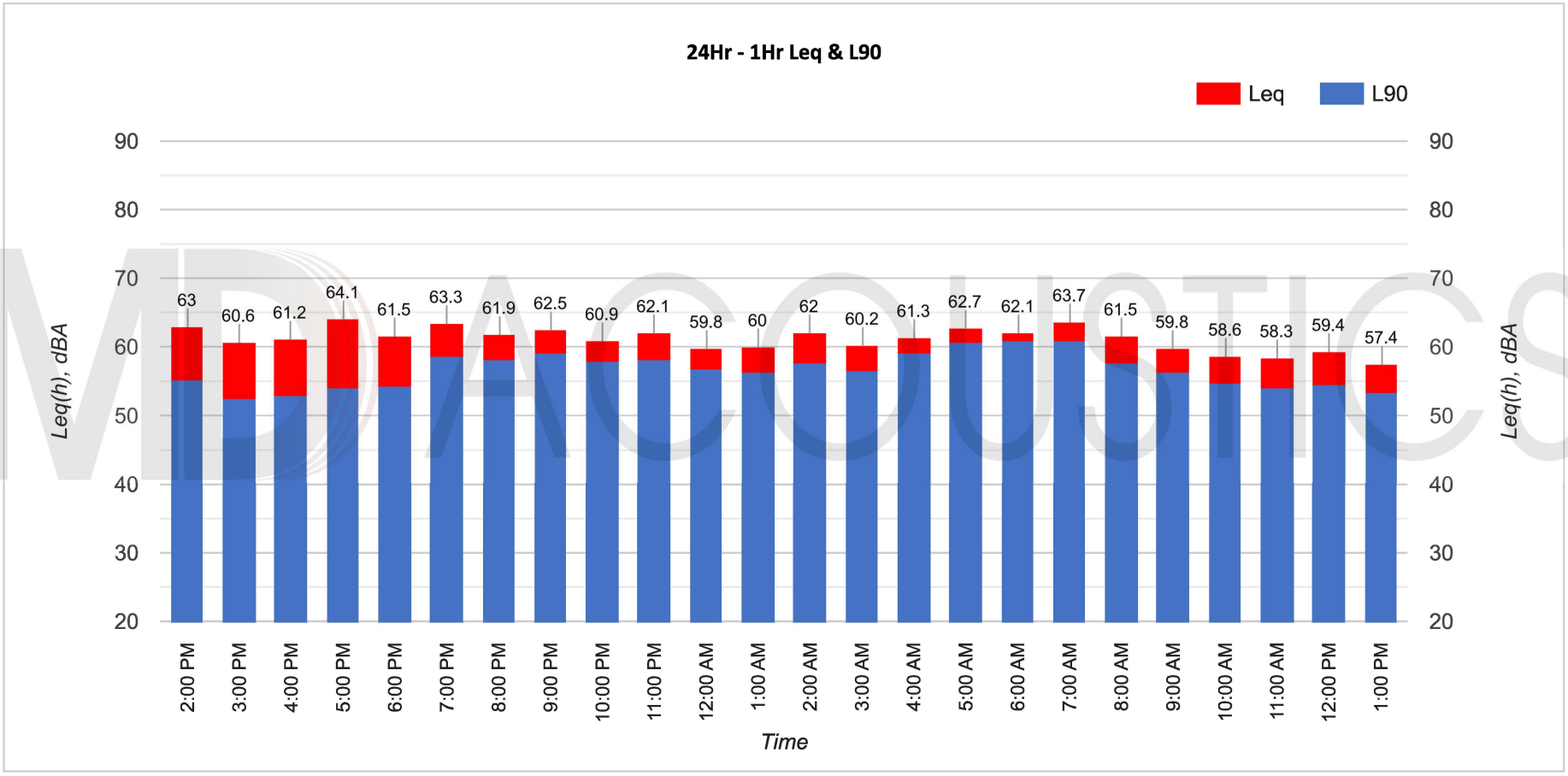
Table 2: Baseline Noise Measurement Summary

Date	Start	Stop	Leq	Lmax	Lmin	L2	L8	L25	L50	L90
10/30/2025	2:00 PM	3:00 PM	55.1	70.8	46.1	59.9	58.8	55.8	53.6	51.2
10/30/2025	3:00 PM	4:00 PM	54	71.1	47	56.4	55.7	54.4	53.7	51.7
10/30/2025	4:00 PM	5:00 PM	53.6	75.9	47	57.3	56	54	52.4	50.1
10/30/2025	5:00 PM	6:00 PM	53.1	68.3	45.7	57.7	57	53.9	51.8	48.5
10/30/2025	6:00 PM	7:00 PM	53.8	72.6	47	60.8	57.2	53.5	52	49.6
10/30/2025	7:00 PM	8:00 PM	54	69.6	49.9	58.2	56.4	54.2	53.1	52
10/30/2025	8:00 PM	9:00 PM	58.5	77.8	51.7	66.3	61.3	58	56.3	53.8
10/30/2025	9:00 PM	10:00 PM	58.8	78.6	52.6	65	59.5	58.2	57.1	55
10/30/2025	10:00 PM	11:00 PM	59.7	80	52.4	69.2	62.7	57.7	56.1	54.7
10/30/2025	11:00 PM	12:00 AM	63.1	87	52.7	70.9	66.7	62.4	57.6	55.5
10/31/2025	12:00 AM	1:00 AM	60.3	85.1	51.2	70.1	63.2	57.8	55.7	53.9
10/31/2025	1:00 AM	2:00 AM	61.3	84.9	51.4	70.5	63.3	57.6	56.4	54.7
10/31/2025	2:00 AM	3:00 AM	63	82.1	51.6	70.7	68.5	62.6	57.7	54.2
10/31/2025	3:00 AM	4:00 AM	58.9	80.4	48.9	68.5	62.6	56	55.1	52.4
10/31/2025	4:00 AM	5:00 AM	58.6	76.6	51.4	65.5	60	58.4	57.5	55.9
10/31/2025	5:00 AM	6:00 AM	59.2	79.3	54.8	64.2	60.6	58.6	57.8	56.6
10/31/2025	6:00 AM	7:00 AM	58.5	72.2	55.5	61.7	60	58.5	58	57.3
10/31/2025	7:00 AM	8:00 AM	61.3	80.2	55.6	67.9	66.7	60	58.6	57.4
10/31/2025	8:00 AM	9:00 AM	56.7	79.8	50.8	58.6	57.6	56.8	55.6	52.8
10/31/2025	9:00 AM	10:00 AM	59.1	77.1	49.6	65.5	62.8	60.3	57.4	52
10/31/2025	10:00 AM	11:00 AM	58.5	73.9	47.3	63.8	63.4	60.7	54.5	50.1
10/31/2025	11:00 AM	12:00 PM	51.7	70.1	46.3	57.9	53.9	51.2	50	49.2
10/31/2025	12:00 PM	1:00 PM	52.8	71.4	45.1	60.3	55.5	52.2	50.8	48.6
10/31/2025	1:00 PM	2:00 PM	50.4	74.1	43.4	57.9	54.4	49.4	47.5	46

	DNL	66.7	CNEL	66.8

24-Hour Continuous Noise Measurement Datasheet - Cont. - NM1

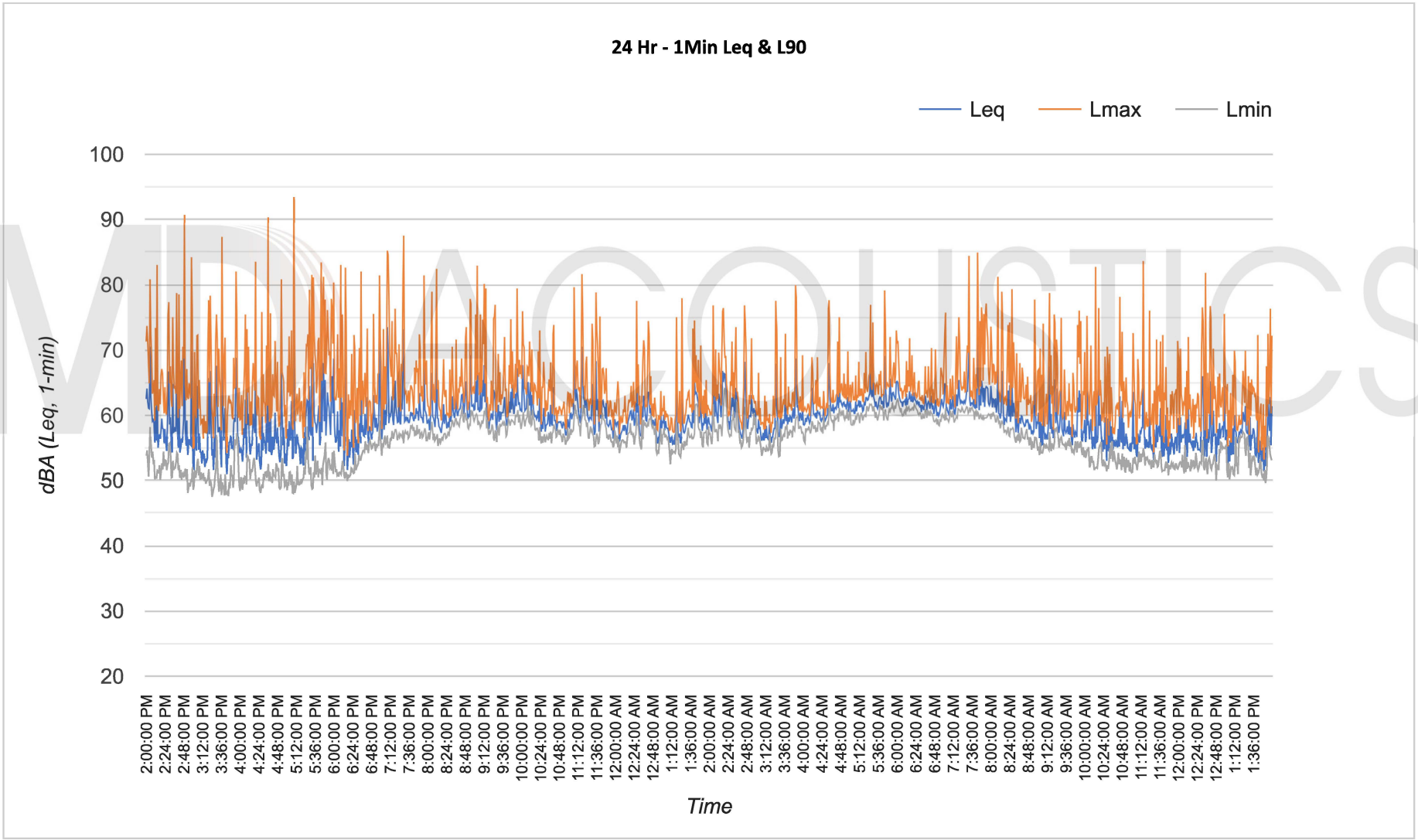
Project Name:	Cosmetology RCCD Noise	**Site Topo:**	Buildings 1-4 stories	**Day:** 1 of 2	
Site Address/Location:	Riverside City College		tall site	**Noise Source(s) w/ Distance:**	
Site Id:	NM1	**Meteorological Cond.:**	75F Sunny winds 0-7MPH	Road and college student noise	
		Ground Type:	Asphalt and Buildings		



MD ACOUSTICS

24-Hour Continuous Noise Measurement Datasheet - Cont. - NM1

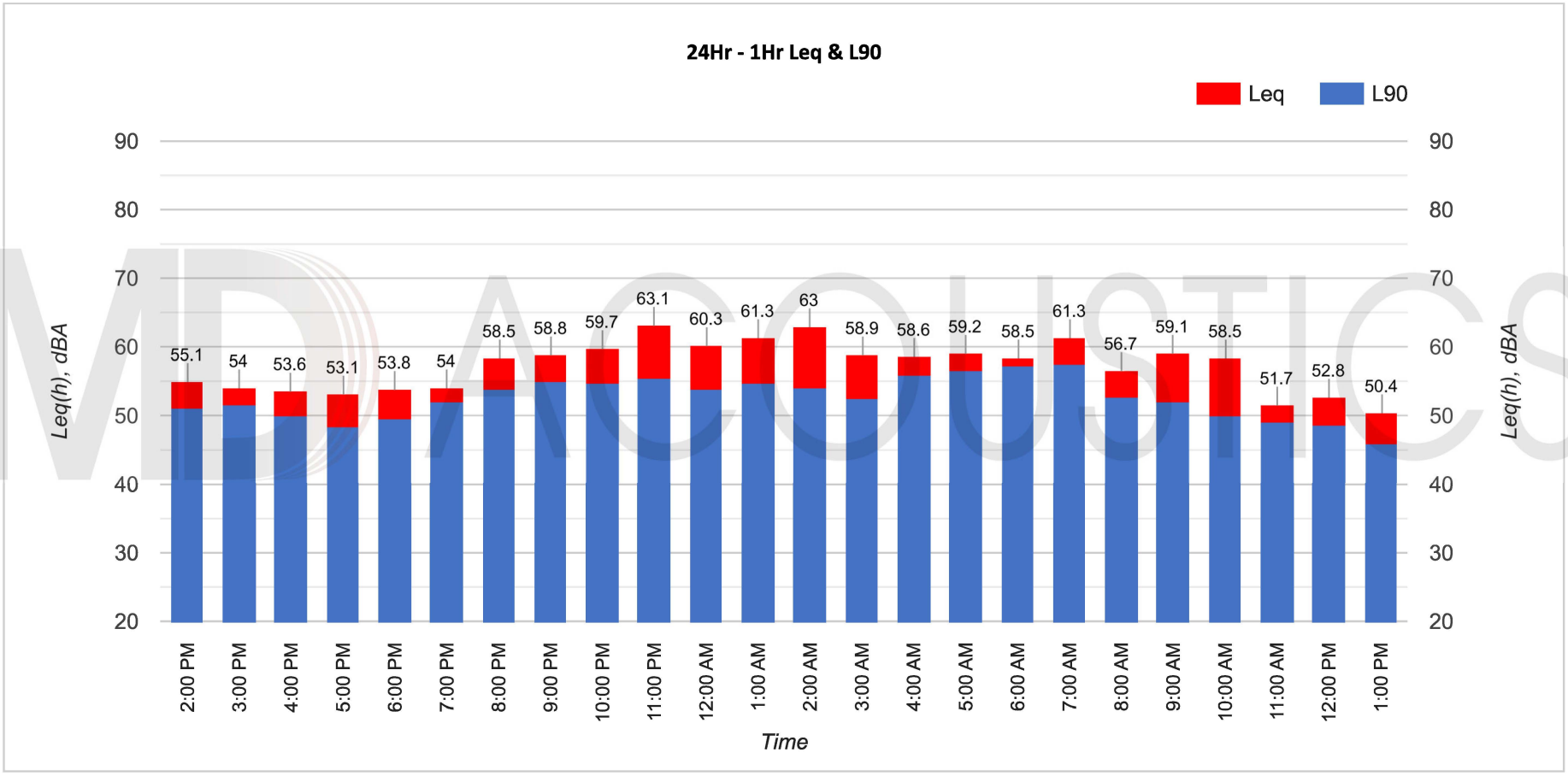
Project Name:	Cosmetology RCCD Noise	**Site Topo:**	Buildings 1-4 stories	**Day:** 1 of 2
Site Address/Location:	Riverside City College		tall site	**Noise Source(s) w/ Distance:**
Site Id:	NM1	**Meteorological Cond.:**	75F Sunny winds 0-7MPH	Road and college student noise
		Ground Type:	Asphalt and Buildings	



MD ACOUSTICS

24-Hour Continuous Noise Measurement Datasheet - Cont. - NM2

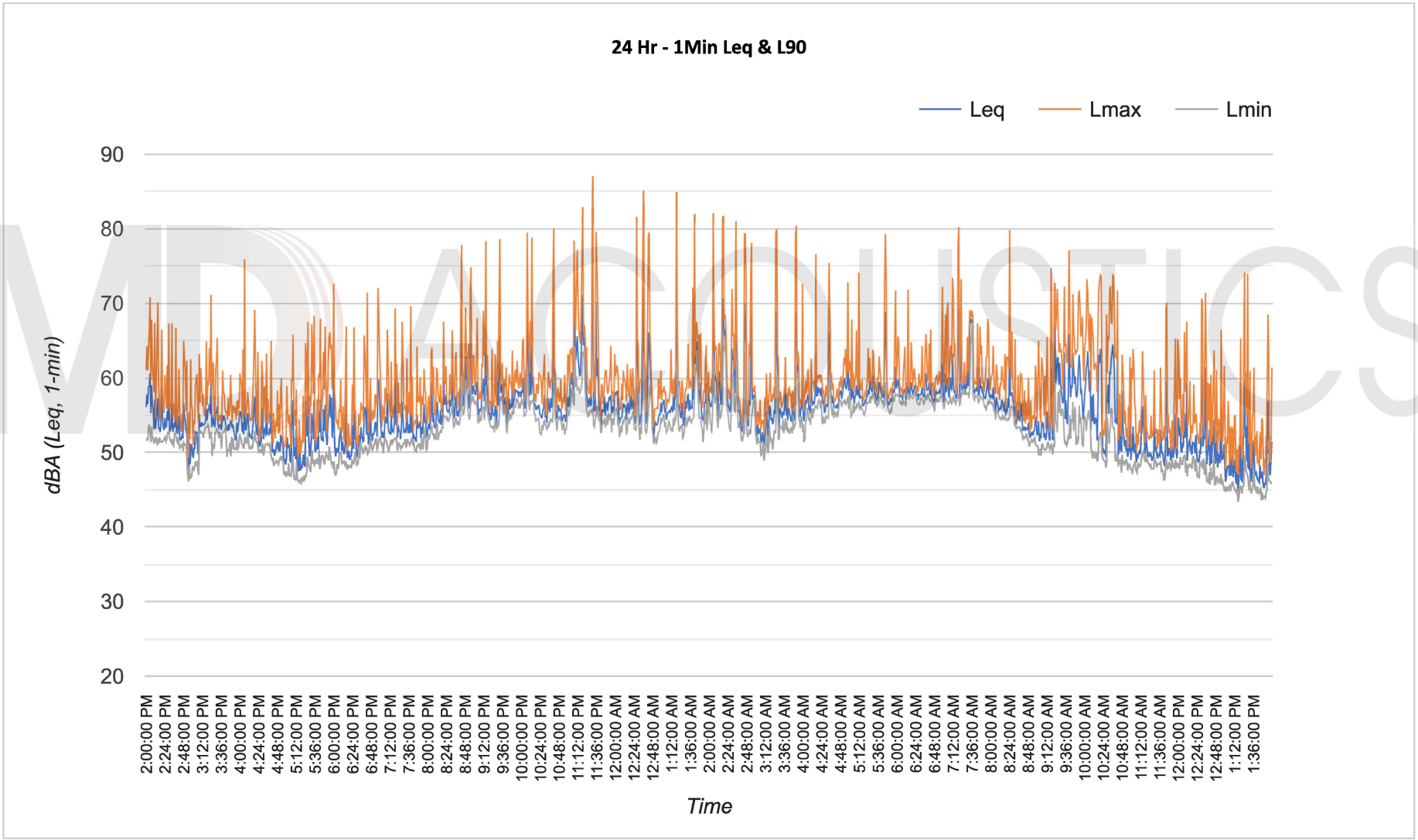
Project Name:	Cosmetology RCCD Noise	**Site Topo:**	Buildings 1-4 stories	**Day:** 1 of 2
Site Address/Location:	Riverside City College		tall site	**Noise Source(s) w/ Distance:**
Site Id:	NM2	**Meteorological Cond.:**	75F Sunny winds 0-7MPH	Road and college student noise
		Ground Type:	buildings and asphalt on a hillside	



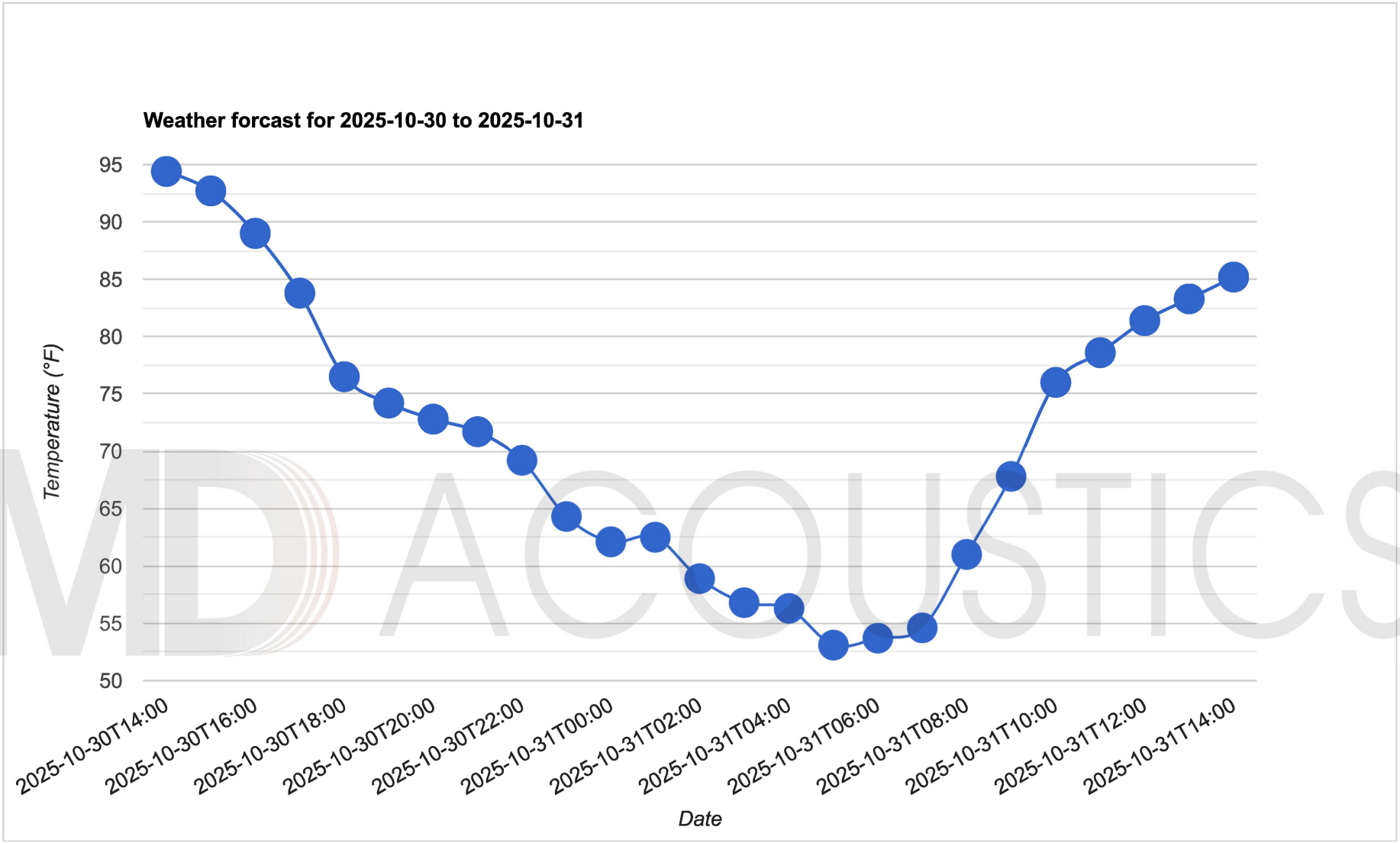
MD ACOUSTICS

24-Hour Continuous Noise Measurement Datasheet - Cont. - NM2

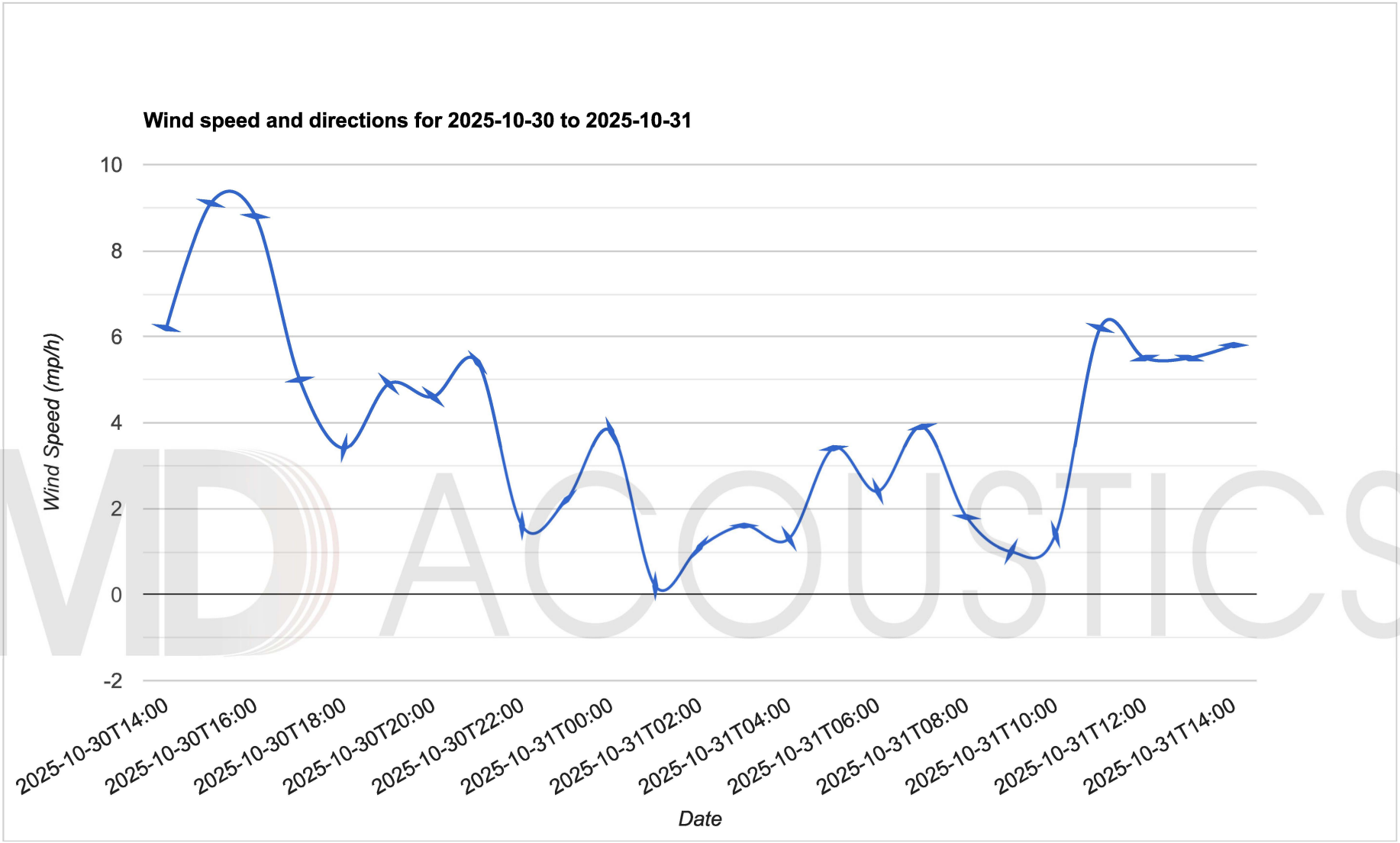
Project Name:	Cosmetology RCCD Noise	**Site Topo:**	Buildings 1-4 stories tall site	**Day:** 1 of 2
Site Address/Location:	Riverside City College			**Noise Source(s) w/ Distance:**
Site Id:	NM2	**Meteorological Cond.:**	75F Sunny winds 0-7MPH	Road and college student noise
		Ground Type:	buildings and asphalt on a hillside	



MD ACOUSTICS



Source: Global Forecast System (GFS) weather forcast model



Source: Global Forecast System (GFS) weather forcast model

Appendix B:

SoundPLAN Input/Outputs

Cosmetology RCCD Noise
Contribution spectra - 001 - Cosmetology RCCD: Outdoor SP

Time slice	Sum	50Hz	63Hz	80Hz	100Hz	125Hz	160Hz	200Hz	250Hz	315Hz	400Hz	500Hz	630Hz	800Hz	1kHz	1.25kHz	1.6kHz	2kHz	2.5kHz	3.15kHz	4kHz	5kHz	6.3kHz	8kHz	10kHz	12.5kHz	16kHz	20kHz
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Receiver R1 Fl G Lr,lim dB(A) Leq,d 49.7 dB(A)																												
Leq,d	33.8	15.5	15.5	15.5	25.2	25.2	25.2	14.7	14.7	14.7	19.8	19.8	19.8	21.7	21.7	21.7	21.2	21.2	21.2	13.3	13.3	13.3	-12.0	-12.0	-12.0	-79.4	-79.4	-79.4
Leq,d	24.7	9.2	9.2	9.2	17.8	17.8	17.8	6.1	6.1	6.1	9.8	9.8	9.8	9.9	9.9	9.9	7.2	7.2	7.2	-3.3	-3.3	-3.3	-32.0	-32.0	-32.0			
Leq,d	24.6	6.7	6.7	6.7	16.1	16.1	16.1	5.7	5.7	5.7	11.0	11.0	11.0	12.5	12.5	12.5	11.6	11.6	11.6	3.1	3.1	3.1	-23.7	-23.7	-23.7	-96.7	-96.7	-96.7
Leq,d	35.9	17.1	17.1	17.1	26.9	26.9	26.9	16.8	16.8	16.8	22.5	22.5	22.5	24.1	24.1	24.1	23.6	23.6	23.6	16.5	16.5	16.5	-5.4	-5.4	-5.4	-62.7	-62.7	-62.7
Leq,d	49.3	29.1	29.1	29.1	39.3	39.3	39.3	30.1	30.1	30.1	36.1	36.1	36.1	37.7	37.7	37.7	37.8	37.8	37.8	32.8	32.8	32.8	19.1	19.1	19.1	-11.5	-11.5	-11.5
Leq,d	25.9	-1.1	-1.1	-1.1	5.3	5.3	5.3	10.7	10.7	10.7	15.7	15.7	15.7	17.6	17.6	17.6	12.6	12.6	12.6	3.2	3.2	3.2	-22.6	-22.6	-22.6			
Leq,d	25.9	-1.1	-1.1	-1.1	5.1	5.1	5.1	10.5	10.5	10.5	15.7	15.7	15.7	17.5	17.5	17.5	12.5	12.5	12.5	3.1	3.1	3.1	-22.8	-22.8	-22.8			
Leq,d	26.6	-0.4	-0.4	-0.4	6.0	6.0	6.0	12.1	12.1	12.1	16.3	16.3	16.3	18.1	18.1	18.1	13.2	13.2	13.2	4.2	4.2	4.2	-20.6	-20.6	-20.6			
Leq,d	26.8	-0.2	-0.2	-0.2	6.4	6.4	6.4	12.7	12.7	12.7	16.4	16.4	16.4	18.3	18.3	18.3	13.4	13.4	13.4	4.5	4.5	4.5	-19.9	-19.9	-19.9			
Leq,d	26.1	-0.9	-0.9	-0.9	5.2	5.2	5.2	10.7	10.7	10.7	15.9	15.9	15.9	17.7	17.7	17.7	12.8	12.8	12.8	3.5	3.5	3.5	-22.0	-22.0	-22.0			
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Source group	Source ty	Tr. lane	Leq,d dB(A)	A dB	
Receiver R1 Fl G Lr,lim dB(A) Leq,d 49.7 dB(A)					
Default parking lot noise	PLot		49.3	0.0	
Default parking lot noise	PLot		35.9	0.0	
Default parking lot noise	PLot		24.6	0.0	
Default parking lot noise	PLot		24.7	0.0	
Default parking lot noise	PLot		33.8	0.0	
Default industrial noise	Point		26.1	0.0	
Default industrial noise	Point		26.8	0.0	
Default industrial noise	Point		26.6	0.0	
Default industrial noise	Point		25.9	0.0	
Default industrial noise	Point		25.9	0.0	

Cosmetology RCCD Noise
Octave spectra of the sources in dB(A) - 001 - Cosmetology RCCD: 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	8kHz	16kHz
		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)	dB(A)	dB(A)
Auto Parking	PLot	3111.87			55.4	90.4	0.0	0.0		0	100%/24h	Typical spectrum	73.7	85.3	77.8	82.3	82.4	82.8	80.1	73.9	61.1
Auto Parking	PLot	580.93			62.7	90.4	0.0	0.0		0	100%/24h	Typical spectrum	73.7	85.3	77.8	82.3	82.4	82.8	80.1	73.9	61.1
Auto Parking	PLot	1026.50			52.8	82.9	0.0	0.0		0	100%/24h	Typical spectrum	66.3	77.9	70.4	74.9	75.0	75.4	72.7	66.5	53.7
Auto Parking	PLot	2885.56			56.1	90.7	0.0	0.0		0	100%/24h	Typical spectrum	74.1	85.7	78.2	82.7	82.8	83.2	80.5	74.3	61.5
Auto Parking	PLot	15918.51			58.7	100.7	0.0	0.0		0	100%/24h	Typical spectrum	84.1	95.7	88.2	92.7	92.8	93.2	90.5	84.3	71.5
12.5-Ton HVAC	Point				83.6	83.6	0.0	0.0		0	100%/24h	HVAC: Lw 83 dBA - Carrier WeatherMaster	62.8	69.9	74.4	77.8	79.0	75.2	71.0	63.9	
12.5-Ton HVAC	Point				83.6	83.6	0.0	0.0		0	100%/24h	HVAC: Lw 83 dBA - Carrier WeatherMaster	62.8	69.9	74.4	77.8	79.0	75.2	71.0	63.9	
12.5-Ton HVAC	Point				83.6	83.6	0.0	0.0		0	100%/24h	HVAC: Lw 83 dBA - Carrier WeatherMaster	62.8	69.9	74.4	77.8	79.0	75.2	71.0	63.9	
12.5-Ton HVAC	Point				83.6	83.6	0.0	0.0		0	100%/24h	HVAC: Lw 83 dBA - Carrier WeatherMaster	62.8	69.9	74.4	77.8	79.0	75.2	71.0	63.9	
12.5-Ton HVAC	Point				83.6	83.6	0.0	0.0		0	100%/24h	HVAC: Lw 83 dBA - Carrier WeatherMaster	62.8	69.9	74.4	77.8	79.0	75.2	71.0	63.9	

Appendix C:

Traffic Information and Noise Modeling Worksheets

INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING

Date: October 27, 2025

To: Mehran Mohtasham, Director of Capital Planning, Riverside Community College District

From: George Ghossain, Principal Engineer, Integrated Engineering Group

Subject: Trip Generation Assessment for The Riverside City College Cosmetology Building Project

---

Integrated Engineering Group (IEG) is pleased to submit this trip generation assessment memo for the proposed Riverside City College (RCC) Cosmetology Building project (Project) located at 6422 Magnolia Avenue in the City of Riverside, California.

The proposed Cosmetology Building will be located on the lower campus adjacent to the Ramona Street Entrance in Parking Lot G, on the northwest corner of Terracina Drive and Saunders Street, and south of the existing tennis courts. The new location will spur development of a new career technical education core of facilities on campus.

This project proposes constructing a new Cosmetology Building at RCC. The new facility will accommodate the College's enrollment by increasing instructional capacity for dedicated laboratory and faculty office space. The proposed Cosmetology building will encompass 35,086 Gross Square Feet (GSF) and consists of 23,171 Assignable Square Feet (ASF). Functional space within the building will include 18,675 ASF of laboratory space, 2,723 ASF of office, and 1,773 ASF of other support space. The new Cosmetology Building will be equipped with modern technology and infrastructure to support the specialized equipment needs of the College's career technical education programs. By increasing the number and size of state-of-the-art Cosmetology laboratories, the project will enhance student learning, improve program completion rates, and better prepare students for employment in their chosen fields.

Currently, the existing Cosmetology Building lacks sufficient dedicated instructional laboratory space, limiting student access to required courses and hindering the College's ability to meet its student success and access goals. The objective of this project is to develop a modernized facility that aligns with current instructional requirements and student needs. The existing Cosmetology Building will be demolished as part of a separate future project.

Our goal is to obtain comments from City of Riverside staff, to ensure that this memo fully addresses the analysis requirements per the City of Riverside Transportation Impact Analysis (TIA) Guidelines for Vehicle Miles Traveled and Level of Service (LOS) Assessment (Guidelines, April 2025).

The preliminary site plan for the Project is shown in **Attachment 1**. It is anticipated that the Project will be constructed in one phase. Parking is expected to remain at the existing adjacent parking lots, and there will be limited street parking on Terracina Drive.

NEED TO COMPLETE LOS AS PART OF THE TIA ANALYSIS

The Guidelines provide activities that would not require a TIA that includes level of service analysis based on land use type or limited trip generation.

TRIP GENERATION

Trip generation is a measure or forecast of the number of trips that begin or end at the project site. The traffic generated is a function of the extent and type of development proposed for the site. These trips will result in some traffic increases on the streets where they occur. Per the Guidelines, trip generation for proposed uses must be calculated based on rates from the *Trip Generation Manual (TGM), 12th Edition*, published by the Institute of Transportation Engineers (ITE) and rates that are developed based on the specific project operational information provided by the site operator. The rates were then applied to determine if this Project net trips generation satisfy the thresholds to be exempt from preparing a TIA with LOS.

It should be noted that the proposed project will replace an existing, aging facility with a modern building equipped with updated technology and infrastructure to support the specialized equipment needs of the College's career technical education programs. This improvement is intended to enhance the student learning experience, increase program completion rates, and better prepare students for employment in their chosen fields.

Since the project will primarily serve existing students who will benefit from the upgraded facility, no additional vehicle trips are anticipated. Therefore, a Level of Service (LOS) analysis is not required, as the project is not expected to generate new trips or result in 100 or more vehicle trips during the peak hour.

PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution and assignment is the process of identifying the probable destinations, directions and traffic routes that Project related traffic will likely affect. Trip distribution and assignment are not applicable in this case since the project has demonstrated that it will generate less than 100 vehicle trips during peak hours.

INTERSECTION ANALYSIS

Intersection analysis is not applicable in this case since the project has demonstrated that it will generate less than 100 vehicle trips during peak hours.

PROJECT ACCESS

Vehicle access to the site will continue to be provided via Saunders Street and Terracina Drive, with Olivewood Avenue serving as the access point from off campus.

INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING

CONCLUSION

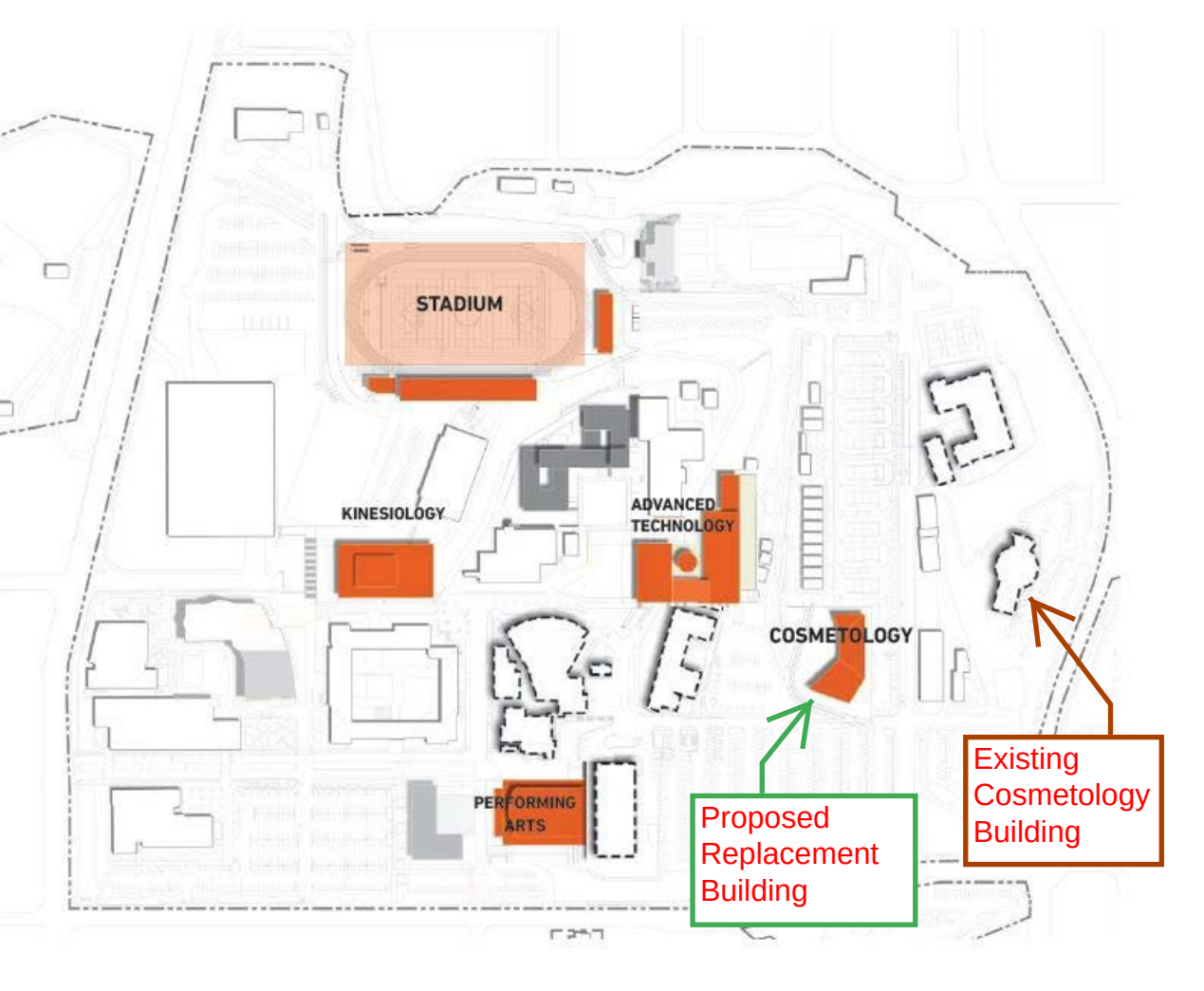
The project is located within the City of Riverside and proposes replacing the existing Cosmetology Building with a new, modernized facility designed to enhance the student learning experience, improve program completion rates, and better prepare students for employment in their chosen fields. As the project is not expected to result in an increase in traffic, it qualifies for an exemption from preparing a TIA, based on the traffic assessment and technical information presented in this memorandum.

Should you have any questions, please feel free to contact me at:
Email: george@intenggroup.com
Phone: (951) 239-1546
Address: 23905 Clinton Keith Road 114-280
Wildomar CA, 92595

Attachment 1 – Project Site Plan

INTEGRATED ENGINEERING GROUP
TRANSPORTATION PLANNING AND ENGINEERING

ATTACHMENT 1 – Project Site Plan


STADIUM
KINESIOLOGY
ADVANCED TECHNOLOGY
COSMETOLOGY
PERFORMING ARTS
Proposed Replacement Building
Existing Cosmetology Building

Project Site



Ground Floor Plan

BUILDING ASF GRAND TOTAL

210 Class Lab
(3007 Cosmetology and Barbering)
16,675 ASF

215 Class Lab Service
(3007 Cosmetology and Barbering)
765 ASF

650 Lounge
(0099 General Assignment)
1,305 ASF

710 Data Processing/Computers
(6780 Management Information Services)
410 ASF

21,675 ASF (31,816 GSF)

310 Office
(3007 Cosmetology and Barbering)
2,520 ASF



210 CLASS LAB (3007 TOP)

215 CLASS LAB SERVICE (3007 TOP)

710 DATA PROCESSING/COMP. (6780 TOP)

GROUND FLOOR TOTAL

210 Class Lab
(3007 Cosmetology and Barbering)
10,280 ASF

215 Class Lab Service
(3007 Cosmetology and Barbering)
765 ASF

710 Data Processing/Computers
(6780 Management Information Services)
270 ASF

Total: 11,315 ASF

Second Floor Plan

210 CLASS LAB (3007 TOP)

310 OFFICE (3007 TOP)

650 LOUNGE (0099 TOP)

710 DATA PROCESSING/ COMPUTER (6780 TOP)

SCALE-1" = 33'



SECOND FLOOR TOTAL

210 - Class Lab
(3007 Cosmetology and Barbering)
6,395 ASF

650 - Lounge
(0099 General Assignment)
1,305 ASF

310 - Office
(3007 Cosmetology and Barbering)
2,520 ASF

710 Data Processing/Computers
(6780 Management Information Services)
140 ASF

Total: 10,360 ASF

Appendix D:

Construction Noise Modeling Output

Receptor - Residences to the South

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
DEMO									
Tractor	2	84	550	680	40	0	0.40	63.2	57.3
Dozer	1	82	550	680	40	0	0.40	61.2	55.3
Concrete Saw	1	90	550	680	20	0	0.20	69.2	60.3
							Log Sum	69.2	64.0
SITE PREP									
Grader	1	85	550	680	40	0	0.40	64.2	58.3
Tractor	1	84	550	680	40	0	0.40	63.2	57.3
								64.2	60.9
GRADE									
Grader	1	85	550	680	40	0	0.40	64.2	58.3
Dozer	1	82	550	680	40	0	0.40	61.2	55.3
Tractor	1	84	550	680	40	0	0.40	63.2	57.3
								64.2	62.0
BUILD									
Crane	1	81	550	680	16	0	0.16	60.2	50.4
Man lift	2	75	550	680	20	0	0.20	54.2	45.3
Tractor	2	84	550	680	40	0	0.40	63.2	57.3
								63.2	61.0
ARCH COAT									
Compressor (air)	1	78	550	680	40	0	0.40	57.2	51.3
								57.2	51.3
TRENCHING									
Slurry Trenching Machine	1	80	80	200	50	0	0.50	75.9	64.9
								75.9	64.9

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

Appendix E:

Construction Vibration Modeling Output

VIBRATION LEVEL IMPACT

Project:	Cosmetology RCCD Noise	Date: 11/17/25
Source:	Large Bulldozer	
Scenario:	Unmitigated	
Location:	South residential buildings	
Address:	Riverside City College, Riverside, CA	

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

DATA INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN BLUE
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	100.00	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 =	**0.019**	IN/SEC	OUTPUT IN RED