APPENDIX E

College of the Desert
West Valley Campus Master Plan and Phase 1 Project

Noise Impact Study

Prepared by

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28811 Woodcock Drive
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August 4, 2015

College of the Desert West Valley Campus Master Plan and Phase I Project Noise Impact Study

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Mr. John Criste
Terra Nova Planning and Research
42635 Melanie Place
Palm Desert, California 92211

SUBJECT: College of the Desert West Valley Campus Master Plan and Phase I Project Noise Impact Study

Dear Mr. Criste;

Endo Engineering is pleased to submit this evaluation of the noise impacts associated with the College of the Desert West Valley Campus (COD WVC) Master Plan and Phase I Project proposed for 29.27 acres previously developed as the Palm Springs Mall. The College of the Desert West Valley Campus would serve 200 full-time equivalent students upon opening in the year 2018 and be located in the heart of Palm Springs. Upon full implementation of the West Valley Campus Master Plan, the facilities would serve approximately 3,000 full-time equivalent students from the western Coachella Valley area of Riverside County, California.

The project site is located north of Baristo Road and the Palm Springs High School, south of Tahquitz Canyon Way, east of Sunset Way, and west of Farrell Drive. The Palm Spring Mall site is under utilized and largely unoccupied but has entitlements for approximately 315,119 square feet of gross leasable area within the mall building. To implement the West Valley Campus Master Plan, the existing floor space within the mall would be demolished and Kaplan College, a private two-year career college that occupies 6.4 percent of mall floor area, would be displaced. The free-standing Jack in the Box fast-food restaurant in the northeast corner of the site and the Camelot Festival Theaters, located on 1.3 acres at the southwest corner of the site, would remain.

The WVC Campus Master Plan would provide up to 250,000 S.F. of building floor area for educational facilities (classrooms, lecture halls, labs, etc.) and other instructional support uses. In addition, ancillary uses are proposed including a 40,000 S.F. conference center and 10,000 S.F. of college retail facilities (e.g., a bookstore, a food court, a copy center, convenience goods and services). The project would also make provision for a 30,000 S.F. library, which may be a City, COD, or joint City/COD facility.

The methodology employed to assess the potential noise impacts is consistent with the City of Palm Springs requirements, goals and policies. This report details: (1) the existing noise environment in the project vicinity; (2) conditions in the opening year 2018 with and without the Phase I Project; (3) General Plan buildout conditions with and without implementation of the West Valley Campus Master Plan; and (4) mitigation measures to minimize potential short-term construction-related noise impacts on residential and other sensitive land uses.

It has been a pleasure to assist you in evaluating this project, which will be of lasting benefit to the community. We trust that the information provided herein will be of value to you and the Desert Community College District in the preparation and processing of the environmental documentation required for the West Valley Campus Master Plan and Phase I Project. If questions or comments arise regarding the findings and recommendations within this report, please do not hesitate to contact our offices. We look forward to discussing the analysis and conclusions with you.

Cordially,
ENDO ENGINEERING

Vicki Lee Endo

Vicki Lee Endo, P.E., T.E.
Registered Professional
Traffic Engineer TR 1161

NOISE IMPACT STUDY

COLLEGE OF THE DESERT
WEST VALLEY CAMPUS MASTER PLAN
AND PHASE I PROJECT

SOUTH OF TAHQUITZ CANYON WAY AND NORTH OF BARISTO ROAD
WEST OF FARRELL DRIVE AND EAST OF SUNSET WAY

CITY OF PALM SPRINGS, CALIFORNIA

AUGUST 4, 2015

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1.0 EXECUTIVE SUMMARY

1.1 Existing Noise Setting

1. The primary sources of noise in the study area are transportation facilities including the Palm Springs International Airport, the Union Pacific Railroad corridor, Interstate 10 freeway and surface streets.

2. At its closest point, the project site is located approximately 0.75 miles west of the runway and 2,640 feet outside of the 60 dB CNEL contour associated with the Palm Springs International Airport.

3. The project site is located approximately 3.3 miles south of the Union Pacific Railroad corridor, which generates 65 dB CNEL at 900 feet from the railroad track.

4. The project site is located approximately 3.5 miles south of the Interstate 10 freeway which generates 60 dB CNEL at approximately 4,870 feet from the freeway centerline.

5. Ambient noise levels generated by motor vehicles along area roadways currently range from a low of 50.0 dB CNEL (at 50 feet from the centerline of Civic Drive, south of Baristo Road) to a high of 77.9 dB CNEL (at 50 feet from the centerline of Ramon Road, east of Farrell Drive).

6. The 70 dB CNEL contour currently falls within the right-of-way along 45 percent of the roadway segments modeled including all of the roadway segments along: Alejo Road, Amado Road, Cerritos Drive, Civic Drive, and Sunset Way.

7. The 65 dB CNEL contour currently falls within the right-of-way along 31 percent of the roadway segments modeled and 250 feet within the project site along Tahquitz Canyon Way, 120 feet within the project site along Farrell Drive, and 25 feet within the project site along Baristo Road.

8. The 60 dB CNEL contour currently falls within the right-of-way along 15 percent of the roadway segments modeled.

1.2 Noise Impacts

1. Demolition and construction activities necessary to implement the WVC Master Plan and Phase I Project would result in temporary increases in the ambient exterior noise levels in the vicinity of the project site on an intermittent basis that would be unavoidable and may annoy noise-sensitive receptors in close proximity at the time. These potentially significant noise impacts would be less than significant, provided the construction activities comply with the following measures required of all developments in the City of Palm Springs:

   - the environmental specifications in the construction contract;

   - the Construction Site Regulations (*Palm Springs Municipal Code Section 8.04.220)* which limit the hours during which construction activities generating excessive noise levels can occur; and

   - the site-specific noise abatement terms, conditions, and restrictions attached to grading and building permits issued by the City of Palm Springs.

2. The increase in heavy truck trips associated with the removal of building debris and other excavated materials associated with demolition, vendors delivering concrete and other building materials, and

construction worker trips is not expected to substantially increase the current volume of traffic or noise levels adjacent to any roadway used for site access in the study area.

3. Motor vehicle noise increases resulting from the Phase I Project in the opening year 2018 would be inaudible (less than 1.0 dB) and constitute a long-term incremental but less than significant operational impact in the study area.

4. The motor vehicle noise increases resulting from the implementation of the WVC Master Plan in the year 2030 would be inaudible (less than 1.0 dB) and constitute a long-term incremental but less than significant operational impact in the study area.

5. Potential long-term operational noise impacts associated with noise sources in the parking areas within the project site would be similar to the parking area noise from the existing mall when fully operational. The noise sensitive receptors to the west will benefit from the removal of the loading docks and the delivery truck activities associated with the functioning mall. The noise from the parking lots would be subject to the provisions of the Noise Ordinance.

6. Potential long-term operational noise impacts associated with stationary sources such as mechanical equipment used for heating, ventilation, and air conditioning would be reduced to less than significant by the location of the exhaust fans and condenser units on roofs or within enclosures that break the line of sight between the noise source and adjacent noise sensitive development.

7. Operational noise impacts associated with truck access and loading areas would be reduced to less than significant by locating the loading area approximately 500 feet from the western site perimeter wall and 350 feet from the northern site boundary. This location would result in a substantially greater separation between the adjacent noise-sensitive areas and the loading docks than afforded by the existing loading docks at the Palm Springs Mall.

8. The buildings to be clustered in the central portion of the site would reduce the propagation of project-related operational noise generated in the outdoor campus plaza (central activity area) into adjacent noise-sensitive areas. This design would also shield the central outdoor campus plaza area from intrusive motor vehicle noise generated along the abutting roadways.

9. The impact of the current and future noise environment on the proposed WVC Master Plan and Phase I Project would be less than significant. The City of Palm Springs noise standard for libraries, meeting halls, and schools specifies an interior noise level of 45 dBA CNEL. Typical commercial construction with fixed windows and fresh air ventilation systems can provide a noise reduction from outside to inside of 30 dBA. Therefore, campus buildings with an exterior noise exposure of up to 75 dBA can achieve interior noise levels of 45 dBA with standard construction techniques.

10. Project-related impacts related to consistency with applicable noise-related plans and policies would be less than significant provided: (1) truck access is restricted to approved truck routes; (2) construction activities incorporate feasible and practical techniques to minimize noise impacts on adjacent uses; (3) future noise levels generated by activities at the campus over the long term are limited to the project site, consistent with the provisions of the City Noise Ordinance; and (4) the contractor either uses portable noise barriers for heavy equipment operations performed within 100 feet of existing residences or provides evidence as to why the use of portable noise barriers is not feasible.

1.3 Noise Mitigation

1.3.1 Measures Required of All Projects

The contractors responsible for implementing the proposed project shall comply with all applicable federal, state and local laws related to noise. Cal OSHA implements the Occupational Health and Safety Act of 1970 (29 Code of Federal Regulations [CFR] 1910.95), which regulates the exposure of workers over an 8-hour workday where noise levels exceed 90 dBA. Hearing protection will be required in areas where the noise exposure exceeds 85 dBA and these areas shall be posted as "high noise areas."

Noise and groundborne vibration impacts during demolition and construction activities shall be regulated through the Construction Site Regulations (Section 8.04.220 of the Palm Springs Municipal Code), the environmental specifications in the construction contract, and the Noise Control Act of 1972, which sets noise emission standards for construction machinery. If the demolition or construction noise produced at the property line disturbs the peace and quiet of any person of normal sensitivity, the contractor shall comply with the Construction Site Regulations set forth in the Palm Springs Municipal Code (Section 8.04.220) which limit construction work to the hours between 7:00 a.m. and 7:00 p.m. on weekdays and between 8:00 a.m. and 5:00 p.m. on Saturdays and prohibit construction work on Sundays and six national holidays. Stationary sources of noise shall comply with the provisions of the City of Palm Springs Noise Ordinance.

1.3.2 Specific Recommendations

The City of Palm Springs has identified temporary construction noise as an area of concern in the Palm Springs 2007 General Plan because construction noise frequently provokes community annoyance and complaints. The Palm Springs 2007 General Plan includes noise goals and policies developed to protect residential areas and other sensitive land uses from impacts associated with exposure to excessive noise. Consequently, all feasible noise reducing measures should be incorporated in the construction specifications to ensure that the potential for adverse noise impacts on the adjacent community is reduced to the maximum extent feasible.

Consistent with those policies the following measures are recommended for consideration and, if feasible incorporation in the project construction specifications to minimize to the greatest extent possible potential short-term demolition and construction activity noise impacts. The applicant and the City of Palm Springs should consider these noise reduction measures in developing site-specific conditions of approval prior to the issuance of grading or building permits to ensure that the demolition and construction-related noise exposure of adjacent noise-sensitive receptors will be reduced to the maximum extent feasible.

1. All construction equipment and associated noise control equipment shall be maintained in proper working order in accordance with the manufacturers' specifications.

2. During the demolition and construction activities, a contact person shall be designated to investigate, document, evaluate, and attempt to resolve legitimate project-related noise complaints. This person's name and contact information shall be posted conspicuously at the site during the demolition and construction activities. The designated contact person shall contact individuals making a complaint within 24 hours to determine the noise source that resulted in the complaint and then implement all feasible measures to reduce the noise at the source.

3. The staging of concrete mixer trucks adjacent to noise-sensitive residential areas west and north of the project site shall be prohibited prior to 7:00 a.m. on weekdays and prior to 8:00 a.m. on Saturdays.

4. The staging of haul trucks required to remove building debris and other excavated materials adjacent to noise-sensitive areas west and north of the project site shall be prohibited prior to 7:00 a.m. on weekdays and prior to 8:00 a.m. on Saturdays.

5. The on-site staging and routing of heavy construction equipment shall minimize the need for heavy vehicles to travel in reverse within the site to avoid the activation of continuous vehicle reverse warning alarms, which are one of the most commonly cited nuisance noises associated with construction activities. These alarms generate 1000 Hertz pure tone beeps at 97 to 112 dBA, which exceeds the noise levels associated with long-term hearing loss.

6. Prior to issuance of grading or building permits, the contractor shall identify the site-specific measures to be implemented to attenuate construction noise levels during demolition and construction activities per the environmental specifications in the construction contract. These specifications may include but are not limited to the following:

   - The contractor shall comply with all local sound control and noise level rules, regulations and ordinances which apply to any and all work performed pursuant to the contract.

   - All feasible best practice demolition and construction techniques shall be implemented to minimize noise impacts on adjacent noise-sensitive land uses.

   - A construction truck routing plan shall be developed and submitted to the City of Palm Springs for review and approval that demonstrates, to the extent feasible, avoidance of routes with adjacent noise-sensitive receptors.

   - Every effort should be made to create the greatest distance between noise sources and sensitive receptors during construction activities.

   - Stockpiling and vehicle staging areas should be located as far as practical from noise-sensitive receptors.

   - Parking, refueling and servicing operations for all heavy equipment and on-site construction vehicles shall be located as far as practical from existing homes, churches, and other noise-sensitive land uses.

   - Stationary equipment should be placed such that emitted noise is directed away from noise-sensitive receptors.

   - The noisiest construction operations shall be arranged to occur together in the construction program to avoid continuing periods of greater annoyance.

7. Prior to the issuance of building permits, the applicant shall demonstrate to the City's satisfaction that the structures to be constructed within the site shall incorporate noise reduction features sufficient to achieve the City of Palm Springs noise standards shown in Table 3-4.

2.0 PROPOSED DEVELOPMENT

2.1 Project Location

The project site is located within the City of Palm Springs, which is in the western portion of the Coachella Valley, in Riverside County, California. Figure 2-1 (Regional Location) shows the project site in its regional context. The project site is located south of Interstate 10, between the interchanges at Indian Avenue/Indian Canyon Drive and Gene Autry Trail. The site is south of Vista Chino (State Route 111), north of Ramon Road, 0.69 miles west of the Palm Springs International Airport. At its closest point, the centerline of the Palm Springs International Airport main runway is located approximately 3,650 feet east of the eastern site boundary.

The project site is currently developed as the Palm Springs Mall, which is largely vacant and bounded on the south by Baristo Road, on the north by Tahquitz Canyon Way, and on the east by Farrell Drive. As shown in Figure 2-2, (Study Area and Key Intersections) the western site boundary is aligned parallel to and extends south of the terminus of Sunset Way. The project site is north of the Palm Springs High School.

Access to the site is currently provided by two existing signalized intersections: (1) Sunset Way at Tahquitz Canyon Way, and (2) Baristo Road at the Palm Springs High School/Palm Springs Mall access. In addition, nine unsignalized driveways, that were constructed to serve the Palm Springs Mall, provide access to the site. Three of the existing driveways are on the south side of Tahquitz Canyon Way, three are on the west side of Farrell Drive, and three on the north side of Baristo Road.

2.2 Existing Entitlements

The Palm Springs Mall site is an underutilized commercial development located adjacent to the south side of Tahquitz Canyon Way, one of the most important and visible east-west corridors in the City of Palm Springs. This corridor serves a mixed/multi-use area between Downtown Palm Springs and the Palm Springs International Airport. Land uses adjacent to Tahquitz Canyon Way include residential, professional office, and commercial uses.

The Palm Spring Mall site is largely unoccupied with entitlements for approximately 315,119 square feet of gross leasable area (GLA) within the main mall building. Figure 2-3 (Existing Palm Springs Mall Site Plan) illustrates the location of the existing mall building in relation to the eleven existing site access points and the currently occupied land uses within and adjacent to the project site.

A transit bus stop and bus turnout exists on the east side of Farrell Drive, south of the northern site access. A transit bus stop and bus turnout is also located on the north side of Baristo Road, at the middle of the southern site boundary. This location is adjacent to the signalized intersection on Baristo Road at the Palm Springs High School/Palm Springs Mall access. This intersection provides a protected crossing of Baristo Road for pedestrians who use SunLine Transit buses to travel to/from the Palm Springs High School.

2.3 Existing On-Site Land Uses

Kaplan College Palm Springs was founded in the fall of 2004 as a branch of the main Kaplan College campus in Vista, California, a provider of educational and career services for individuals and businesses. Located at 2475 East Tahquitz Canyon Way, Kaplan College Palm Springs is a private two-year career college that currently occupies approximately 20,080 square feet of gross floor area within the Palm Springs Mall building. The facilities include: classrooms, a library, student and staff lounges, business offices, and a reception area. The programs offered include a medical assistant program, a massage therapy program, a dental assistant program, and a criminal justice program. Each program is taught in specially built classrooms, fully equipped laboratories, and computer rooms.

Figure 2-1
Regional Location

Endo Engineering

Scale: 1” = 5,700’

Figure 2-2
Study Area and
Key Intersections

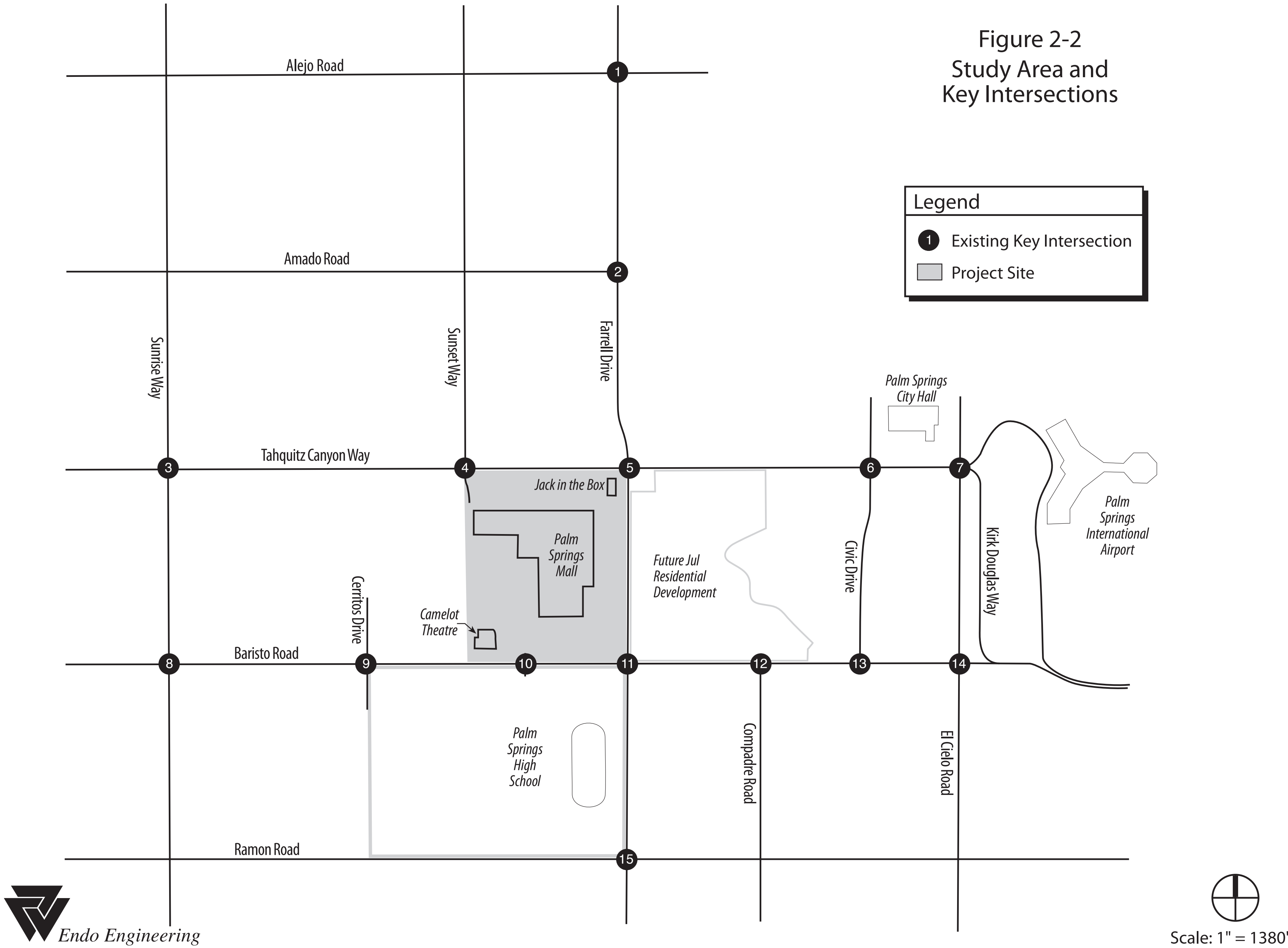
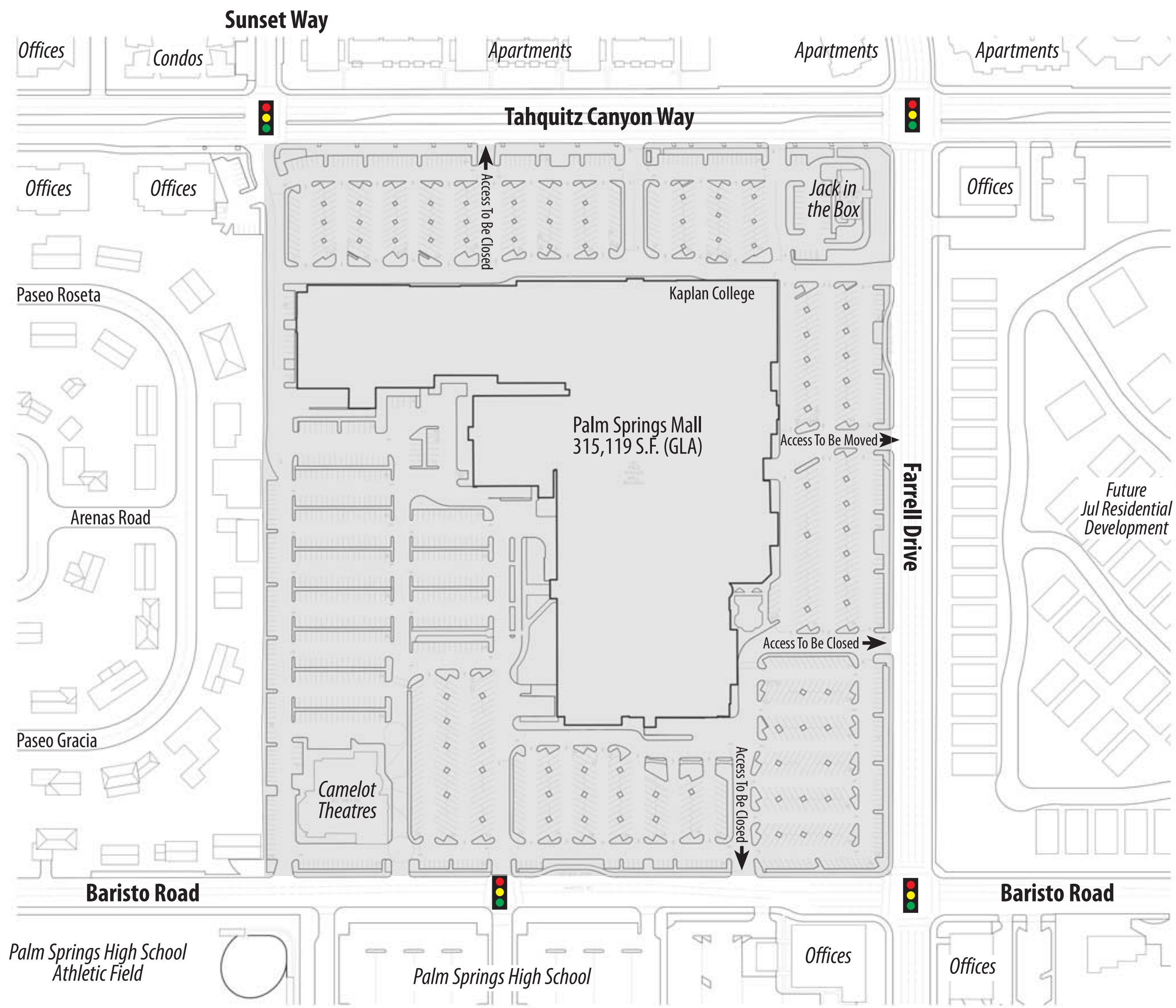


Figure 2-3
Palm Springs Mall
Existing Site Plan



Source: HMC Architects

Scale: 1" = 300'

A free-standing Jack in the Box fast-food restaurant with drive-through service is located at on the southwest corner of the intersection of Farrell Drive with Tahquitz Canyon Way. This 2,736 S.F. restaurant has one access connection on Tahquitz Canyon Way, approximately 165 feet west of Farrell Drive, and another access connection on Farrell Drive, approximately 190 feet south of Tahquitz Canyon Way.

The original Camelot Theatre was an independent Palm Springs-based theatre that opened in 1967 at 2300 East Baristo Road, in the southwest corner of the Palm Springs Mall parking lot. The Camelot Theatre is one venue for the annual Palm Springs Film Festival and the Festival of Arts. This theater provides three screens and 864 seats within a site occupying 56,640 SF (1.3 acres).

2.4 Project Description

The project site includes 29.27 acres previously developed as and currently occupied by the Palm Springs Mall, which is underutilized and largely vacant. The Desert Community College District (the Applicant) is proposing the demolition of the Palm Springs Mall building, which encompasses 315,119 square feet (SF) of gross leasable area (GLA), to allow the development of the College of the Desert (COD) West Valley Campus Master Plan and Phase I Project.

To implement the WVC Master Plan, the existing building space within the mall would be demolished and Kaplan College, a private two-year career college that occupies 20,080 square feet of gross floor area (GFA), would be displaced. The free-standing Jack-in-the-Box fast food restaurant in the northeast corner of the site and the Camelot Festival Theatres, located on 1.3 acres at the southwest corner of the site, would remain with the proposed project.

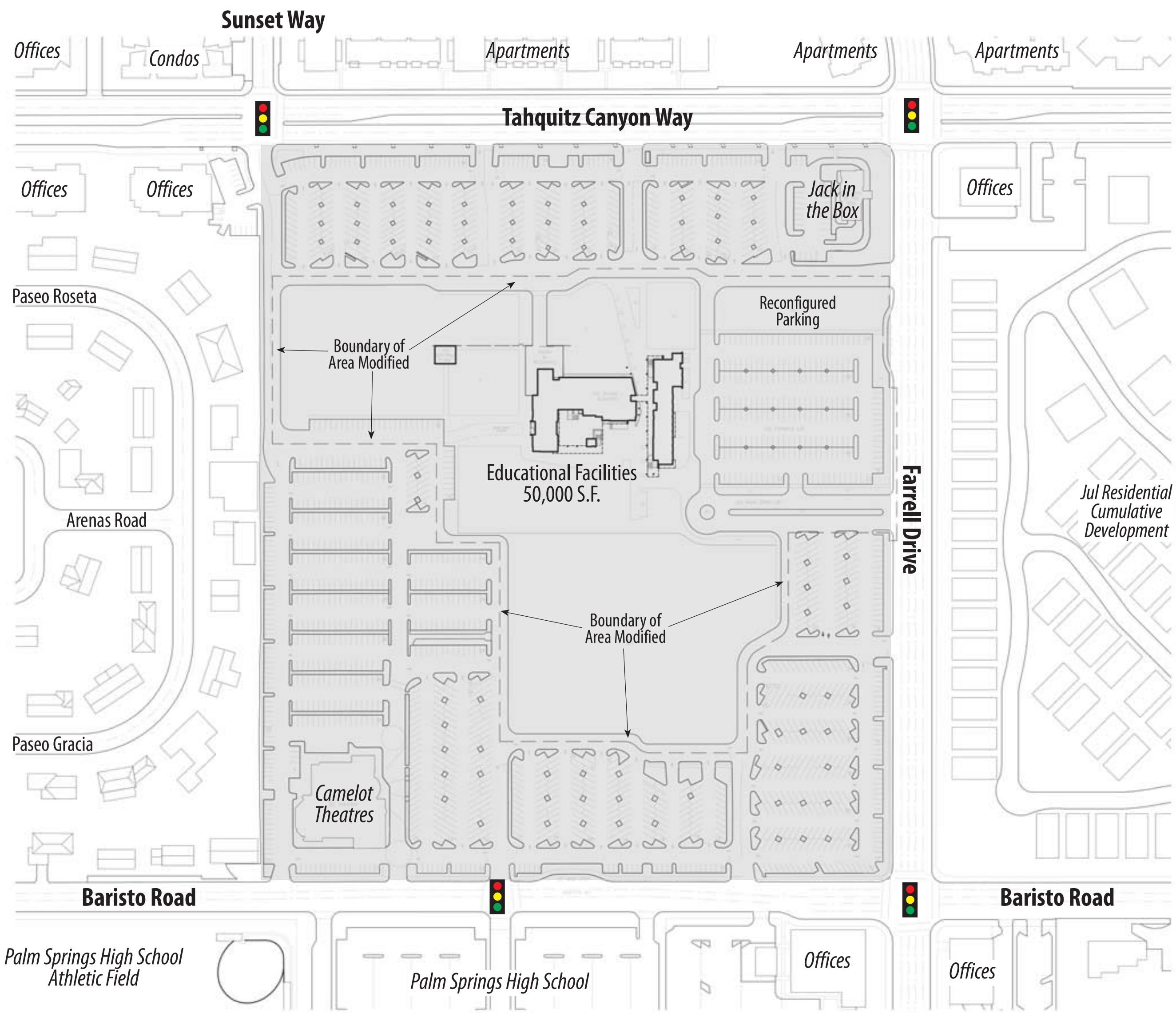
2.4.1 Phase I Project

Upon opening in the year 2018, the College of the Desert West Valley Campus Phase I Project would be designed to serve 200 full-time equivalent students (FTES) with a headcount of 786 students. Figure 2-4 shows the Site Plan for the Phase I Project. As shown therein, the Phase I Project would provide up to 50,000 square feet of new building space for classrooms, lecture halls, administrative offices, and other support facilities. A total of 160 parking spaces are proposed for the Phase I Project, with temporary overflow parking for an additional fifty vehicles.

The Phase I Project access would remain essentially the same as the existing site access, with one exception. The existing middle site access on Farrell Drive would be relocated approximately 115 feet to the south and widened from the existing 35-foot width to 57 feet in width (curb-to-curb) to serve as the main site access in conjunction with the Phase I Project. The main campus entry drive would extend 350 feet west of Farrell Drive and provide an entry pavement width of 24 feet and an exit pavement width of 24 feet, separated by a raised median approximately 9 feet in width. The new access location would be more closely aligned with the midpoint of the eastern site boundary. With approximately 1,245 feet of frontage on Farrell Drive, the midpoint of the eastern site boundary would be approximately 625 feet north of the north curb on Baristo Road and 625 feet south of the south curb on Tahquitz Canyon Way.

The Phase I Project main parking area would be located south of the Jack in the Box restaurant, between the new campus administration building and Farrell Drive. This parking lot would be reconfigured to align the aisles perpendicular to Farrell Drive. A student drop-off bay would be provided in front of the new administration building, where students could be dropped off from the passenger side of vehicles and enter the campus buildings without being required to cross vehicular travel ways.

Figure 2-4
College of the Desert - West Valley Campus
Phase I Project Site Plan



Source: HMC Architects

Scale: 1" = 300'

2.4.2 Buildout of the WVC Master Plan

The COD WVC Master Plan would provide up to 250,000 S.F. of building floor area for educational facilities and other instructional support uses. Ancillary uses would also be provided including a 40,000 S.F. conference center and 10,000 S.F. of limited campus-oriented retail facilities (e.g., a bookstore, a food court, a copy center, convenience goods and services). The project would also make provision for a 30,000 S.F. library, which may be a City, District, or joint facility. A total of 1330 off-street parking spaces are proposed to serve the WVC Master Plan development.

The building locations and site access plan for the WVC Master Plan are shown in Figure 2-5 (COD West Valley Campus Master Plan). Upon full implementation of the WVC Master Plan, the facilities would be designed to serve approximately 3,000 FTES (8,040 headcount) from the western Coachella Valley. For the purposes of this analysis, the project buildout year was assumed to be the year 2030, which is also the buildout year assumed for the land uses in the *2007 City of Palm Springs General Plan*.

2.4.3 Proposed Site Access and Internal Circulation

The Phase I Project proposes the relocation of the central site access on Farrell Drive to the middle of the site frontage. The middle site access on Farrell Drive is currently located approximately 545 feet south of the centerline of Tahquitz Canyon Way. The Phase I Project would relocate this access to approximately 660 feet south of the centerline of Tahquitz Canyon Way and widen the access connection from approximately 30 feet to approximately 57 feet (measured curb to curb) to accommodate two entry lanes, two exit lanes, separated by a raised landscape median 9 feet wide.

The main campus entry would extend approximately 350 feet west of Farrell Drive with a traffic circle at the western terminus. The main entry drive would provide access to the reconfigured parking lot at two points located approximately 150 feet and 325 feet west of Farrell Drive.

The implementation of the WVC Master Plan would include the consolidation of the two existing right-turn only site access connections on Tahquitz Canyon Way (Intersections 16 and 17) into a single access connection located west of the Conference Center. As proposed, this access would be approximately 24 feet in width.

The proposed project would not relocate the northern site access intersection on Farrell Drive (Intersection 19). This intersection provides direct access to the Jack in the Box drive-through lane without requiring motorists to drive through the surface parking lots associated with the WVC Master Plan. The existing site access connection is located north of a SunLine Transit Authority bus stop and bus bay that can accommodate two buses simultaneously and would be retained with the proposed project.

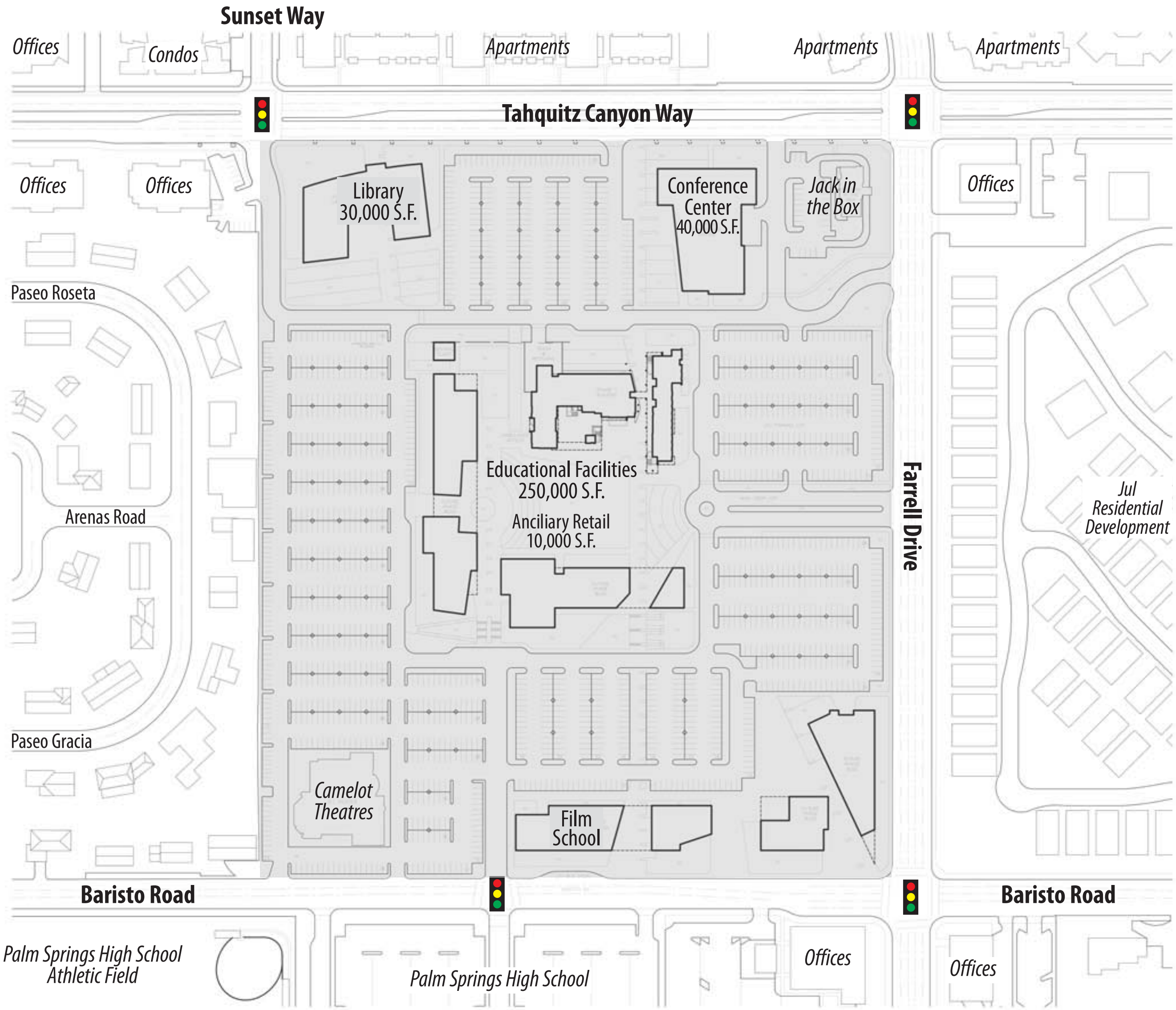
2.4.4 Construction Details

The Phase I Project would require the demolition of approximately 315,119 SF of GLA within the Palm Springs Mall building, which has a height that varies from approximately 22 to 30 feet. Outdated utility lines would be excavated and removed. The site would be graded and trenching activities would facilitate the installation of new utility lines within the site. The demolition is expected to occur in the year 2017, followed by site grading and the construction of 50,000 square feet of building floor area to implement the Phase I Project before the end of the opening year 2018.

Approximately 21,073 tons of demolition debris would be removed from the site by haul trucks including 7,800 tons of demolished building materials and approximately 13,275 tons of concrete that would be broken up, excavated and loaded into haul trucks on-site, before being hauled away for disposal at a remote location.

Site grading is expected to require the importation of approximately 10,000 cubic yards of fill material for the Phase I Project. To implement the WVC Master Plan, 30,000 cubic yards of fill material is expected to be

Figure 2-5
College of the Desert - West Valley Campus
Master Plan Site Plan



Source: HMC Architects

Scale: 1" = 300'

imported (including the 10,000 cubic yards required for the Phase I Project). The construction of approximately five additional future phases would be required to implement the WVC Master Plan. The construction activities would occur over a period of 15 to 20 years.

2.5 Cumulative Development

The Jul Residential Development was evaluated as a near-term cumulative project in the opening year 2018 with and without the Phase I Project traffic. This cumulative project will be constructed east of Farrell Drive, between Tahquitz Canyon Way and Baristo Road, as shown in Figure 2-2. The development would include 76 single-family detached residential dwelling units and 114 residential condominium dwelling units.

The traffic volumes associated with this development were taken from the *Jul Residential Development Traffic Impact Study Update* (dated November 15, 2013) prepared by Arch Beach Consulting. The trip generation forecast therein included 1,386 daily trips, of which 108 would occur during the morning peak hour (23 inbound and 85 outbound) and 136 would occur during the PM peak hour (88 inbound and 48 outbound). The primary access would be on Baristo Road, opposite the existing intersection of Compadre Road. A secondary access would be on Louella Road, south of Tahquitz Canyon Way.

The growth in background traffic volumes associated with cumulative development throughout the region was taken into account by using the General Plan buildout traffic projections developed in conjunction with the *Palm Springs 2007 General Plan*. These traffic projections represent the future horizon year 2030 and include the growth anticipated by the Land Use Element designations. The future opening year 2018 traffic projections include a portion of the regional growth in background traffic volumes that was incorporated in the General Plan buildout traffic projections.

3.0 Existing Noise Environment

Noise in daily life fluctuates over time, with some fluctuations being minor while others are substantial. Some fluctuations are random while occurs exhibit regular patterns. Some noises seem relatively constant, while others change rapidly and vary widely. Some noises, like a single gun shot, are of extremely short duration (transient) while others, like pile driver noise, are intermittent.

Noise fundamentals are introduced below such as: noise rating schemes, typical noise levels of familiar noise sources, sound propagation, and various factors which affect motor vehicle noise levels. This information is followed by a discussion of: (1) the harmful effects of noise, (2) community responses to sound, (3) guidelines for achieving land use compatibility with noise, and (4) the current noise environment in the project vicinity. A glossary of technical terms related to noise is provided as **Appendix A.**

3.1 Fundamentals of Noise

Noise levels are measured on a logarithmic scale in decibels which are then weighted and added over a 24-hour period to reflect not only the magnitude of the sound, but also its duration, frequency, and time of occurrence. In this manner, various acoustical scales and units of measurement have been developed such as: equivalent sound levels (Leq), day-night average sound levels (Ldn) and community noise equivalent levels (CNELs).

A-weighted decibels (dBA) approximate the subjective response of the human ear to a broad frequency noise source by discriminating against the very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. The decibel scale has a value of 1.0 dBA at the threshold of human hearing and 140 dBA nearing the threshold of pain. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud.

Under controlled conditions in a laboratory, the trained healthy human ear is able to discern changes in sound levels of 1 dBA, when exposed to steady single frequency signals in the mid-frequency range. Outside of these controlled conditions, the trained ear can detect changes of 2 dBA in normal environmental noise. A 3.0 decibel increase in noise level reflects a doubling of the acoustic energy. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dBA.[1]

The human perception of loudness is nonlinear in terms of decibels and acoustical energy. For instance, if one source produces a noise level of 70 dBA, two of the same sources produce 73 dBA, three will produce about 75 dBA, and ten will produce 80 dBA. Human perception is complicated in that two identical noise sources do not sound twice as loud as one noise source.

Acoustic experts have tested thousands of subjects to establish the relationship between changes in acoustical energy and the corresponding human reaction. Table 3-1 summarizes their findings. The average human perceives a 10 dBA decrease in noise levels as one-half of the original level, even though it exposes the average human to one-tenth of the acoustic energy associated with the reference sound. An increase of 3 dBA in noise level is perceived as a barely perceptible increase, but it actually exposes the listener to twice the acoustic energy of the noise level before the increase.

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1. Mr. Rudy Hendriks, Caltrans Environmental Engineering - Noise, Air Quality and Hazardous Waste Management Office, *Technical Noise Supplement,* October 1998, pg. 41.

Table 3-1
Changes in Human Perception of Noise Level Changes

Noise Level Change (dBA)	Relative Energy Change	Perceived Change In Percentage	Descriptive Change In Human Perception
+40 dBA	10,000 x		Sixteen Times as Loud
+30 dBA	1,000 x		Eight Times as Loud
+20 dBA	100 x	+300%	Four Times as Loud
+15 dBA	31.6 x	+183%	
+10 dBA	10 x	+100%	Twice as Loud
+9 dBA	7.9 x	+87%	
+8 dBA	6.3 x	+74%	
+7 dBA	5.0 x	+62%	
+6 dBA	4.0 x	+52%	
+5 dBA	3.16 x	+41%	Readily Perceptible Increase
+4 dBA	2.5 x	+32%	
+3 dBA	2.0 x	+23%	Barely Perceptible Increase
+0 dBA	**1**	**0%**	**Reference (No Change)**
-3 dBA	0.5 x	-19%	Barely Perceptible Reduction
-4 dBA	0.4 x	-24%	
-5 dBA	0.316 x	-29%	Readily Perceptible Reduction
-6 dBA	0.25 x	-34%	
-7 dBA	0.20 x	-38%	
-8 dBA	0.16 x	-43%	
-9 dBA	0.13 x	-46%	
-10 dBA	0.10 x	-50%	One-Half as Loud
-15 dBA	0.0316 x	-65%	
-20 dBA	0.01 x	-75%	One-Quarter As Loud
-30 dBA	0.001 x		One-Eighth as Loud
-40 dBA	0.0001 x		One-Sixteenth as Loud

a. Mr. Rudy Hendriks, Caltrans, *Technical Noise Supplement,* October, 1998.
b. Change in relative energy with respect to a zero change in dBA (no change).
c. Average human perceived change in noise level. A positive change represents an increase. A negative change represents a decrease.

3.1.1 Typical Noise Levels of Common Activities

Examples of the decibel level of various noise sources are shown in Figure 3-1. The quiet rustle of leaves generates 10 dBA. Ambient noise levels in a motion picture studio are typically 20 dBA. Interior noise in a library measures 35 dBA. A theater or large conference room exhibits ambient noise levels of 40 dBA. Ambient noise outdoors in a quiet urban area is 50 dBA during the daytime and 40 dBA during the nighttime hours. Normal conversation at 5 feet generates 55 dBA. The noise level in a commercial area is typically 65 dBA. A busy street generates 75 dBA at 50 feet and 60 dBA at 300 feet. The ambient noise level in a noisy urban area during daytime hours is approximately 75 dBA.

An automobile horn can generate 100 decibels at a distance of 16 feet. By comparison, a mother holding a screaming infant in her arms is subjected to 100 to 117 decibels. A jackhammer generates 120 decibels at a distance of three feet. The Who is in the *Guinness Book of World Records* as the loudest rock band, for a 1976 concert at which the band generated a sound level of 120 decibels at a distance of 50 meters from the sound system. Football game crowds can cheer as loudly as a rock band can play. By comparison, jet fly-over at 1,000 feet generates 105 dBA.

3.1.2 Noise Rating Schemes

Equivalent sound levels are not measured directly but rather calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) is the constant level that, over a given time period, transmits the same amount of acoustic energy as the actual time-varying sound. Equivalent sound levels are the basis for both the Ldn and CNEL scales.

Day-night average sound levels (Ldn) are a measure of the cumulative noise exposure of the community. The Ldn value results from a summation of hourly Leq's over a 24-hour time period with an increased weighting factor applied to the nighttime period between 10:00 PM and 7:00 AM. This noise rating scheme takes into account those subjectively more annoying noise events which occur during the normal sleeping hours.

Community noise equivalent levels (CNEL) also carry a weighting penalty for noises that occur during the nighttime hours. In addition, CNEL levels include a penalty for noise events that occur during the evening hours between 7:00 PM and 10:00 PM. Because of the weighting factors applied, CNEL values at a given location will always be larger than Ldn values, which in turn will exceed Leq values. However, CNEL values are typically within one decibel of the Ldn value.

As used in General Plan applications, the CNEL metric means the annualized daily sound level (the sum of 365 days of individual CNEL values divided by 365). The annualized CNEL reflects the fundamental theory that real community impacts are related to long-term noise exposure levels. That is why airport, railroad, and highway noise impact criteria are all based on annualized CNEL values.

3.1.3 Sound Propagation

Sound propagating through the air is affected by many factors including: air temperature, humidity, wind and temperature gradients, vicinity and type of ground surface, obstacles, and terrain features. All of these factors are frequency dependent. Between the noise source and the receiver the noise level decreases and the frequency spectrum changes as a result of geometric spreading, ground absorption, atmospheric effects and refraction, as well as shielding, diffraction, and reflection.

For a "line source" of noise such as a heavily traveled roadway, the noise spreads cylindrically and the noise level drops off by a nominal value of 3.0 decibels for each doubling of distance between the noise source and the noise receiver. Environmental factors such as wind conditions, temperature gradients, characteristics of the ground (hard or soft) and the air (relative humidity), and the presence of vegetation combine to increase the attenuation achieved outside laboratory conditions to 4.5 decibels per doubling of distance in many cases.

Figure 3-1
Typical Noise Levels of Familiar Sources

	dBA	
	145	
Physically Painful	140	Sonic Boom
Extremely Loud	135	
	130	
	125	Jet Takeoff at 200’
Discomforting	120	Oxygen Torch
	115	Discotheque
	110	Construction Noise at 10’
	105	Power Mower at 3’
Very Loud	100	Newspaper Press, Subway Train
	95	Freight Train at 50’
	90	Food Blender
	85	Electric Mixer, Alarm Clock
	80	Heavy Truck at 50’, Average Factory
	75	Busy Street Traffic at 50’
	70	Average Traffic at 100’, Vacuum Cleaner at 10’
	65	Electric Typewriter at 10’
	60	Dishwasher at 10’, Air Conditioning Unit at 15’
	55	Normal Conversation at 5’
	40	Typical Daytime Suburban Background, Quiet Office
	45	Refrigerator at 10’
	40	Bird Calls
	35	Library
Very Quiet	30	Soft Whisper at 16’
	25	
	20	Motion Picture Studio
	15	
Barely Audible	10	Leaves Rustling
	5	
Threshold of Hearing	0	

Source: Tipler, Paul A. “Physics”, New York: Worth Publishers, 1976

The increase in noise attenuation in exterior environments is particularly true: (1) for freeways where an elevated or depressed profile, higher truck mix, or the presence of intervening buildings or topography come into play; (2) where the view of a roadway is interrupted by isolated buildings, clumps of bushes, scattered trees; (3) when the intervening ground is soft or covered with vegetation; or (4) where the source or receiver is located more than three meters above the ground. The nominal value of 3.0 dBA with doubling applies to sound propagation from a "line source": (1) over the top of a barrier greater than 3 meters in height; or (2) where there is a clear unobstructed view of the highway, the ground is hard, no intervening structures exist and the line-of-sight between the noise source and receiver averages more than 3 meters above the ground.[2]

In an area that is relatively flat and free of barriers, the sound level resulting from a single "point source" of noise attenuates or drops off by 6 decibels for each doubling of distance from the noise source or 20 decibels for each factor of ten in distance due to the geometric spreading of the energy as it radiates away from the source in a spherical pattern. This applies to fixed noise sources and mobile noise sources that are temporarily stationary. An idling truck or other heavy equipment operating within a confined area, such as loading docks or on-site construction activities, are point sources of noise.

3.1.4 Noise Shielding By Structures

One of the most effective ways of reducing noise is shielding. Shielding occurs when the observer's view of the noise source is obstructed by structures that interfere with the propagation of the sound waves. Shielding can be accomplished by using mufflers and shrouding on construction equipment or by erecting a sound barrier between the construction equipment and a noise receiver. A solid noise barrier wall can shield receivers by up to 20 dBA.

In a similar manner, the closest row of residences located along a roadway will acoustically shield the residents who live in the homes located behind the first row. The amount of attenuation provided by rows of buildings has a maximum value of 10 dBA and depends on the size of the gaps between the buildings. An attenuation of 3 dBA is typically allowed by the Federal Highway Administration (FHWA) for the first row of buildings, if they occupy 40 to 65 percent of the row leaving gaps which occupy the remaining 35 to 60 percent of the row. An attenuation of 5 dBA is typically assumed when the buildings occupy 65 to 90 percent of the row, leaving 10 to 35 percent of the row as gaps. Rows of buildings behind the first row will also shield the area behind them and are typically assumed to attenuate the exterior sound levels behind them by 1.5 dBA for each row of buildings.

In most situations, if the exterior area can be protected, the interior will also be protected. The first step is to identify areas where frequent human use occurs (like a patio, a porch, or a swimming pool). The interior noise levels may then be computed by subtracting from the predicted exterior noise levels the noise reduction expected to be provided by the building. Building noise reduction factors from exterior to interior range from a low of 10 dB (for all buildings with windows open) to a high of 35 dB (for masonry buildings with double-glazed windows). Masonry buildings with single-glazed windows achieve an exterior to interior noise reduction of 25 dB. Light frame buildings with ordinary sash windows closed achieve a 20 dB noise reduction. Light frame construction with storm windows can achieve a 25 dB reduction from outside to inside sound levels.

3.1.5 Factors Affecting Motor Vehicle Noise

The noise levels adjacent to "line sources" such as roadways increase by 3.0 dBA with each doubling in the traffic volume (provided that the speed and truck mix do not change). From the mathematical expression relating increases in the number of noise sources (motor vehicles) to the increase in the adjacent sound level, it can be shown that a 26 percent increase in the traffic volume will cause a 1.0 dBA increase in adjacent noise levels. Doubling the number of vehicles on a given route increases the adjacent noise levels by 3.0 dBA, but changing the vehicle speed has an even more dramatic effect.

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2. State of California, Department of Transportation, *Noise Manual*, 1980.

Increasing the vehicle speed from 35 to 45 mph raises the adjacent noise levels by approximately 2.7 dBA. Raising the speed from 45 to 50 mph increases adjacent noise levels by 1.0 dBA. A speed increase from 50 to 55 mph increases adjacent noise levels by 0.9 dBA. Consequently, lower motor vehicle speeds can have a significant positive impact in terms of reducing adjacent noise levels.[3]

The truck mix on a given roadway has a significant effect on adjacent noise levels. As the number of trucks increases and becomes a larger percentage of the vehicle volume, adjacent noise levels increase. This effect is more pronounced if the number of heavy-duty (3+ axle) trucks is large, compared to the number of medium-duty (2-axle) trucks.

3.2 Harmful Effects of Noise

Noise can cause temporary physical and psychological responses in humans. Temporary physical reactions to passing noises range from a startle reflex to constriction in peripheral blood vessels, the secretion of saliva and gastric juices, and changes in heart rate, breathing patterns, the chemical composition of the blood and urine, dilation of pupils in the eye, visual acuity and equilibrium. The chronic recurrence of these physical reactions has been shown to cause fatigue, digestive disorders, heart disease, circulatory and equilibrium disorders. Moreover, noise is a causal factor in stress-related ailments such as ulcers, high blood pressure and anxiety.

Three harmful effects of noise that are commonly of concern include speech interference, the prevention or interruption of sleep, and hearing loss. Figure 3-2 illustrates how excessive background noises can reduce the amount and quality of verbal exchange and thereby impact education, family life-styles, occupational efficiency, and the quality of recreation and leisure time. Speech interference begins to occur at about 40 to 45 decibels and becomes severe at about 60 decibels. Background noise levels affect performance and learning processes through distraction, reduced accuracy, increased fatigue, annoyance and irritability, and the inability to concentrate (particularly when complex tasks are involved or in schools where younger children exhibit short concentration spans).

Several factors determine whether or not a particular noise event will interfere with or prevent sleep. These factors include the noise level and characteristics, the stage of sleep, the individual's age and motivation to waken. Ill or elderly people are particularly susceptible to noise-induced sleep interference, which can occur when intruding noise levels exceed the typical 35-45 decibel background noise level in bedrooms. Sleep prevention can occur when intruding noise levels exceed 50 dBA.

Hearing loss, like other adverse noise impacts, is related to a combination of noise amplitude and duration or exposure. Hearing loss may begin to occur at 75 dBA (as shown in Table 3-2) and is one of the most harmful effects of noise on people. Any noise greater than 85 dBA can damage hearing if the human ear is exposed to it over an extended period.

Table 3-2
Harmful Effects Of Noise[a]

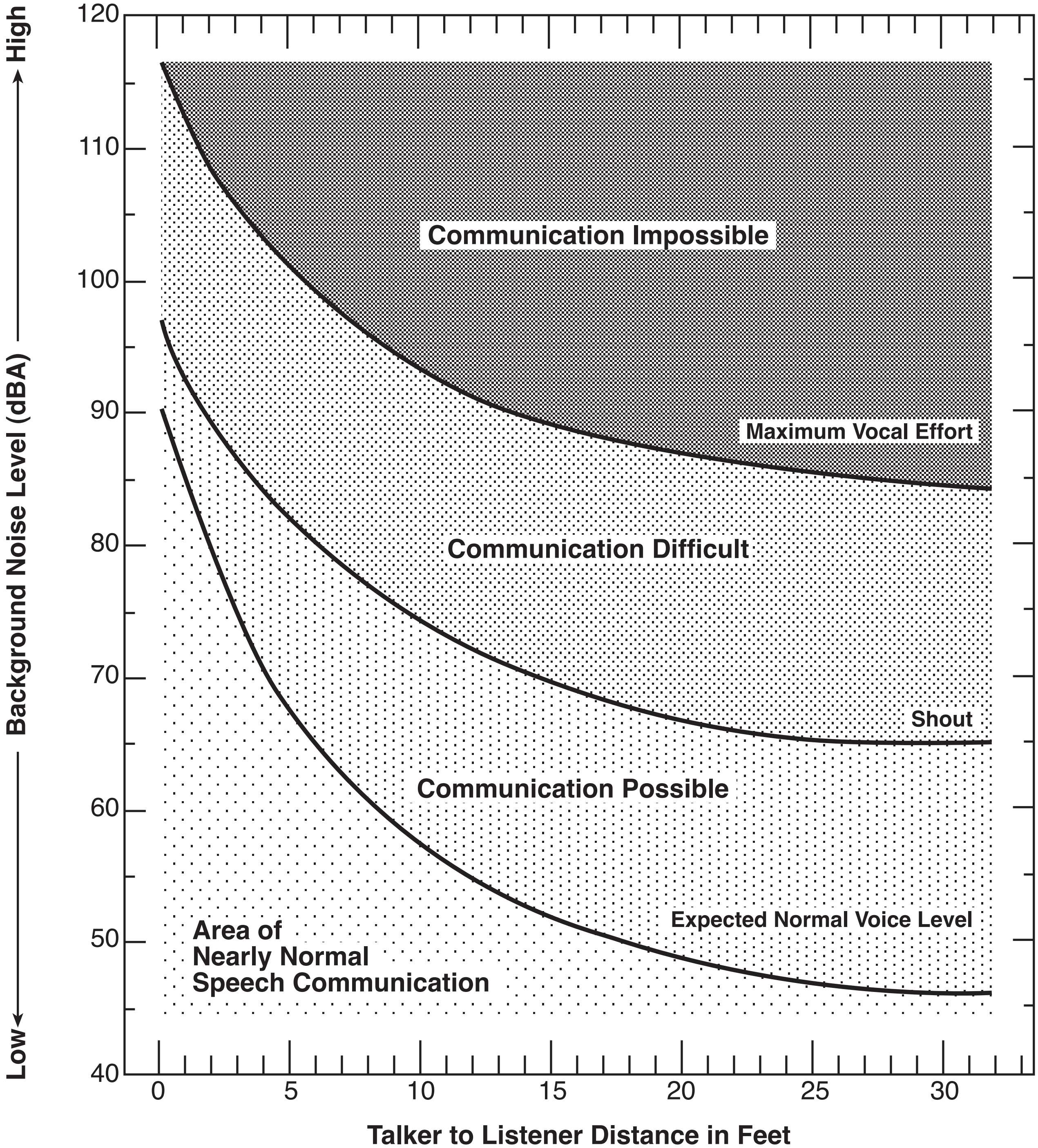
Harmful Effect	Noise Levels at Which Harmful Effects Occur
Prevention or Interruption of Sleep	35 - 45 dB (A)
Speech Interference	50 - 60 dB (A)
Extra Auditory Physiological Effects	65 - 75 dB (A)
Hearing Loss	75 - 85 dB (A)

a. California Department of Public Health, *Report to 1971 Legislature.*

3. Endo Engineering conclusions based on RD-77-108 runs with all variables held constant except vehicle speed.

Figure 3-2

Speech Communication as a Function
of Background Noise Level



Endo Engineering

Source: Miller, “Effects of Noise on People”, Journal of Acoustical Society of America, V.56, No. 3, 9/74

Traditionally, people have not been diagnosed with hearing loss until their 60s or later and hearing impairment has been viewed as a natural effect of aging. However, hearing loss from environmental noise exposure is developing at an earlier age than ever before. Many baby boomers are showing symptoms of hearing loss in their late 40s and 50s.

More than 28 million Americans currently have some degree of hearing loss (from mild to severe) and the number could reach 78 million by the year 2030, as baby boomers mature. One study estimates that as many as 5.2 million children in the United States between the ages of 6 and 19 have some hearing damage from amplified music and other noise sources.[4] In many of these cases, exposures to very loud, impulsive, or sustained noises caused damage to the inner ear that was substantial even before a hearing loss was actually noticed.

Transportation noise levels experienced by communities and the general public are normally not high enough to produce hearing damage. The main causes of permanent damage are daily exposure to industrial noise. Although hearing loss cannot be reversed, reducing exposure to excessive noise can prevent the damage from getting worse. To prevent the spread of hearing loss, a desirable goal would be to minimize the number of noise sources that expose people to sound levels above 70 decibels.

Even if an individual spends their life in a library, they will not hear as well at the age of seventy as they did when twenty. Hearing loss is a natural effect of the aging process.[5] Most common types of hearing loss occur at the higher frequencies and are caused by damage to the sensitive hair cells essential for hearing that line the cochlea inside the inner ear that, once damaged, are not regenerated. Various levels of noise affect these hair cells in different ways.

If an explosion occurs next to a person, the acoustic trauma kills hair cells in the ear and very suddenly causes substantial traumatic hearing loss that can be permanent. Standing in front of large speakers at a concert could cause a less serious temporary threshold shift in which the hair cells are stressed but not permanently damaged. This type of stress is often accompanied by ringing in the ears that can last for hours or even days after the event. However, repeated threshold shifts can lead to permanent hearing loss. Even if an individual's noise exposure does not reach levels that would cause instant hearing loss or temporary impairment at certain frequencies, constant exposure to noise in daily life may lead to deterioration over time. As the time during which the hair cells can rest decreases, they may become prematurely exhausted.

Protecting hearing requires an assessment of the risk of hearing loss and an understanding of the fact that the louder the noise, the less time people should be exposed to it. The risk of hearing loss is determined from the intensity of the sound (measured in decibels) multiplied by the duration of the sound (the exposure time). Prolonged exposure to any noise above 85 decibels can cause gradual hearing loss. For each five-decibel increase, the permissible exposure time is cut in half. Thus, one hour at 110 decibels is equivalent to eight hours at 95 decibels. Sound levels above 116 decibels (snowmobiles are 120 dB and rock concerts are 140 dB) are unsafe for any period of time.

The development of adverse reactions to sound usually occurs over a long period of time, with some exceptions such as gunshots or explosions at close range. Therefore, adverse reactions are often evaluated in terms of the probability of the impact or the percent of the population affected. In noise exposure, as in other aspects of life, the norm is to accept a certain level of risk. Occupational Safety and Health Administration (OSHA) criteria that specify hearing protection in workplaces where noise levels exceed 90 dBA are based upon protecting only 80 percent of the population from hearing loss. Similarly, community annoyance criteria are frequently set at levels that allow up to a 15 percent probability of adverse reaction.

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4. Mr. David Noonan, "A Little Bit Louder Please," *Newsweek,* June 6, 2005 Issue.
5. Dr. Robert Dobie, Professor of Otolaryngology, University of California, Davis.

3.3 Community Responses to Sound

Many people must work and live in areas where noise exceeds acceptable levels. Construction and industrial noise sources frequently generate sound levels high enough to damage the hearing of nearby workers. These noise sources often provoke community annoyance complaints and are therefore the subject of noise control legislation at the federal, state, and local level.

People react to sound in different ways. A high level noise is more objectionable than a low level noise. Intermittent truck peak noise levels are more objectionable than continuous level fan noise. Humans are more sensitive to high frequency noise than low frequency noise. People tend to compare an intruding noise with the existing background noise and usually find it objectionable if the new noise is: (1) readily identifiable, or (2) considerably louder than the ambient noise.

The nature of the work or activity that is underway when the noise exposure occurs affects the way listeners react to the new noise. For example, workers in a factory or office may not be disturbed by highway traffic noise, but people sleeping at home or studying in a library and exposed to the same noise tend to be annoyed and find the noise objectionable. By the same token, an automobile horn at 2:00 a.m. is more disturbing than the same noise in traffic at 5:00 p.m.

Approximately 10 percent of the population has a very low tolerance for noise and will object to any noise not of their own making. Consequently, even in the quietest environment, some complaints will occur. Another 25 percent of the population will not complain even in very severe noise environments.[6] Thus, a variety of reactions can be expected from people exposed to any given noise environment.

Despite this variability in behavior on an individual level, the population as a whole can be expected to exhibit the following responses to changes in noise levels. An increase or decrease of 1.0 dBA cannot be perceived except in carefully controlled laboratory experiments. A 3.0 dBA increase is considered just noticeable outside of the laboratory. An increase of 5.0 dBA is often necessary before any noticeable change in community response (i.e. complaints) would be expected.[7]

Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon each individual's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including:

- fear associated with noise producing activities;
- socio-economic status and educational level of the receptor;
- noise receptor's perception that they are being unfairly treated;
- attitudes regarding the usefulness of the noise producing activity; and
- receptor's belief that the noise source can be controlled.[8]

Studies have shown that changes in long-term noise levels measured in units of Ldn or CNEL, are noticeable and are responded to by people. About 10 percent of the people exposed to traffic noise of 60 Ldn will report being highly annoyed with the noise, and each increase of one Ldn is associated with approximately 2 percent more people being highly annoyed. When traffic noise exceeds 60 Ldn or aircraft noise exceeds 55 Ldn, people begin complaining.[9] Group or legal actions to stop the noise should be expected to begin at traffic noise levels near 70 Ldn and aircraft noise levels near 65 Ldn.

6. Bolt Beranek & Newman, *Literature Survey for the FHA Contract on Urban Noise*, Report No. 1460, January 1967.
7. State of California, Department of Transportation, *Noise Manual*, 1980 and Highway Research Board, *National Cooperative Highway Research Program Report 117*, 1971.
8. United States Environmental Protection Agency, *Public Health and Welfare Criteria For Noise*, July 1973.
9. State of California, Department of Health Services, Dr. Jerome Lukas, Memo dated July 11, 1984.

3.4 Land Use Compatibility With Noise

Some land uses are more tolerant of noise than others. Schools, hospitals, churches and residences are more sensitive to noise intrusion than commercial or industrial activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. Consequently, land use compatibility with the noise environment is important in the planning and design process.

The annoyance-based research by the federal Environmental Protection Agency prescribes an average 24-hour noise level of 55 dBA as the goal for exterior noise levels in residential areas, with 75 dBA identified as the absolute upper limit of acceptability. Table 3-3 summarizes the EPA findings with regard to: (1) the effects of various noise levels on residential communities (in terms of hearing loss, speech interference and annoyance); (2) the general community attitude toward the area; and (3) the average community reaction to different noise exposure levels. While these levels are relevant for planning and design, they are not land use planning criteria because they do not consider economic cost, technical feasibility or the development needs of the community.

3.4.1 Palm Springs General Plan Standards and Policies

Noise concerns must be incorporated in land use planning to reduce the potential for future noise/land use incompatibilities within the City of Palm Springs. The City has adopted standards and criteria that specify acceptable limits of noise for various land uses to prevent noise/land use conflicts. The City reduces the impact of transportation noise in the community through the construction of noise barriers and by site design review. The impacts of non-transportation noises are effectively controlled through the enforcement and application of the City's Noise Ordinance and the Construction Site Regulations in the *Palm Springs Municipal Code*.

Goals and policies regarding land use compatibility with noise are identified in the Noise Element of the *Palm Springs 2007 General Plan*. The goal of the Noise Element is to protect residential areas and other sensitive land uses from impacts generated by exposure to excessive noise levels, by minimizing to the greatest extent possible, noise impacts associated with stationary, mobile and temporary noise sources. The Noise Element identifies numerous policies and actions designed to achieve these goals.

The Noise Element contains guidelines for land use compatibility with various community noise exposure levels to permit noise concerns to be incorporated in the land use planning process and prevents future noise incompatibilities. As shown in Figure 3-3, community noise levels are identified as "normally acceptable", "conditionally acceptable", "normally unacceptable", or "clearly unacceptable" for each land use category. A "normally acceptable" designation indicates that conventional construction can occur with no special noise reduction requirements. A "conditionally acceptable" designation implies that new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use type is made and needed noise insulation features are incorporated in the design. If development is to proceed where a "normally unacceptable" designation would apply, the outdoor areas must be shielded and a detailed analysis of the noise reduction requirements must be undertaken to identify design features required to achieve acceptable indoor noise levels. New development should generally not be undertaken if the community noise levels would result in a "clearly unacceptable" designation.

As shown in Figure 3-3, office buildings, businesses, commercial and professional uses, playgrounds and neighborhood parks are considered "normally acceptable" in areas where the exterior noise exposure does not exceed 70 CNEL, but "conditionally acceptable" in areas where the exterior noise exposure is between 67.5 CNEL and 77.5 CNEL. Low-density residential uses are considered "normally acceptable" where the noise exposure is 60 CNEL or less and "conditionally acceptable" where it is between 55 and 70 dBA. Schools and libraries are "normally acceptable" at a CNEL up to 70 dBA and "conditionally acceptable" in areas where noise levels are 60 to 70 CNEL.

Table 3-3

Effects of Noise on People
(Residential Land Uses Only)

Effects[1] / Day-Night Average Sound Level in Decibles	Hearing Loss	Speech Interference		Annoyance[2]	Average Community Reaction[4]	General Community Attitude Toward Area
		Indoor	Outdoor			
	Qualitative Description	% Sentence Intelligibility	Distance in Meters for 95% Sentence Intelligibility	% of Population Highly Annoyed[3]		
75 and above	May Begin to Occur	98%	0.5	37%	Very Severe	Noise is likely to be the most important of all adverse aspects of the community environment.
70	Will Not Likely Occur	99%	0.9	25%	Severe	Noise is one of the most important adverse aspects of the community environment.
65	Will Not Occur	100%	1.5	15%	Significant	Noise is one of the important adverse aspects of the community environment.
60	Will Not Occur	100%	2.0	9%	Moderate to Slight	Noise may be considered an adverse aspect of the community environment.
55 and below	Will Not Occur	100%	3.5	4%		Noise is considered no more important than various other environmental factors.

1. "Speech Interference" data are drawn from the following tables in EPA's "Levels Document:" Table 3, Fig. D-1, Fig. D-2, Fig. D-3. All other data from National Academy of Science report "Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise" (1977).

2. Depends on attitudes and other factors.

3. The percentages of people reporting annoyance to lesser extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in integrating annoyance over a very long time.

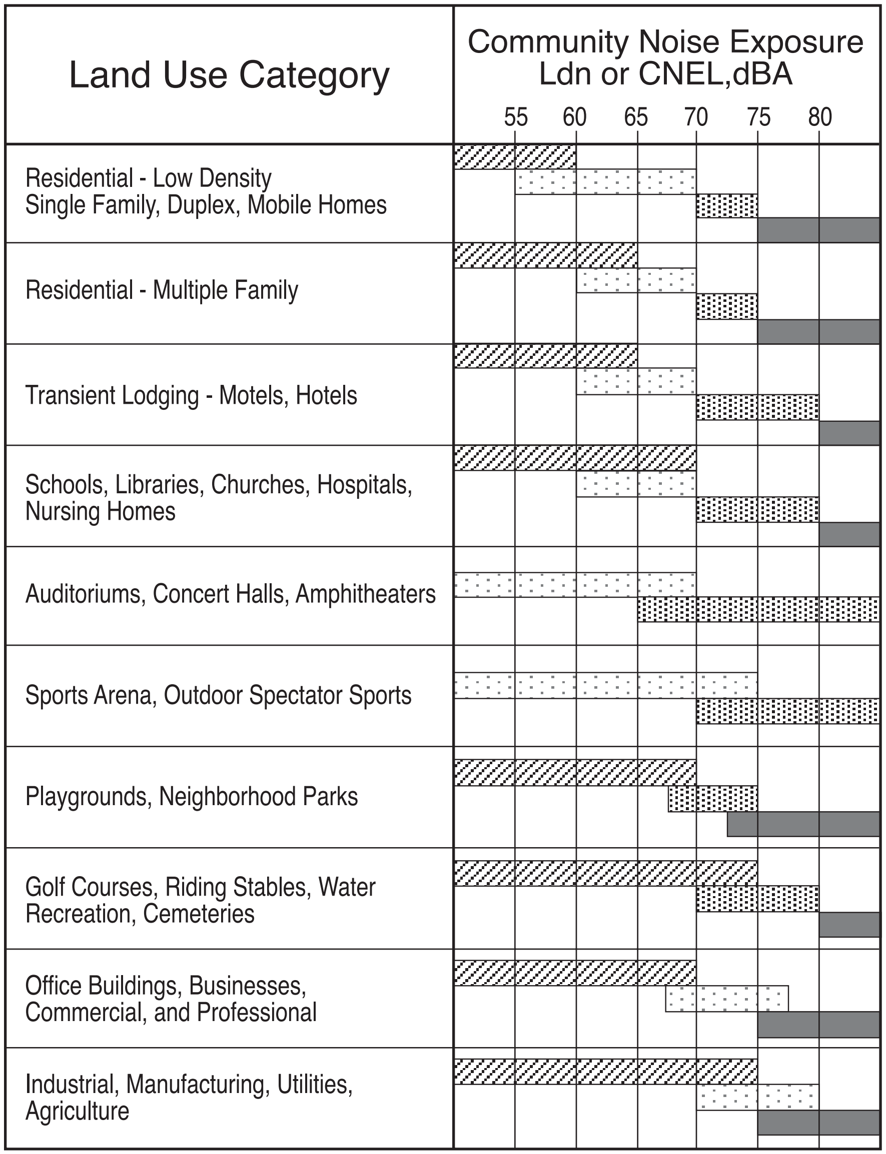
4. Attitudes or other non-acoustic factors can modify this. Noise at low levels can still be an important problem, particularly when it intrudes into a quiet environment.

Note: Research implicates noise as a factor producing stress-related health effects such as heart disease, high blood pressure and stroke, ulcers and other digestive disorders. The relationships between noise and these effects, however have not as yet been conclusively demonstrated.

Source: U.S. Department of Transportation "Guidelines for Considering Noise in Land Use Planning and Control", 1980

Figure 3-3

Land Use Compatibility for Community Noise Exposure



Interpretation

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.

Conditionally Acceptable

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise reduction insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment will seem noisy.

Normally Unacceptable

New construction or development should generally be discouraged. If new construction or develoment does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor areas must be shielded.

Clearly Unacceptable

New construction or development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

Endo Engineering

Source: “Palm Springs 2007 General Plan,” Adopted October 24, 2007.

City Noise Standards

To protect citizens from the harmful and annoying effects of exposure to excessive noise, the City of Palm Springs has adopted specific interior and exterior noise standards related to various land uses in the Noise Element of the *Palm Springs 2007 General Plan.* Table 3-4 presents the City policies regarding interior and exterior noise standards by land use category. As shown in Table 3-4, the exterior noise standard is 65 CNEL for parks, residential development, school classrooms and playgrounds. There is no exterior noise standard for movie theaters, libraries, meeting halls, offices, commercial/retail development, or restaurants.

Table 3-4
City of Palm Springs Interior and Exterior Noise Standards[a]

Land Use		CNEL (dBA)	
Category	Uses	Interior[b]	Exterior[c]
Residential	Single-Family, Multiple-Family, Duplex	45[d]	65
	Mobile Homes	--	65[e]
Commercial	Hotel, Motel, Transient Housing	45	--
	Commercial Retail, Bank, Restaurant	55	--
	Office Building, Research and Development, Professional Offices	50	--
	Amphitheater, Concert Hall, Auditorium, Meeting Hall	45	--
	Gymnasium (Multipurpose)	50	--
	Sports Club	55	--
	Manufacturing, Warehousing, Wholesale, Utilities	65	--
	Movie Theaters	45	--
Institutional/Public	Hospital, School, Classrooms/Playgrounds	45	65
	Church, Library	45	--
Open Space	Parks	--	65

a. Noise Element of the *Palm Springs 2007 General Plan*, Adopted October 24, 2007, pg. 8-8, based on the California Office of Planning and Research "General Plan Guidelines," 2003.
b. Indoor environment excluding bathrooms, kitchens, toilets, closets, and corridors.
c. The exterior noise levels are to be attained in habitable areas and need not encompass the entire property. Habitable areas are dwelling areas that are occupied, or intended or designed to be occupied by one family with facilities for living, sleeping, cooking and eating per the California Health and Safety Code Section 19970. The outdoor environment is limited to: the private yard of single-family dwellings; multiple-family private patios or balconies accessed from within the dwelling (balconies 6 feet deep or less are exempt); mobile home parks; park picnic areas; school playgrounds; and hospital patios.
d. Noise-level requirement with closed windows, mechanical ventilation, or other means of natural ventilation shall be provided per Chapter 12, Section 1205 of the *Uniform Building Code*.
e. Exterior noise levels should be such that interior noise levels will not exceed 45 dBA CNEL.

Exterior noise levels apply to outdoor areas which have regular human use and in which a lowered noise level would be beneficial. They need not be applied to the entire property, to areas having limited human use, or where lowered noise levels would produce little benefit. Outdoor environments are generally limited to private yards of single-family residences, private patios or balconies of multi-family residences, mobile home parks, picnic areas at parks, and school playgrounds.

Interior noise standards relate to indoor activity areas where no exterior noise-sensitive land use or activity is identified. Interior noise standards typically apply to indoor environments excluding bathrooms, kitchen areas, closets and corridors. An interior noise standard of 45 CNEL applies to meeting halls, movie theaters, schools, libraries, single-family and multiple-family residential development. The interior noise standard for offices is 50 CNEL. Commercial retail uses have an interior noise standard of 55 CNEL.

City Noise Goals and Policies

The City of Palm Springs has adopted numerous noise policies designed to achieve the City's noise goals. The following City noise goals are set forth in the Noise Element of the *Palm Springs 2007 General Plan.*

- Protect residential areas and other sensitive land uses from impacts generated by exposure to excessive noise.
- Minimize, to the greatest extent possible, the impact of transportation-related noise on residential areas and other sensitive land uses.
- Minimize, to the greatest extent possible, the impact of nontransportation-related stationary and temporary noise on residential areas and other sensitive land uses.

The following noise policies identified in the *Palm Springs 2007 General Plan* may be relevant to the proposed project.

Policy NS1.1 Continue to enforce acceptable noise standards consistent with health and quality of life goals established by the City and employ noise abatement measures, including the noise ordinance, applicable building codes, and subdivision and zoning regulations.

Policy NS1.2 Encourage the application of site planning and architectural design techniques that reduce noise impacts on proposed and existing projects.

Policy NS1.3 Utilize maximum anticipated, or "worst case," noise conditions as the basis for land use decisions and design controls as a means of preventing future incompatibilities.

Policy NS1.4 Evaluate the compatibility of proposed land uses with the existing noise environment when preparing, revising, or reviewing development proposals.

Policy NS1.5 Protect noise-sensitive land uses such as schools, hospitals, and convalescent homes from unacceptable noise levels from both existing and future noise sources.

Policy NS1.6 Require mitigation where sensitive uses are to be placed along transportation routes to ensure compliance with state noise standards.

Policy NS1.7 Allow new developments in areas exposed to noise levels greater than 60 dB CNEL only if appropriate mitigation measures are included such that applicable noise standards are met.

Policy NS1.8 Include measures within project design that will assure that adequate interior noise levels are attained as required by the California Building Standards Code (Title 24), California Noise Insulation Standards (Title 25) and pertinent sections of the *California Building Code* and the *Palm Springs Municipal Code*.

Policy NS1.9 Develop joint agreements with adjacent jurisdictions to apply standardized zoning and soundproofing requirements to reduce noise incompatibilities across jurisdictional boundaries.

Policy NS1.10 Minimize noise spill over from commercial uses into adjacent residential neighborhoods.

Policy NS1.11 Encourage public agencies and institutions located in the City to incorporate appropriate measures to contain noise generated by their activities on-site.

Policy NS2.1 Require noise-attenuating project design or sound barriers to reduce the level of traffic-generated noise on residential and other noise-sensitive land uses to acceptable levels.

Policy NS2.2 Use traffic calming measures to reduce vehicular speeds and noise levels in residential neighborhoods.

Policy NS2.4 Require that new development minimize the noise impacts of trips it generates on residential neighborhoods by locating driveways and parking away from the habitable portions of dwellings to the greatest extent possible.

Policy NS2.5 Require that development generating increased traffic and subsequent increases in the ambient noise levels adjacent to noise-sensitive land uses provide appropriate mitigation to reduce the impact of noise.

Policy NS2.6 Employ noise-mitigation practices, such as natural buffers or setbacks between arterial roadways and noise-sensitive areas, when designing future streets and highways, and when improvements occur along existing road segments.

Policy NS2.7 Maintain roadways so that the paving is in good condition to reduce noise-generating cracks, bumps, and potholes.

Policy NS2.10 Require new equipment and vehicles purchased by the City to comply with noise-performance standards consistent with the best available noise-reduction technology.

Policy NS2.11 Encourage employers to participate in vanpools and other transportation demand management programs to reduce traffic and noise impacts in the City.

Policy NS2.12 Work with local agencies to provide public transit services that reduce traffic and noise and to ensure that the equipment they use does not generate excessive noise levels.

Policy NS2.13 Encourage the Union Pacific railroad to minimize the level of noise produced by train movements and whistle noise within the City by reducing the number of nighttime operations, improving vehicle system technology and constructing new or developing improved sound barriers where residences exist next to the track.

Policy NS 2.14 Review and evaluate the City's traffic-flow systems to synchronize signalization to avoid traffic stops, which produce excessive noise.

Policy NS2.15 Locate land uses that are compatible with higher noise levels adjacent to major roads and railway corridors.

Policy NS2.16 Restrict truck access in the City to approved truck routes and review hours of access to maximize residential and commercial activities free of truck traffic.

Policy NS2.17 Restrict early-morning trash pickup to less-sensitive land use areas where possible and rotate early morning pickup areas where restrictions are not possible.

Policy NS2.18 Require businesses that generate substantial parking overflow into residential areas to participate in the development of municipal or private parking structures.

Policy NS2.23 Work with the federal government to incorporate helicopter routes on the "VFR (Visual Flight Rules) Aeronautical Chart" that align with the City's commercial corridors, such as Palm Canyon and Indian Canyon Drives.

Policy NS2.24 Maximum compatibility between aircraft operations at Palm Springs International Airport and noise-sensitive land uses within the environs of the airport shall be achieved through compliance with the Noise Compatibility Plan of the *FAR Part 150 Noise Compatibility Study*.

Policy NS2.25 Encourage and facilitate the development of alternative transportation modes that minimize noise within residential areas such as bicycle and pedestrian pathways.

Policy NS3.1 Require that automobile and truck access to commercial properties - including loading and trash areas - located adjacent to residential parcels be located at the maximum practical distance from the residential parcel.

Policy NS3.2 Require that parking for commercial uses adjacent to residential areas be enclosed within a structure or separated by a solid wall with quality landscaping as a visual buffer.

Policy NS3.3 Require that parking lots and structures be designed to minimize noise impacts on-site and on adjacent uses, including the use of materials that mitigate sound transmissions and configuration of interior spaces to minimize sound amplification and transmission.

Policy NS3.4 Minimize, to the greatest extent possible, noise impacts on adjacent residential areas from live entertainment, amplified music, or other noise associated with nearby commercial or restaurant uses.

Policy NS3.5 Require that entertainment uses, restaurants, and bars control the activities of their patrons to the greatest extent possible to minimize noise impacts on adjacent residences.

Policy NS3.6 Restrict, where appropriate, the development of entertainment uses and other high-noise-generating uses adjacent to residential areas, senior citizen housing, schools, health care facilities, and other noise-sensitive uses.

Policy NS3.7 Pursue the development of municipal parking structures in commercial districts to reduce parking overflow into adjacent neighborhoods and the noise impacts associated with overflow parking.

Policy NS3.9 Encourage commercial uses that abut residential properties to employ techniques to mitigate noise impacts from truck deliveries, such as the use of a sound wall or enclosure of the delivery area.

Policy NS3.10 Require that construction activities that impact adjacent residential units comply with the hours of operation and noise levels identified in the City Noise Ordinance.

Policy NS3.11 Require that construction activities incorporate feasible and practical techniques which minimize the noise impacts on adjacent uses, such as the use of mufflers and intake silencers no less effective than originally equipped.

Policy NS3.12 Encourage the use of portable noise barriers for heavy equipment operations performed within 100 feet of existing residences, or make applicants provide evidence as to why the use of such barriers is not feasible.

Policy NS3.15 Work with public agencies and institutions that maintain facilities in the City to ensure that noise generated by their activities is limited to their site. Appropriate mitigation measures such as physical enclosures and time restrictions for operation shall be implemented.

Policy NS3.16 Allow for deviations from the noise standards for projects that are considered to be of significant importance (municipal revenue, socially valued, etc.) or contribute significant benefits to the City, provided that:

- The impacts can be mitigated by an acceptable compensating mechanism; and
- The impacts shall be reviewed with public hearings by the community and approved by the Planning Commission and City Council in conjunction with a Planned Development District.

Policy NS3.17 Promote the use of solar energy generation systems to reduce noise impacts on the community.

Palm Springs Municipal Code Requirements

Operational Noise

The Palm Springs Noise Ordinance (Chapter 11.74) was designed to protect quiet residential areas throughout the City of Palm Springs from non-transportation noise sources. The noise levels encouraged by the Noise Ordinance are typical of a quiet residential area. The Noise Ordinance specifies adopted maximum permissible sound levels by receiving land use and maximum permissible dwelling interior sound levels. These noise control standards apply to non-transportation noise sources and are in addition to the interior and exterior noise standards specified in the Noise Element of the *Palm Springs 2007 General Plan.* These maximum permissible sound levels are applicable to stationary noise sources associated with the long-term operation of the project site. They apply to noise generated by: (1) mechanical equipment (such as HVAC condensers and exhaust fans); (2) loading docks and service access areas; (3) noise generated in parking areas; and (4) noise generated by amplified public address systems.

Unless a permit has been granted by the board of appeals, no person shall operate or cause to be operated any single or combination of fixed source or non-stationary source type of equipment or machinery (except construction equipment) used in connection with construction operations that individually or collectively constitutes an identifiable sound source in such a manner as to cause the sound level at any point on the property line of any property to exceed by five decibels or more the noise level limits set forth in Sections 11.74.031 and 11.74.032, as outlined below. However, if the measurement location is on a boundary between two different zones, the noise level limit applicable to the lower noise zone plus five decibels shall apply.

The Palm Springs Noise Ordinance sets noise level limits in low-density residential areas adjacent to commercial areas of 55 dBA (between 7:00 a.m. and 6:00 p.m.), 50 dBA (between 6:00 p.m. and 10:00 p.m.), and 45 dBA (between 10:00 p.m. and 7:00 a.m.). These noise level limits may not be exceeded by five decibels or more at the residential property line, with allowances for time duration of the sound during the daytime hours. The time duration of sound allowances include: +3 dBA for up to 30 minutes per hour, +6 dBA for up to 15 minutes per hour, +8 dBA for up to 10 minutes per hour, +11 dBA for up to 5 minutes per hour, +15 dBA for up to 2 minutes per hour, +18 dBA for up to 1 minute per hour, +21 dBA for up to 30 seconds per hour, and +24 dBA for up to 15 seconds per hour.

Limitation of Hours of Construction

The Construction Site Regulations (Chapter 8.04.220) limit construction work to the hours of 7:00 a.m. to 7:00 p.m. on weekdays and 8:00 a.m. to 5:00 p.m. on Saturdays, if the noise produced is of such intensity or quality that it disturbs the peace and quiet of any other person of normal sensitivity. Construction work is not permitted on Sundays or major holidays (including Thanksgiving Day, Christmas Day, New Years Day, July 4th, Labor Day, and Memorial Day) when residents are more likely to be at home.

3.5 Current Noise Exposure

The primary sources of noise in the study area are transportation facilities. Master planned roadways are located adjacent to the project site that accommodate passenger cars, trucks, buses and motorcycles that increase ambient noise levels within the project site as well as throughout the study area. In addition, the Palm Springs International Airport generates aircraft over flights, and railroad lines pass through the City of Palm Springs north of the project site on the Union Pacific Railroad lines located south of Interstate 10.

The CNEL noise metric allows the total noise exposure of an area resulting from many individual noise events over a long period of time to be summed and expressed as a single value and mapped as a series of contour lines around the noise source. CNEL values represent the accumulation of noise energy in a manner somewhat similar to the way a rain gauge accumulates precipitation from passing storm fronts. Whether the noise event is brief and intense or occurs over an extended period at lower levels, the total noise energy at a location is summed to determine the exposure over a specified period.

In the case of highway noise, CNEL values typically reflect the noise exposure over an average 24-hour period. CNEL values can reflect the noise exposure over the peak activity period or over a year, as is often the case with airport contours. In either case, they reflect the weighted summation of all of the sound events at a designated location, whether the events are far away with minimal effect or nearby, creating the dominant noise exposure at that location.

With the CNEL metric, sound events that occur during the evening hours are given a 5 dB penalty while those that occur at night are given a 10 dB penalty, to reflect the sensitivity of noise-sensitive receptors to sound events during these periods. This assumes that one evening noise event is equal in impact to three similar daytime events and one nighttime sound event is equal in impact to ten equivalent daytime sound events.

3.5.1 Aircraft Noise

The Palm Springs International Airport generates aircraft over flights that are audible and affect the current noise exposure of the project site and the study area. At its closest point, the end of the runway at the Palm Springs International Airport is located 0.75 miles east of the site. The maximum noise exposure considered acceptable for new residential land uses in the environs of the Palm Springs International Airport is 62 dB CNEL.[10] The *Riverside County Airport Land Use Compatibility Plan* recommends that dwellings incorporate special noise attenuation measures in their design, if required, to ensure that interior noise levels do not exceed 45 dB CNEL.

The *Palm Springs 2007 General Plan* includes airport noise contours that represent a composite of year 2002 and year 2020 noise levels derived from the *Palm Springs International Airport Master Plan Study* (May 2003). As shown in Figure 3-4, at its closest point, the site is located approximately 2,640 feet outside the 60 dB CNEL contour and 3,070 feet outside the 65 dB CNEL contour associated with the Palm Springs International Airport.[11]

3.5.2 Railroad Noise

The Union Pacific rail corridor is located north of the study area, along the south side of Interstate 10. Pursuant to the Noise Control Act, the Environmental Protection Agency regulates railroad noise and sets operating noise standards for railroad equipment. Figure 8-4 of the *Palm Springs 2007 General Plan* identifies the 65 dB CNEL railroad noise contour as being located approximately 900 feet on either side of the Union Pacific railroad tracks. The northern boundary of the site is located approximately 3.3 miles south of the Union Pacific rail corridor. Although the noise generated by railroad activities may be audible within the site at times, it does not pose a significant constraint to noise-sensitive development.

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10. *Riverside County Airport Land Use Compatibility Plan Policy Document* (Adopted March 2005).
11. *Palm Springs 2007 General Plan* (Figure 8-6) based upon the year 2002 and 2020 contours in the *Palm Springs International Airport Master Plan Study* (May, 2003).

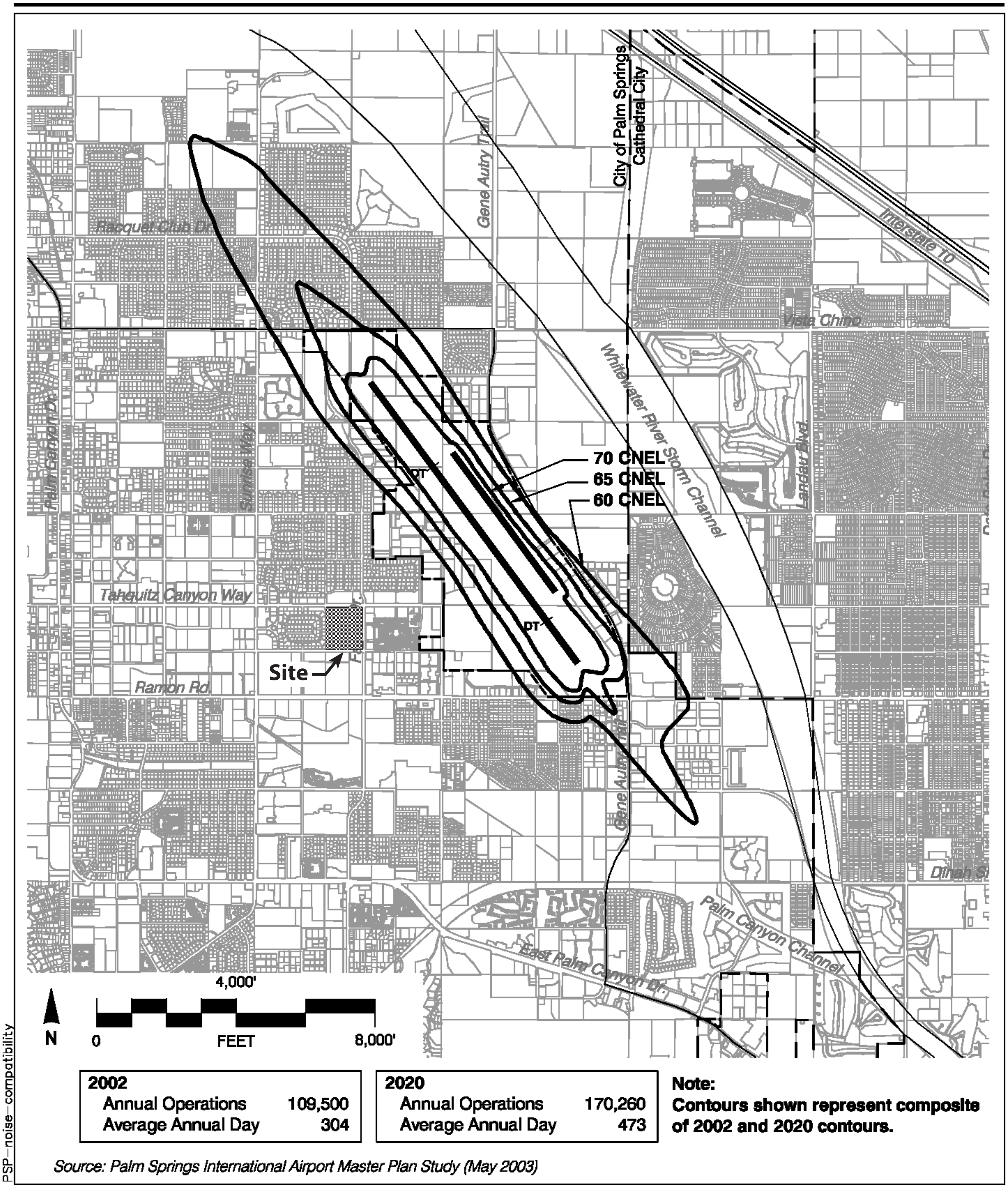

Figure 3-4
Palm Springs International Airport
Noise Compatibility Contours

3.5.3 Motor Vehicle Noise

The northern boundary of the project site is located approximately 3.5 miles south of the Interstate 10 freeway. Figure 8-4 of the *Palm Springs 2007 General Plan* identifies the 60 CNEL noise contour generated by vehicles on Interstate 10 as being located approximately 4,870 feet north and south of the Interstate 10 centerline east of Indian Canyon Drive. The 65 CNEL contour is located approximately 1,850 feet north and south of Interstate 10 in this area. Consequently, the noise generated by traffic on the Interstate 10 freeway is not audible within the site and does not pose a constraint to noise-sensitive development within the site.

Noise from motor vehicles is generated by engine vibrations, the interaction between the tires and the road, and the exhaust system. Consequently, reducing the speed of motor vehicles reduces the noise exposure of listeners both inside the vehicle and adjacent to the roadway. The Federal Highway Traffic Noise Prediction Model (RD-77-108) developed by the Federal Highway Administration and used throughout the United States was utilized to estimate existing highway noise conditions near the project site. The FHWA Highway Traffic Noise Prediction Model is based upon reference energy emission levels for automobiles, medium trucks (2 axles) and heavy trucks (3 or more axles). As recommended by Caltrans, the Calveno traffic noise emission curves were used to accurately estimate the noise levels within the study area.

This noise model accepts various parameters including the traffic volume, vehicle mix and speed, and roadway geometry, in computing equivalent noise levels during typical daytime, evening, and nighttime hours. The resultant noise levels are then weighted, summed over 24 hours, and output as the CNEL value. The model assumes that the noise receptor has a clear unobstructed line-of-sight exposure to the traffic on the roadway, with no barrier or other shielding at the receiver location. The noise contours assume flat terrain, without barrier interference or field-of-view restrictions such as intervening buildings or landscaping.

Noise contours are lines of constant sound level. Various CNEL contours were located through a series of computerized iterations designed to isolate the 60, 65, and 70 CNEL contour locations. The CNEL values include adjustments during the evening and night to compensate for the heightened sensitivity of the average listener during these hours.

The traffic data used for the noise modeling was taken from the *College of the Desert West Valley Campus Master Plan and Phase I Project Traffic Impact Study* (Endo Engineering; July 15, 2015). An eight percent truck mix was assumed for the noise modeling of Major Thoroughfares. The truck mix specified by Riverside County for noise analyses (2.58 percent trucks) was assumed for all Secondary Thoroughfares and Collector Streets.[12] To ensure a conservative analysis, all sites were considered "hard" as opposed to "soft" so that noise levels were atmospherically attenuated by geometric spreading of the sound energy at a rate of 3.0 dBA with each doubling of distance.

Table 3-5 provides the current noise levels adjacent to roadways within the study area. The distances to various noise contours used for land use compatibility purposes shown therein were determined by assuming a sound propagation with distance drop-off rate of 3.0 dBA with each doubling.[13]

As shown in Table 3-5, the ambient noise levels generated by vehicles along area roadways currently range from a low of 50.0 CNEL at 50 feet from the centerline of Civic Drive, south of Baristo Road, to a high of 77.9 CNEL at 50 feet from the centerline of Ramon Road, east of Farrell Drive. Within the study area, the 70 CNEL contour is currently located within the right-of-way of Alejo Road, Amado Road, Cerritos Drive, Civic Drive, and Sunset Way. Throughout the study area, the 70 CNEL contour is currently located outside the right-of-way of El Cielo Road, Farrell Drive, Ramon Road, Sunrise Way, and Tahquitz Canyon Way.

12. Riverside County Department of Health, *Memorandum Regarding Requirements for Determining and Mitigating Traffic Noise Impacts to Residential Structures.* (January 15, 2004).
13. Ibid.

Table 3-5
Existing Exterior Noise Exposure Adjacent to Area Roadways

Roadway Segment	A.D.T.[a] (Veh./Day)	CNEL @ 50 Feet[b]	Distance to Contours (Ft.)[c] 70 dBA	65 dBA	60 dBA
Sunrise Way					
North of Tahquitz Canyon Way	22,320	76.2	184	579	1,829
South of Tahquitz Canyon Way	21,360	75.2	147	460	1,453
North of Baristo Road	21,940	75.3	151	471	1,486
South of Baristo Road	22,610	75.5	157	493	1,557
Sunset Way					
North of Tahquitz Canyon Way	1,560	56.8	R/W	R/W	R/W
Cerritos Drive					
North of Baristo Road	460	51.5	R/W	R/W	R/W
South of Baristo Road	1,550	56.8	R/W	R/W	R/W
Farrell Drive					
North of Alejo Road	13,810	71.2	63	184	579
South of Alejo Road	14,130	71.3	64	189	592
North of Amado Road	14,290	71.4	65	193	606
South of Amado Road	15,110	71.6	68	202	634
North of Tahquitz Canyon Way	15,910	71.8	71	211	664
South of Tahquitz Canyon Way	12,140	70.6	56	161	504
North of Baristo Road	11,340	70.3	53	151	471
South of Baristo Road	10,540	70.0	50	141	439
North of Ramon Road	11,180	70.3	53	151	471
South of Ramon Road	9,190	69.4	45	123	383
Compadre Road					
South of Baristo Road	990	54.8	R/W	R/W	R/W
Civic Drive					
North of Tahquitz Canyon Way	2,690	60.5	R/W	R/W	56
South of Tahquitz Canyon Way	1,030	56.3	R/W	R/W	R/W
North of Baristo Road	990	56.2	R/W	R/W	R/W
South of Baristo Road	240	50.0	R/W	R/W	R/W
El Cielo Road					
North of Tahquitz Canyon Way	4,690	69.6	46	143	453
South of Tahquitz Canyon Way	12,410	74.4	123	383	1,208
North of Baristo Road	12,780	74.5	126	392	1,236
South of Baristo Road	13,740	74.8	135	420	1,325
Alejo Road					
West of Farrell Drive	3,780	65.0	R/W	R/W	157
East of Farrell Drive	2,910	61.6	R/W	R/W	72

a. A.D.T. = year 2015 peak season average daily two-way traffic volume.
b. CNEL values are given at 50 feet from the roadway centerline (see Appendix B for model assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the street right-of-way.

Table 3-5 (Continued)
Existing Exterior Noise Exposure Adjacent to Area Roadways

Roadway Segment	A.D.T.[a] (Veh./Day)	CNEL @ 50 Feet[b]	Distance to Contours (Ft.)[c] 70 dBA	65 dBA	60 dBA
Amado Road					
West of Farrell Drive	1,390	59.6	R/W	R/W	R/W
Tahquitz Canyon Way					
West of Sunrise Way	11,910	73.5	101	311	982
East of Sunrise Way	12,610	73.7	106	326	1,029
West of Sunset Way	12,770	73.8	108	334	1,052
East of Sunset Way	12,070	73.5	101	311	982
West of Farrell Drive	11,700	73.4	99	304	960
East of Farrell Drive	14,400	74.3	120	374	1,181
West of Civic Drive	14,390	74.3	120	374	1,181
East of Civic Drive	13,640	74.1	115	357	1,128
West of El Cielo Road	13,630	74.0	113	349	1,102
East of El Cielo Road	5,290	69.9	49	138	429
Baristo Road					
West of Sunrise Way	3,610	63.7	R/W	37	117
East of Sunrise Way	5,840	65.9	R/W	61	189
West of Cerritos Drive	5,870	65.9	R/W	61	189
East of Cerritos Drive	6,140	66.0	R/W	63	198
West of PS High School	5,900	66.0	R/W	62	194
East of PS High School	6,430	66.3	R/W	67	207
West of Farrell Drive	6,570	66.4	R/W	68	212
East of Farrell Drive	5,460	65.6	R/W	57	177
West of Compadre Road	5,080	65.3	R/W	R/W	165
East of Compadre Road	4,450	64.7	R/W	R/W	144
West of Civic Drive	4,340	64.6	R/W	R/W	141
East of Civic Drive	4,230	64.5	R/W	R/W	137
West of El Cielo Road	4,260	64.5	R/W	R/W	137
East of El Cielo Road	3,020	63.0	R/W	R/W	98
Ramon Road					
West of Farrell Drive	23,330	77.1	226	712	2,250
East of Farrell Drive	27,700	77.9	272	856	2,705

a. A.D.T. = year 2015 peak season average daily two-way traffic volume.
b. CNEL values are given at 50 feet from the roadway centerline (see Appendix B for model assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the street right-of-way.

The 70 dBA contour presently falls within the right-of-way along 25 of the 55 (45 percent) roadway segments analyzed. The 65 CNEL contour is located within the right-of-way along 17 of the roadway segments analyzed (31 percent). The 60 CNEL contour is located within the right-of-way along eight of the roadway segments evaluated (15 percent). Within the project site, the 65 CNEL contour generated by motor vehicles on the adjacent roadways is currently located approximately 300 feet from the centerline of Tahquitz Canyon Way, 70 feet from the centerline of Baristo Road and 160 feet from the centerline of Farrell Drive. Thus, the 65 dB CNEL contour is currently located approximately 250 feet within the site along Tahquitz Canyon Way, 120 feet within the site along Farrell Drive, and 25 feet within the site along Baristo Road.

Table 3-6 identifies the number of roadway segments within the study area that generate noise levels at a distance of fifty feet from their centerline within various of noise level ranges. In addition, the percentage of the roadways modeled that was found to fall within each range of noise levels is shown in Table 3-6. As shown therein, eleven percent of the roadways modeled currently generate noise levels that exceed 75 CNEL at a point located 50 feet from their centerline. Twenty-two percent of the roadway segments modeled generate noise levels between 65 and 70 CNEL. Thirty-one percent of the roadway segments modeled generate noise levels below 65 CNEL. Thirty-six percent of the roadway segments modeled generate noise levels between 70 and 75 CNEL.

Table 3-6
Area Roadway Segments Currently Generating Noise Levels
At Fifty Feet Within Various CNEL Ranges

Noise Exposure Range At 50 Feet From Centerline	Number of Roadway Segments In Range	Percentage of Roadway Segments Within Noise Exposure Range
≤ 60 CNEL	9	16
60.1-65.0 CNEL	9	16
65.1-70.0 CNEL	12	21
70.1-75.0 CNEL	20	36
75.1-80.0 CNEL	6	11

Noise Generated By Development Within the Site

Non-transportation noise levels currently generated within the Palm Springs Mall site are typical of urbanized areas and include sounds associated with the existing fast-food restaurant and movie theater that occupy the parcels in the northeast and southwest corners of the site, as well as the Kaplan College operating within the mall building. Except for the Kaplan College, the Palm Springs Mall building is unoccupied and generates very little noise. Relatively few motor vehicles currently enter and leave the site. Those that do, typically park in the northeast corner of the site, more than 500 feet from the noise-sensitive single-family residential land uses adjacent to the western site boundary.

Heavy delivery trucks no longer frequent the loading docks constructed to serve the retail uses in the mall. The HVAC condensing units and exhaust fans mounted on the building roof behind the building façade generate very low levels of noise at ground level. The speakers used to communicate with patrons in vehicles at the fast food restaurant do not generate substantial noise levels, compared to the noise levels generated by motor vehicles along Tahquitz Canyon Way and Farrell Drive.

The Camelot Theatres were constructed with the soundproofing necessary to comply with the City of Palm Springs Noise Ordinance. The *Palm Springs Municipal Code* limits sound levels for stationary sources of noise radiated for extended periods from any premises in excess of 60 decibels at the property line.

3.6 Noise Sensitive Receptors

Noise-sensitive and vibration-sensitive land uses are locations where people reside or the presence of unwanted sound could adversely affect the use of the land. Noise-sensitive land uses identified in the *Palm Springs 2007 General Plan* Noise Element include: residential land uses, hospitals, rest homes and convalescent hospitals, churches, schools, and other areas. Areas identified as "noise sensitive" must be protected from excess noise to maintain the quality of life within the City of Palm Springs. The Federal Highway Administration identifies additional noise-sensitive land uses including: recreation areas, playgrounds, active sports areas, parks, motels, hotels, public meeting rooms, auditoriums, and libraries for federally funded roadway projects that require either federal or Caltrans review.

Land uses that are not considered noise sensitive include: industrial uses, manufacturing uses, utilities, undeveloped land, parking lots, and transit terminals. Land uses considered to be relatively insensitive to noise typically include businesses, commercial, and professional developments.

3.6.1 Land Uses Surrounding the Site

The Palm Springs City Hall is located north of Tahquitz Canyon Way and east of Civic Drive. The courthouse and police station are located south of Tahquitz Canyon Way and west of El Cielo Road. The Palm Springs International Airport occupies more than 930 acres located east of El Cielo Road and west of Gene Autry Trail, between Ramon Road and Vista Chino. The end of the runway at the Palm Springs International Airport is located 0.75 miles east of the site at its closest point.

The area north of the site is developed with medium-density single-story residential land uses and high-density two-story and 3-story apartments. The area to the east is primarily vacant but includes a two-story medical office building on the southeast corner at the intersection of Farrell Drive and Tahquitz Canyon Way with medical imaging equipment which may be sensitive to ground vibration. The area to the west includes low-density single-story residential land uses and professional offices along the north and south side of Tahquitz Canyon Way. The area to the south is developed as the Palm Springs High School. Professional offices occupied by the Palm Springs Unified School District and the Automobile Club of Southern California are located on the southwest and southeast corners at the intersection of Farrell Drive and Baristo Road.

Sensitive Receptors West of the Site

Single-family detached residential land uses occupy the area west of the project site, between Baristo Road and the professional office uses that front on the south side of Tahquitz Canyon Way. Single-story detached residential land uses are located west of and adjacent to the western site boundary. Approximately twenty-one single-story residences in this area are located within 500 feet west of the Palm Springs Mall building that would be demolished to implement the Phase I Project. All of these residences are shielded by the perimeter wall constructed along the western site property line.

The concrete masonry block perimeter wall extends six to eight feet above the parking lot grade and shields the noise-sensitive single-story low-density residential land uses located west of the project site. By interrupting the direct noise path along the line of sight between the noise source and the residential receivers, the existing perimeter wall functions as a noise barrier. It attenuates noise levels at the residences behind the barrier by approximately 5 to 8 decibels.

While landscaping exists along some portions of this wall, it is not sufficiently dense to attenuate noise appreciably. Caltrans research has shown that ordinary landscaping along highways accounts for less than a 1 dBA noise reduction. Trees that extend at least 16 feet above the line of sight must be at least 100 feet wide and very dense to obstruct the visual path to the noise source sufficiently to attenuate traffic noise by 5 dBA.[14]

The existing perimeter wall is highest where the western edge of the existing mall structure is closest to the western property line (i.e., approximately 59 feet east of the property line). This is the location where residences shielded by the perimeter wall are located closest to the site. Four homes are located within 150 feet of the mall structure at this point. The two closest residences are located approximately 90 and 105 feet west of the western

14. Caltrans. *Technical Noise Supplement, A Technical Supplement to the Traffic Noise Analysis Protocol.* October 1998.

façade of the mall building. The neighboring residences to the south and north are located approximately 130 and 140 feet from the western facade of the mall structure.

Seven of the twenty-one residences located within 500 feet of the mall building are in the first row of homes behind the barrier (i.e., located closest to the perimeter wall). Six residences are located in the second row of homes behind the perimeter wall. The closest row of residences will acoustically shield the residents who live in the homes located behind the first row. Shielding occurs when the observer's view of the noise source is obstructed by structures that interfere with the propagation of the sound waves.

The amount of attenuation provided by rows of buildings depends on the size of the gaps between the buildings and has a maximum value of 10 dBA. An attenuation of 3 dBA is typically allowed by the Federal Highway Administration (FHWA) for the first row of buildings, if they occupy 40 to 65 percent of the row leaving gaps which occupy the remaining 35 to 60 percent of the row. Eight additional residences are in the third row of homes west of the perimeter wall and benefit from the partial shielding provided by the two closer rows of residences. Rows of buildings behind the first row will shield the area behind them and are typically assumed to attenuate the exterior sound levels behind them by 1.5 dBA for each row of buildings.

Sensitive Receptors North of the Site

The area north of the project site is developed with medium- and high-density residential land uses. Single-family detached residential land uses with direct residential frontage are located along both sides of Sunset Way, north of Andreas Road. The Desert Holly development includes fourteen single-story condominiums and occupies one acre on the northwest corner at the intersection of Sunset Way with Tahquitz Canyon Way. This complex was constructed in 1957 and provides a solid stucco perimeter wall surrounding the residential units to reduce noise levels generated by vehicles along Tahquitz Canyon Way. This development is located within 500 feet of the northwest corner of the Palm Springs Mall building.

Two-story and three-story apartments occupy the area north of Tahquitz Canyon Way, between Sunset Way and Civic Drive. The Sage Courtyard Apartments are located east of Sunset Way at 2300 East Tahquitz Canyon Way and include 155 dwelling units in two-story buildings built in 1969. The first row of these apartments is within 500 feet of the north facade of the Palm Springs Mall building. The three-story Airport Gardens Apartments are located west of Farrell Drive at 2580 East Tahquitz Canyon Way. The eastern wing of this structure is within 500 feet of the Palm Springs Mall building. The three-story Desert Crest Apartments are located east of Farrell Drive, at 2600 East Tahquitz Canyon Way. Of the 64 units in this development, only the six apartment units located closest to the site appear to be within 500 feet of the Palm Springs Mall building to be demolished.

Sensitive Receptors East of the Site

East of the project site, medical offices occupied by Desert Advanced Imaging are located on the southeast corner at the intersection of Farrell Drive with Tahquitz Canyon Way. The site of the future medium density Jul Residential Development is currently vacant and located east of Farrell Drive, between Tahquitz Canyon Way and Baristo Road. Seventy-nine of the 202 approved Sundial condominiums are located east of the Jul Residential Development site and south of the professional office land uses that front on the south side of Tahquitz Canyon Way. Single-family detached residential land uses are located adjacent to the south side of Baristo Road, east and west of Compadre Road.

Sensitive Receptors South of the Site

Palm Springs High School is located south of the project site with a campus that extends west of Farrell Drive, between Baristo Road and Ramon Road. The surface parking area for the high school is located on the south side of Baristo Road, opposite the Palm Springs Mall site. The gymnasium is located south of the main parking lot. The athletic field associated with the Palm Springs High School is located south of Baristo Road and west of the high school parking lot. Outdoor athletic fields and baseball diamonds occupy the area south of Baristo Road and west of the high school.

Palm Springs High School serves students in grades 9 through 12 and has a current enrollment of approximately 2,164 students. The high school has a full-time faculty of approximately 80 teachers. The zero period starts at 7:00 AM and first period starts at 8:00 AM. Sixth period ends at 2:45 PM. With an enrollment of 2,164 students, Palm Springs High School is projected to generate approximately 633 inbound and 298 outbound trips during the morning peak hour. The weekday traffic volumes on Baristo Road, adjacent to the project site, are highest between 7:15 and 8:15 AM, when classes convene.

An office building occupied by the Automobile Club of Southern California is located on the southeast corner at the intersection of Farrell Drive and Baristo Road. The St. Theresa Catholic Church and Elementary School are located on the west side of Compadre Road, north of Ramon Road.

4.0 NOISE IMPACT ANALYSIS

4.1 Significance Thresholds

Noise increases or decreases of 1.0 dBA cannot be perceived except in carefully controlled laboratory experiments. Therefore, project-related noise increases of this magnitude are not considered to be significant. Studies have shown that the smallest perceptible change in sound level for a person with normal hearing sensitivity is approximately 3 dBA. A change of at least 5 dBA would be noticeable and would likely evoke a community reaction whereas a 10 dBA increase is subjectively heard as a doubling in loudness.

4.1.1 Construction Phase Criteria

Construction noise is of most concern when it is generated near noise-sensitive land uses, occurs at night or during the early morning hours. A significant construction noise impact may result if construction activities occur outside of the hours permitted in the Construction Site Regulations (i.e., between the hours of 7:00 p.m. and 7:00 a.m. on weekdays, before 8:00 a.m. or after 5:00 p.m. on Saturdays, or anytime on Sunday of the six major holidays listed in Chapter 8.04.220 of the *Palm Springs Municipal Code).*

4.1.2 Operational Phase Criteria

The City has adopted a Noise Ordinance in the *Palm Springs Municipal Code* to regulate stationary sources of noise and policies and guidelines in the *Palm Springs 2007 General Plan* to limit the effect of noise on sensitive land uses. The City Noise Ordinance defines noise and regulates it by land use and time of day. These standards represent the exterior noise level limits, as measured at the property boundary. A significant operational noise impact would result if the operation of the proposed project causes the ambient noise level at the property line of the receiving land use to exceed the noise level limits established in the Palm Springs Noise Ordinance (Chapter 11.74 of the *Palm Springs Municipal Code*).

If the project-related change in noise levels exceeds 5.0 dBA, it is considered to be audible and "potentially significant," provided noise-sensitive receptors are affected. If a project-related noise increase exceeds 5.0 dBA and a receiving land use is expected to exceed the noise standards detailed in the Noise Element of the *Palm Springs 2007 General Plan* as a result, the noise impact is considered "clearly significant" and warrants the development of appropriate mitigation strategies.

4.1.3 Groundborne Vibration Criteria

In evaluating the potential for building damage, vibratory motion is commonly described by identifying the peak particle velocity (PPV) in inches per second. To assess human response, an average vibration amplitude is more appropriate and the root-mean-square (RMS) amplitude is typically used. The RMS value is the average of the amplitude squared over time (typically a one-second period) and always less than PPV. For a single frequency, it is about 70 percent of the PPV. For random groundborne vibration, such as that from trains, the RMS value is approximately 25 percent of the peak amplitude.

There are no adopted State or City groundborne vibration standards. However, based on the California Department of Transportation guidelines, the proposed project would result in a significant construction or operational vibration impact if the proposed project would expose buildings to groundborne vibration at or above the structural damage threshold screening criteria of 0.3 PPV appropriate for older residential buildings.[1]

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1. California Department of Transportation, Division of Environmental Analysis Environmental Engineering, Hazardous Waste, Air, Noise, Paleontology Office. *Transportation and Construction Vibration Guidance Manual.* September, 2013.

4.2 Short-Term Construction-Related Impacts

4.2.1 Construction Noise Impacts

Demolition and construction activities require the intermittent use of heavy noise-generating equipment such as jackhammers, pneumatic impact equipment, saws, fork lifts, portable generators, bulldozers, haul trucks, water trucks, and compaction equipment. Consequently, the activities required to demolish the existing Palm Springs Mall main building and implement the Phase I Project and WVC Master Plan would result in temporary increases in the ambient exterior noise levels in the project vicinity on an intermittent basis during the construction activities. The increases in noise levels would be audible at times and may result in the temporary annoyance of nearby residents and other building occupants in the vicinity during the construction period.

Three main methods are typically used to control noise emitted from construction sites: (1) the work hours can be restricted; (2) maximum permitted noise levels can be established by the City of Palm Springs; and (3) the use of the best practical means to minimize noise impacts can be required in the contract specifications or as conditions of approval attached to grading and building permits. The Construction Site Regulations in the *Palm Springs Municipal Code* limit the hours during which construction activities can take place if the noise produced at the property line disturbs nearby noise-sensitive receptors. This will result in demolition and construction work occurring primarily during the daytime hours, when residents are more likely to be away from home. It also allows noise-sensitive neighbors some relief from construction noise during the evenings and nighttime hours on weekdays, on Saturday afternoons, Sundays, and holidays. Construction activities would occur within the hours permitted by the City's Construction Site Regulations unless an after-hours construction permit has been issued by the City for low noise level construction activities such as interior improvements and painting.

Temporary sources of noise such as heavy equipment used for demolition, excavation, and construction activities are controlled through the Noise Control Act of 1972, which sets noise emission standards for construction machinery. Although the Palm Springs Noise Ordinance (Municipal Code Section 11.74.030) limits non-transportation and temporary source noise levels at the property line, construction equipment noise is exempt. The City of Palm Springs has the authority to regulate noise associated with site-specific construction equipment and activities through the imposition of conditions of approval attached to grading and building permits.

The increases in the ambient noise levels at the property line would vary throughout the construction period, depending on several factors. The equipment types and duration of use and the number of equipment being operated at any given time would affect the noise levels generated during construction activities. Since noise levels decrease as the distance from the source increases, the distance between the construction-related activity and the sensitive receptor would affect the ambient exterior noise levels at the receptor. The presence or absence of a noise attenuation barrier of sufficient height to affect the noise transmission path between the noise source and the noise receptor would have a substantial effect on the noise level at the noise receptor. Once the structural framing and exterior building walls have been completed, the majority of the construction activity would occur within the structure and would not substantially increase noise levels at sensitive receptors in the vicinity.

The transport of workers, equipment, and building materials to and from the construction site would incrementally increase noise levels along the roadways leading to and from the site. This increase would be temporary in nature and would not be audible to noise-sensitive receptors located along the roadways utilized for this purpose. The City of Palm Springs has designated truck routes including Sunrise Way, Ramon Road, State Route 111 and Interstate 10, which are designed to accommodate the additional weight and turning radii associated with heavy truck traffic in the City of Palm Springs.

Construction activities are carried out in discrete steps, each of which has its own mix of equipment, and consequently its own noise characteristics. These various sequential phases will change the character of the noise levels surrounding the construction site as work progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow noise ranges to be categorized by work phase.

Typical noise levels at a distance of 50 feet from various types of equipment that may be used during the construction process are shown in Figure 4-1, which illustrates typical construction equipment noise ranges without barriers that could obstruct the noise transmission path between the noise source and receptor. Based on EPA studies of construction noise, construction noise sources are typically active during 40 to 50 percent of the time during a typical 8-hour workday.

The earth-moving equipment category includes excavating machinery (backhoes, bulldozers, shovels, trenchers, front loaders, etc.) and parking lot preparation and paving equipment (compactors, scrapers, graders, pavers, etc.). Typical operating cycles may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Noise levels at 50 feet from earth moving equipment range from 73 to 96 dBA, but relatively little earthwork will be required, given that the site is relatively flat, was previously developed, and the surface parking areas will be reused to the maximum extent feasible.

The Environmental Protection Agency (EPA) has found that the noisiest equipment types operating at construction sites typically range from 88 to 91 dBA at 50 feet. Although noise ranges were found by the EPA to be similar for all construction phases, the erection phase (laying sub-base and paving) tended to be less noisy. Noise levels varied from 79 dBA to 89 dBA at 50 feet during the erection phase of construction. The foundation phase of construction tended to create the highest noise levels, ranging from 88 to 96 dBA at 50 feet. Since 1970, regulations have been enacted to reduce noise levels associated with certain types of construction equipment to meet worker noise exposure standards. However, some older pieces of construction equipment remain in use.

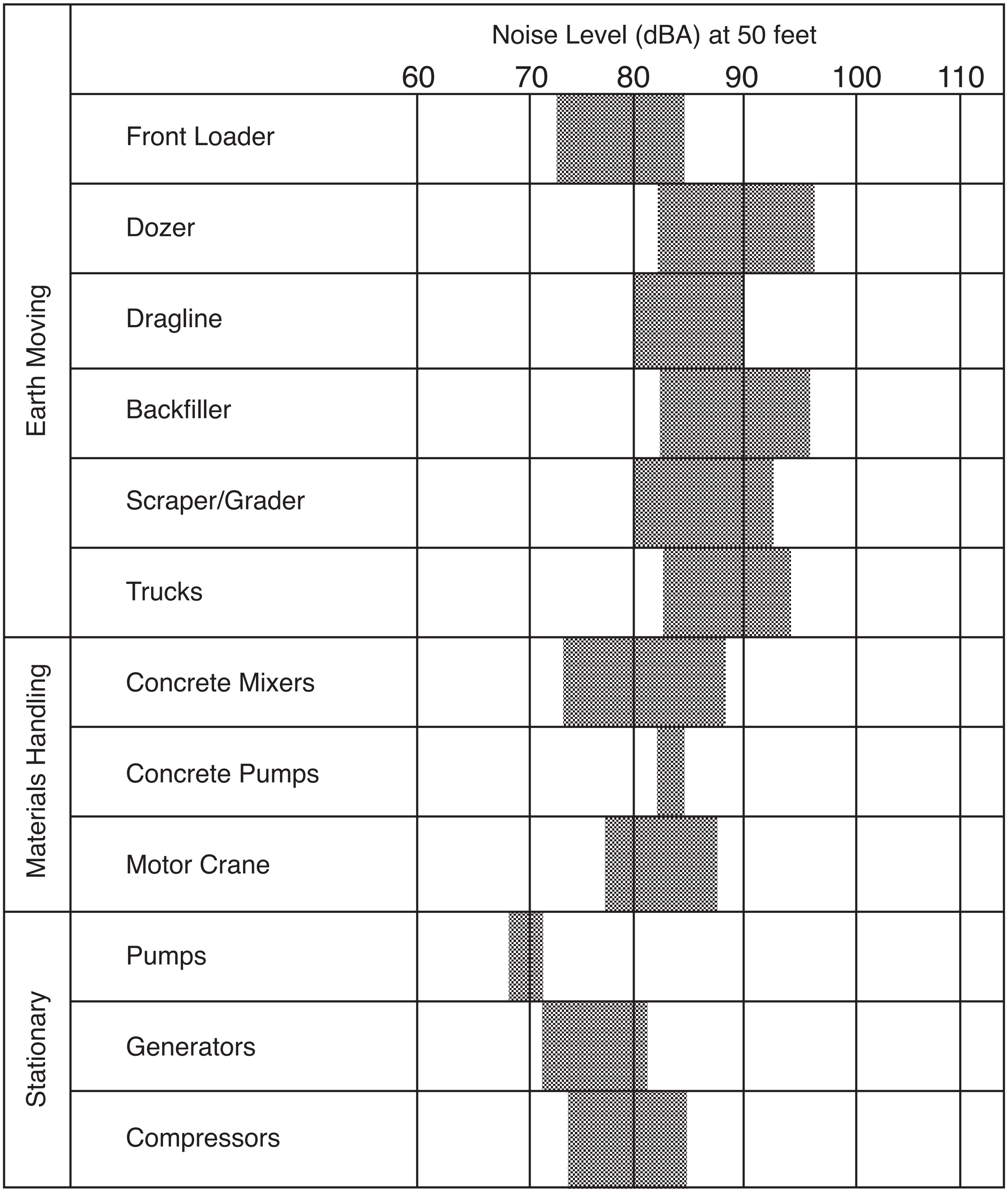
The concrete masonry perimeter wall along the western property line would shield the noise-sensitive residential areas to the west and provide an attenuation of 5 to 8 dBA. Exterior to interior building noise reduction factors range from a low of 10 dB (for all buildings with windows open) to a high of 35 dB (for masonry buildings with double-glazed windows). Masonry buildings with single-glazed windows achieve an exterior to interior noise reduction of 25 dB. Light frame buildings with ordinary sash windows closed achieve a 20 dB noise reduction.

The construction activities would comply with the Construction Site Regulations (Palm Springs Municipal Code Section 8.04.220), the noise-related contract specifications, and any site-specific noise abatement terms, conditions, and restrictions attached to grading and building permits issued by the City of Palm Springs. The City of Palm Springs has not established maximum acceptable noise levels for construction activities, but has established goals and policies in the *Palm Springs 2007 General Plan* related to construction noise. Although adherence to the regulations and requirements required of all developments may serve to preclude or reduce significant impacts, it cannot guarantee that the construction noise impacts will be mitigated to a less than significant level unless all feasible and practical site-specific measures are implemented to minimize the noise exposure of nearby noise-sensitive receptors. Since site-specific construction details are not currently available, the degree of short-term noise impacts can not be determined and any conclusions reached at the present time regarding the applicability, feasibility, and effectiveness of site-specific noise abatement measures would be speculative. Therefore, the impacts associated with construction noise would be considered potentially significant at this time.

4.2.2 Construction Groundborne Vibration Impacts

Vibration transmitted by objects in contact with the ground will propagate energy through the ground that can be perceptible to humans as a rumbling sound caused by the vibration of room surfaces. Groundborne vibration can cause structural damage and elicit a response in humans ranging from annoyance to complaints, depending on the activities in which they are engaged at the time. Some individuals may be annoyed at barely perceptible levels of vibration. Land uses such as residential areas, schools, and open space/recreation areas (where quiet environments are necessary for enjoyment) are particularly sensitive to noise and groundborne vibration.

Figure 4-1
Construction Noise



Source: EPA, 1971; "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances". NTID300.1

Endo Engineering

Construction operations can include a wide range of activities that can generate groundborne vibration, but blasting and the demolition of structures typically generate the highest groundborne vibration. Many types of construction activity fall between a single event transient source and a continuous or frequent intermittent source. Transient or single-event sources include blasting or drop balls used to break foundation slabs during demolition for removal by haul truck. Vibration from traffic including heavy truck traffic is a continuous source of vibration. Construction equipment with steel treads generates more groundborne vibration than comparable equipment with rubber tires.

Depending on the vehicle type, weight, and most importantly, the pavement condition, heavy trucks can generate groundborne vibrations. Loaded trucks generate more groundborne vibration than empty trucks. The vibration levels generated by heavy vehicles passing over a paved surface are increased where there are features other than smooth pavement such as: potholes, pavement joints, discontinuities, or the differential settlement of the pavement. Wheel shaker/wheel spreading devices with raised dividers (rails, pipe or grates) commonly used to remove bulk material from the wheels of construction vehicles to prevent track-out from site access points can generate groundborne vibrations.

On-site demolition and construction activities will occur that could generate groundborne vibration at residential and other structures in close proximity and be perceptible to the building occupants. This potentially significant impact could be reduced by requiring stationary source equipment to be placed as far as feasible from adjacent vibration-sensitive land uses and maintaining paved surfaces within the site in good condition to minimize vibrations generated by the movement of heavy trucks within the site.

The California Department of Transportation (Caltrans) has developed a screening procedure for use in assessing the potential for structural damage and human annoyance associated with groundborne vibration. The peak particle velocity (PPV) at various distances from construction activity can be predicted from typical vibration source amplitudes at 25 feet from various categories of construction equipment. These reference PPV values were documented by the Federal Transit Administration and are shown in Table 4-1. The predicted PPV values at various distances from the source of the vibration can be calculated from the reference values, as shown in Table 4-1, and compared to the potential threshold criteria guidelines for vibration damage and vibration annoyance summarized in Table 4-2 to assess the potential for structural damage and human annoyance associated with groundborne vibration in the vicinity of construction activities.

Table 4-1
Vibration Source Amplitudes for Construction Equipment

Equipment	Peak Particle Velocity (Inches/Second)[a]				
	25 Feet[b]	50 Feet	100 Feet	150 Feet	200 Feet
Vibratory Roller	0.210	0.098	0.046	0.029	0.021
Large Bulldozer	0.089	0.042	0.019	0.012	0.009
Caisson Drilling	0.089	0.042	0.019	0.012	0.009
Loaded Trucks	0.076	0.035	0.017	0.011	0.008
Jackhammer	0.035	0.016	0.008	0.005	0.004
Small Bulldozer	0.003	0.001	0.001	0.000	0.000

a. The PPV values shown at distances greater than 25 feet from the source were determined based on the Caltrans construction equipment vibration prediction and screening assessment procedure in *Transportation and Construction Vibration Guidance Manual* (September, 2013). The values shown assume the recommended conservative vibration attenuation rate (n=1.1) for Soil Class III, hard soils such as dense compacted sand and dry consolidated clay that requires a pick to break up the soil and cannot be dug with a shovel.

b. Reference PPV values at 25 feet from various sources per *Transit Noise and Vibration Impact Assessment* (Federal Transit Administration, May, 2006) recommended for use in screening by Caltrans in *Transportation and Construction Vibration Guidance Manual* (September, 2013).

Table 4-2
Threshold Criteria Guidelines for Vibration Damage and Annoyance[a]

Potential Adverse Impact	Maximum Peak Particle Velocity (Inches/Second)	
	Transient/Single Event Sources	Continuous/Frequent Intermittent Sources
Structure Type and Condition		
- Extremely Fragile	0.12	0.08
- Fragile	0.20	0.10
- Historic and Some Older Buildings	0.50	0.25
- Older Residential Structures	0.50	0.30
- New Residential Structures	1.00	0.50
- Modern Commercial Buildings	2.00	0.50
Human Response		
- Barely Perceptible	0.04	0.01
- Distinctly Perceptible	0.25	0.04
- Strongly Perceptible	0.90	0.10
- Severe	2.00	0.40

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

While there are no Caltrans or Federal Highway Administration standards for vibration, criteria to evaluate the potential for damage and annoyance from activities that generate vibration have been reported by various organizations and governmental agencies and synthesized by Caltrans, as shown in Table 4-2.[2] The thresholds for both architectural damage and perception/annoyance are higher for transient vibration than for continuous vibration. Groundborne vibrations more readily affect typical wood-frame residential structures than buildings constructed of heavier materials.

Although construction details are not currently available, predicted maximum vibration velocities for various types of construction equipment over a range of distances between the source and the receiver are provided in Table 4-1. It can be seen from Table 4-2 that the damage potential threshold criteria for older residential structures is 0.3 PPV for continuous/intermittent sources. This significance threshold would not be exceeded at distances in excess of 25 feet from the construction equipment, as shown in Table 4-1. This indicates a low potential for structural or architectural damage at sensitive residential land uses in the project vicinity.[3]

As shown in Table 4-2, a continuous/intermittent source vibration amplitude of 0.10 inches per second would be strongly perceptible to building occupants. Table 4-1 indicates that none of the construction equipment evaluated would generate a continuous vibration amplitude of 0.10 inches per second at distances of 50 feet or more. The

2. Caltrans, Division of Environmental Analysis Environmental Engineering, Hazardous Waste, Air, Noise, Paleontology Office. *Transportation and Construction Vibration Guidance Manual*. September 2013.
3. In the event that driven piles be required to implement the project, there is the potential for vibration levels to exceed the potential structure damage threshold criteria. An impact pile driver can generate vibration velocities of 6.0 PPV at ten feet, 0.92 PPV at 35 feet, and 0.47 PPV at 55 feet. By comparison, a sonic pile driver can generate vibration velocities of 2.9 PPV at ten feet, 0.44 PPV at 35 feet, and 0.23 PPV at 55 feet. Loaded haul trucks generate vibration levels of 0.30 PPV at ten feet.

closest residence is located approximately 100 feet west of the Palm Springs Mall building, at its closest point. The vibration generated by most construction activities would be barely perceptible to sensitive receptors in the surrounding community.

4.2.3 Effects on Sensitive Receptors

Construction Noise Effects

Noise-sensitive areas are currently located north, south and west of the site. The near-term cumulative Jul Residential Development will result in the construction of noise-sensitive residential land uses east of the project site. Four noise-sensitive single-family residences are located within 100 feet west of the area to be modified in conjunction with the Phase I Project. Two of these residential structures are located within 50 feet of the western site perimeter wall, which extends 8 feet in height above the surface parking lot grade at this location. There are a total of eight residential residences located within 100 feet of the west site boundary. At their closest point, the apartment buildings located north of Tahquitz Canyon Way are approximately 360 to 375 feet from the existing Palm Springs Mall building to be demolished.

While office buildings are not typically considered to be noise-sensitive receptors, they may contain equipment that is sensitive to groundborne vibration. High levels of vibration may interfere with equipment that is highly sensitive to groundborne vibration, such as high-resolution lithography equipment and electron microscopes. The Plaza East professional office building is located on the southwest corner at the intersection of Sunset Way at Tahquitz Canyon Way, approximately 165 feet west of the proposed library building. The Desert Advanced Imaging medical office building is located approximately 360 feet east of the proposed conference center building and the closest point on the existing Palm Springs Mall building.

Noise-sensitive land uses are those areas of human habitation or substantial use where noise intrusion can adversely impact the occupants, use, or enjoyment of the environment. Demolition and construction activities would create short-term noise increases that would be noticeable to residents within the area surrounding the site adjacent to those areas under construction. Adjacent residents and other noise-sensitive receptors may perceive short-term noise increases when:

- demolition of the existing Palm Springs Mall building occurs;
- the building debris and other excavated material are loaded onto trucks and hauled away;
- construction vehicles enter and leave the site (with construction workers, building materials, wet concrete, fill material, and construction equipment);
- activities occur in construction staging areas;
- any temporary generators are operated;
- any necessary excavation activity is underway; and
- building construction occurs.

The intensity of the noise impacts will depend upon the proximity of the noise-sensitive receivers to the area under construction, the number and type of construction equipment operating each day, the length of time each piece of equipment is used, and whether or not intervening barriers or buildings effectively obstruct the noise transmission path between the source and the receptor. Although grading activities typically exhibit one of the highest potentials for noise impacts, the site was previously graded and is relatively flat. Site grading activities are expected to be relatively minor.

Where no barriers exist, noise generated by a single point source of noise (such as a stationary piece of construction equipment) attenuates at a rate of 6 decibels with each doubling of distance between the noise source and the noise receptor. However, a concrete masonry perimeter wall exists along the western site boundary that provides acoustic shielding for the residents west of the site including approximately 5 to 8 decibels of noise attenuation.

The site is rectangular and extends approximately 1,000 feet in the east/west direction and 1,200 in the north/south direction. The Palm Springs Mall building is centrally located within the site, as shown in Figure 2-3 and surrounded by surface parking lots. The mall building varies in height from approximately 22 to 30 feet. The two closest single-story residences are located approximately 100 feet west of the Palm Springs Mall building and shielded by a concrete masonry block perimeter wall approximately eight feet in height constructed at the property line. At this location, the west face of the mall building is approximately 59 feet east of the perimeter wall and provides additional shielding for these residents but also reflects noise when delivery trucks access the loading docks located closest to the perimeter wall.

The Phase I Project construction activity will take place largely in the center of the site, which will maximize the separation between the construction activities and sensitive receptors to the north, south and west. If it were determined to be feasible to demolish those portions of the mall building on the west side of the structure last, they could function as a barrier to attenuate the noise entering the residential area west of the site during the initial demolition activities.

Noise sensitive residential development located 100 feet from the construction activity would benefit from a 6 dBA noise attenuation with distance and an additional 5 to 8 decibel barrier attenuation from the perimeter wall. Those residences located 200 feet away would perceive a 12 dB reduction in exterior construction noise levels associated with distance plus 5 to 8 decibels of barrier attenuation associated with the perimeter wall. When the construction activities occur 400 feet away from residences, an 18 dB reduction in noise levels would occur associated with distance plus 5 to 8 decibels of barrier attenuation associated with the perimeter wall. To attenuate the noise levels by 5 decibels, the perimeter wall between the construction noise source and a noise receptor would be required to interrupt the line-of-sight exposure to the noise source.

The levels of construction noise expected to occur within close proximity, may cause annoyance and generate complaints but will be temporary and limited by the Construction Site Regulations and the imposition of conditions of approval associated with the issuance of building and grading permits by the City of Palm Springs. Long-term hearing loss or other severe effects are not anticipated. Construction operating cycles would be limited to the less-sensitive hours of the day and generate noise levels that are intermittent.

Groundborne Vibration Effects

High levels of groundborne vibration rarely affect human health but may be an annoyance that can adversely affect concentration or disturb sleep. High levels of vibration may cause architectural damage to fragile or historic residential buildings or interfere with activities by individuals who are highly sensitive to groundborne vibration.

The typical background RMS vibration velocity level in residential areas of 50 VdB is below the threshold of perception for humans, which is approximately 65 VdB.[4] Most indoor vibration that is perceptible is the result of doors slamming, people moving around, or mechanical equipment such as vacuum cleaners, clothes washers and dryers, and electric garage door openers. Human response to vibration is not usually significant unless the vibration exceeds 70 VdB. Most people would be strongly annoyed if the vibration level in a residence reaches 85 VdB. Buses and trucks typically create 64 VdB at 50 feet and rarely create vibration that exceeds 70 VdB at 50 feet except when traveling over bumps. By comparison, bulldozers and other heavy tracked construction equipment can generate 93 VdB at 50 feet. Blasting at construction projects can create an RMS vibration velocity level of 100 VdB at 50 feet.[5]

4. Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment* (May 2006). The RMS vibration velocity level in decibels (VdB) is commonly used to measure the root mean square (RMS) amplitude relative to 10^{-6} inches/second. The RMS amplitude is used to describe the effect of vibration on the human body.
5. Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment* (May 2006).

4.2.4 Cumulative Construction Noise Impact

The proposed project would increase heavy truck traffic near the project site during the demolition and construction activities required to implement the WVC Master Plan and Phase I Project. The cumulative Jul Residential Development located east of Farrell Drive, between Tahquitz Canyon Way and Baristo Road, may be under construction at the same time that the Phase I Project is being constructed. Doubling the number of identical noise sources increases typically increases the noise level by 3.0 dBA, which is the smallest perceptible change in sound level for a person with normal hearing sensitivity. Even if the trucks were using the same roadways, the increase in the total traffic volume would not result in a perceptible increase in the noise levels generated along those roadways. The cumulative construction noise impacts would be less than significant.

4.3 Long-Term Operational Impacts

Long-term operational noise increases associated with the proposed WVC Master Plan and Phase I Project would result primarily from the increases in mobile source noise emissions along the access roadways in the study area. Project-related traffic increases on site access roads would increase off-site motor vehicle noise levels. Noise generated by future activities within the West Valley Campus of the College of the Desert may be audible at times within the surrounding noise-sensitive residential areas. Motor vehicle noise levels generated by future traffic volumes on the major thoroughfare (Tahquitz Canyon Way) and secondary thoroughfares (Farrell Drive and Baristo Road) adjacent to the project site would increase the ambient noise levels within the project site over the long term and must be identified to ensure that the proposed land uses would meet the City of Palm Springs noise standards.

4.3.1 Off-Site Vehicular Noise Impacts

Noise levels on area streets were quantified for the Phase I Project opening year 2018 and the future planning horizon year 2030, when the site would be developed per the WVC Master Plan and fully occupied. Traffic volumes in the year 2018 both with and without the Phase I Project were analyzed to determine the impact of the Phase I Project on motor vehicle noise levels in the vicinity. Future year 2030 traffic volumes were modeled to forecast ultimate noise levels on-site and in the study area to identify the significance of long-term increases in motor vehicle noise associated with the Phase I Project and WVC Master Plan.

Noise increases or decreases of 1.0 dBA cannot be perceived in a community setting and are considered less than significant. Changes in motor vehicle noise levels of up to 3.0 dBA can barely be perceived in an outdoor environment and are not considered significant. Changes in motor vehicle noise that would equal or exceed 5.0 dBA are considered noticeable and potentially significant, provided noise-sensitive receptors would be affected.

Opening Year 2018 With Phase I Project

The projected noise levels adjacent to roadways carrying traffic volumes associated with the Phase I Project in the year 2018 are shown in Table 4-3. As shown therein, the lowest noise level is projected to be 50.0 dBA CNEL at 50 feet from the centerline of Civic Drive, south of Baristo Road. The highest noise levels are expected to be generated by motor vehicles along Ramon Road, west and east of Farrell Drive. The noise levels at 50 feet from the centerline of Ramon Road are projected to be 77.4 and 78.2 dBA CNEL, respectively in this area.

The 70 CNEL contour is projected to remain within the right-of-way along 26 of the 56 roadway segments analyzed (46 percent). The 65 CNEL contour will remain within the right-of-way along fourteen (25 percent) of the roadway segments analyzed. Projected year 2018+Phase I Project vehicular noise levels are projected to remain below 60 CNEL at the right-of-way on nine (sixteen percent) of the roadway segments modeled in the study area.

Table 4-3
Opening Year 2018+Phase I Project
Exterior Noise Exposure Adjacent to Area Roadways

Roadway Segment	A.D.T.[a] (Veh/Day)	CNEL @ 50 Feet[b]	Distance to Contours (Ft.)[c] 70 dBA	65 dBA	60 dBA
Sunrise Way					
North of Tahquitz Canyon Way	23,030	76.3	189	592	1,871
South of Tahquitz Canyon Way	21,810	75.3	151	471	1,486
North of Baristo Road	22,400	75.4	154	482	1,521
South of Baristo Road	23,140	75.6	161	504	1,593
Sunset Way					
North of Tahquitz Canyon Way	1,600	56.9	R/W	R/W	R/W
Cerritos Drive					
North of Baristo Road	470	51.5	R/W	R/W	R/W
South of Baristo Road	1,580	56.8	R/W	R/W	R/W
Farrell Drive					
North of Alejo Road	14,770	71.5	66	197	620
South of Alejo Road	15,050	71.6	68	202	634
North of Amado Road	15,190	71.6	68	202	634
South of Amado Road	15,860	71.8	71	211	664
North of Tahquitz Canyon Way	16,510	72.0	74	221	696
South of Tahquitz Canyon Way	13,260	71.0	60	176	553
North of Baristo Road	12,460	70.8	58	168	528
South of Baristo Road	11,780	70.5	55	157	493
North of Ramon Road	12,260	70.7	57	165	516
South of Ramon Road	9,500	69.6	47	129	401
Compadre Road					
North of Baristo Road	900	54.4	R/W	R/W	R/W
South of Baristo Road	1,220	55.7	R/W	R/W	R/W
Civic Drive					
North of Tahquitz Canyon Way	2,740	60.6	R/W	R/W	57
South of Tahquitz Canyon Way	1,050	56.4	R/W	R/W	R/W
North of Baristo Road	1,010	56.3	R/W	R/W	R/W
South of Baristo Road	240	50.0	R/W	R/W	R/W
El Cielo Road					
North of Tahquitz Canyon Way	4,780	69.7	47	147	463
South of Tahquitz Canyon Way	12,980	74.6	129	401	1,265
North of Baristo Road	13,360	74.7	132	410	1,295
South of Baristo Road	14,490	75.1	144	449	1,420
Alejo Road					
West of Farrell Drive	4,280	65.6	R/W	57	180
East of Farrell Drive	2,970	61.7	R/W	R/W	74

a. A.D.T. = Opening Year 2018+Phase I Project daily two-way traffic volume.
b. CNEL values are given at 50 feet from the roadway centerline (see Appendix B for model assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the street right-of-way.

Table 4-3 (Continued)
Opening Year 2018+Phase I Project
Exterior Noise Exposure Adjacent to Area Roadways

Roadway Segment	A.D.T.[a] (Veh/Day)	CNEL @ 50 Feet[b]	Distance to Contours (Ft.)[c] 70 dBA	65 dBA	60 dBA
Amado Road					
West of Farrell Drive	1,450	59.8	R/W	R/W	R/W
Tahquitz Canyon Way					
West of Sunrise Way	12,580	73.7	106	326	1,029
East of Sunrise Way	13,290	73.9	110	341	1,077
West of Sunset Way	13,460	74.0	113	349	1,102
East of Sunset Way	12,990	73.8	108	334	1,052
West of Farrell Drive	12,310	73.6	103	319	1,005
East of Farrell Drive	14,950	74.4	123	383	1,208
West of Civic Drive	15,000	74.5	126	392	1,236
East of Civic Drive	14,230	74.2	118	366	1,154
West of El Cielo Road	14,220	74.2	118	366	1,154
East of El Cielo Road	5,390	70.0	50	141	439
Baristo Road					
West of Sunrise Way	3,800	63.9	R/W	39	122
East of Sunrise Way	6,180	66.2	R/W	65	203
West of Cerritos Drive	6,210	66.2	R/W	65	203
East of Cerritos Drive	6,490	66.3	R/W	67	212
West of PS High School	6,250	66.2	R/W	65	203
East of PS High School	6,830	66.6	R/W	71	222
West of Farrell Drive	6,980	66.7	R/W	73	227
East of Farrell Drive	6,410	66.3	R/W	67	207
West of Compadre Road	6,090	66.1	R/W	64	198
East of Compadre Road	5,190	65.4	R/W	55	169
West of Civic Drive	5,090	65.3	R/W	R/W	165
East of Civic Drive	4,990	65.2	R/W	R/W	161
West of El Cielo Road	5,020	65.3	R/W	53	165
East of El Cielo Road	3,120	63.2	R/W	R/W	102
Ramon Road					
West of Farrell Drive	25,130	77.4	242	763	2,411
East of Farrell Drive	29,940	78.2	291	917	2,898

a. A.D.T. = Opening Year 2018+Phase I Project daily two-way traffic volume.
b. CNEL values are given at 50 feet from the roadway centerline (see Appendix B for model assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the street right-of-way.

Table 4-4 details the increase in the opening year 2018 motor vehicle noise levels associated with the traffic increase on each roadway segment that would result from development of the Phase I Project. The increase in operational traffic associated with the Phase I Project is not projected to result in an audible motor vehicle noise increase (greater than 1.0 dBA) along any of the roadways segments evaluated. Since noise increases or decreases of 1.0 dBA cannot be perceived in the community, the motor vehicle noise impacts associated with the Phase I Project would be less than significant.

Table 4-4
Increase in Year 2018 Motor Vehicle Noise
At Fifty Feet With Phase I Project

Roadway Segment	Without Phase I Project [a] (CNEL)	With Phase I Project (CNEL)	Increase (dBA)
Sunrise Way			
North of Tahquitz Canyon Way	76.3	76.3	0.0
South of Tahquitz Canyon Way	75.3	75.3	0.0
North of Baristo Road	75.4	75.4	0.0
South of Baristo Road	75.6	75.6	0.0
Sunset Way			
North of Tahquitz Canyon Way	56.8	56.9	0.1
Cerritos Drive			
North of Baristo Road	51.5	51.5	0.0
South of Baristo Road	56.8	56.8	0.0
Farrell Drive			
North of Alejo Road	71.4	71.5	0.1
South of Alejo Road	71.5	71.6	0.1
North of Amado Road	71.6	71.6	0.0
South of Amado Road	71.8	71.8	0.0
North of Tahquitz Canyon Way	71.9	72.0	0.1
South of Tahquitz Canyon Way	71.0	71.0	0.0
North of Baristo Road	70.7	70.8	0.1
South of Baristo Road	70.4	70.5	0.1
North of Ramon Road	70.6	70.7	0.1
South of Ramon Road	69.6	69.6	0.0
Compadre Road			
North of Baristo Road	54.4	54.4	0.0
South of Baristo Road	55.7	55.7	0.0
Civic Drive			
North of Tahquitz Canyon Way	60.6	60.6	0.0
South of Tahquitz Canyon Way	56.4	56.4	0.0
North of Baristo Road	56.3	56.3	0.0
South of Baristo Road	50.0	50.0	0.0
El Cielo Road			
North of Tahquitz Canyon Way	69.7	69.7	0.0
South of Tahquitz Canyon Way	74.5	74.6	0.1
North of Baristo Road	74.7	74.7	0.0
South of Baristo Road	75.0	75.1	0.1
Alejo Road			
West of Farrell Drive	65.6	65.6	0.0
East of Farrell Drive	61.7	61.7	0.0

a. See Appendix B for assumptions. CNEL values are given at 50 feet from the roadway centerline. Year 2018 noise levels and traffic volumes without the Phase I Project are provided in Appendix C.

Table 4-4 (Continued)
Increase in Year 2018 Motor Vehicle Noise
At Fifty Feet With Phase I Project

Roadway Segment	Without Phase I[a] Project (CNEL)	With Phase I Project (CNEL)	Increase (dBA)
Amado Road			
West of Farrell Drive	59.7	59.8	0.1
Tahquitz Canyon Way			
West of Sunrise Way	73.7	73.7	0.0
East of Sunrise Way	73.9	73.9	0.0
West of Sunset Way	73.9	74.0	0.1
East of Sunset Way	73.8	73.8	0.0
West of Farrell Drive	73.6	73.6	0.0
East of Farrell Drive	74.4	74.4	0.0
West of Civic Drive	74.4	74.5	0.1
East of Civic Drive	74.2	74.2	0.0
West of El Cielo Road	74.2	74.2	0.0
East of El Cielo Road	70.0	70.0	0.0
Baristo Road			
West of Sunrise Way	63.9	63.9	0.0
East of Sunrise Way	66.1	66.2	0.1
West of Cerritos Drive	66.1	66.2	0.1
East of Cerritos Drive	66.2	66.3	0.1
West of PS High School	66.2	66.2	0.0
East of PS High School	66.5	66.6	0.1
West of Farrell Drive	66.6	66.7	0.1
East of Farrell Drive	66.2	66.3	0.1
West of Compadre Road	66.0	66.1	0.1
East of Compadre Road	65.3	65.4	0.1
West of Civic Drive	65.2	65.3	0.1
East of Civic Drive	65.1	65.2	0.1
West of El Cielo Road	65.1	65.3	0.2
East of El Cielo Road	63.2	63.2	0.0
Ramon Road			
West of Farrell Drive	77.4	77.4	0.0
East of Farrell Drive	78.2	78.2	0.0

a. See Appendix B for assumptions. CNEL values are given at 50 feet from the roadway centerline. Year 2018 noise levels and traffic volumes without the Phase I Project are provided in Appendix C.

Year 2030 With WVC Master Plan Buildout

Table 4-5 summarizes the motor vehicle noise levels throughout the study area upon implementation of the WVC Master Plan in the year 2030. The lowest noise level is projected to be 50.4 dBA CNEL at 50 feet from the centerline of Civic Drive, south of Baristo Road. The highest noise levels are expected to be generated by motor vehicles along Ramon Road, west and east of Farrell Drive. The noise levels at 50 feet from the centerline of Ramon Road are projected to be 78.7 and 79.6 dBA CNEL, respectively in this area.

Table 4-5
Year 2030 With West Valley Campus Master Plan
Exterior Noise Exposure Adjacent to Area Roadways

Roadway Segment	A.D.T.[a] (Veh/Day)	CNEL @ 50 Feet[b]	Distance to Contours (Ft.)[c]		
			70 dBA	65 dBA	60 dBA
Sunrise Way					
North of Tahquitz Canyon Way	26,280	76.9	216	680	2,148
South of Tahquitz Canyon Way	24,220	75.8	168	528	1,668
North of Baristo Road	24,850	75.9	172	540	1,707
South of Baristo Road	25,330	76.0	176	553	1,746
Sunset Way					
North of Tahquitz Canyon Way	2,050	58.0	R/W	R/W	R/W
Cerritos Drive					
North of Baristo Road	510	51.9	R/W	R/W	R/W
South of Baristo Road	1,710	57.2	R/W	R/W	R/W
Farrell Drive					
North of Alejo Road	19,880	72.8	87	265	836
South of Alejo Road	20,030	72.8	87	265	836
North of Amado Road	20,030	72.8	87	265	836
South of Amado Road	19,980	72.8	87	265	836
North of Tahquitz Canyon Way	19,980	72.8	87	265	836
South of Tahquitz Canyon Way	19,010	72.6	83	254	799
North of Baristo Road	18,440	72.5	82	248	780
South of Baristo Road	18,370	72.4	80	242	763
North of Ramon Road	18,370	72.4	80	242	763
South of Ramon Road	10,800	70.1	51	144	449
Compadre Road					
North of Baristo Road	900	54.4	R/W	R/W	R/W
South of Baristo Road	1,320	56.0	R/W	R/W	R/W
Civic Drive					
North of Tahquitz Canyon Way	2,960	60.9	R/W	R/W	61
South of Tahquitz Canyon Way	1,130	56.7	R/W	R/W	R/W
North of Baristo Road	1,090	56.6	R/W	R/W	R/W
South of Baristo Road	260	50.4	R/W	R/W	R/W
El Cielo Road					
North of Tahquitz Canyon Way	5,160	70.0	50	157	496
South of Tahquitz Canyon Way	14,810	75.2	147	460	1,453
North of Baristo Road	15,220	75.3	151	471	1,486
South of Baristo Road	17,440	75.9	172	540	1,707
Alejo Road					
West of Farrell Drive	6,990	67.7	R/W	93	292
East of Farrell Drive	3,200	62.0	R/W	R/W	79

a. A.D.T. = Year 2030+WVC Master Plan buildout daily two-way traffic volume.
b. CNEL values are given at 50 feet from the roadway centerline (see Appendix B for model assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the street right-of-way.

Table 4-5 (Continued)
Year 2030 With West Valley Campus Master Plan
Exterior Noise Exposure Adjacent to Area Roadways

Roadway Segment	A.D.T.[a] (Veh/Day)	CNEL @ 50 Feet[b]	Distance to Contours (Ft.)[b] 70 dBA	65 dBA	60 dBA
Amado Road					
West of Farrell Drive	1,750	60.6	R/W	R/W	57
Tahquitz Canyon Way					
West of Sunrise Way	15,590	74.6	129	401	1,265
East of Sunrise Way	16,260	74.8	135	420	1,325
West of Sunset Way	16,440	74.9	138	429	1,356
East of Sunset Way	16,560	74.9	138	429	1,356
West of Farrell Drive	14,740	74.4	123	383	1,208
East of Farrell Drive	17,000	75.0	141	439	1,387
West of Civic Drive	16,990	75.0	141	439	1,387
East of Civic Drive	16,160	74.8	135	420	1,325
West of El Cielo Road	16,150	74.8	135	420	1,325
East of El Cielo Road	5,820	70.4	54	154	482
Baristo Road					
West of Sunrise Way	4,660	64.8	R/W	48	150
East of Sunrise Way	7,830	67.2	R/W	81	255
West of Cerritos Drive	7,870	67.2	R/W	81	255
East of Cerritos Drive	8,160	67.3	R/W	85	267
West of PS High School	7,240	66.9	R/W	76	238
East of PS High School	8,690	67.6	R/W	89	280
West of Farrell Drive	8,850	67.7	R/W	91	286
East of Farrell Drive	9,260	67.9	R/W	95	300
West of Compadre Road	9,260	67.9	R/W	95	300
East of Compadre Road	9,260	67.9	R/W	95	300
West of Civic Drive	9,260	67.9	R/W	95	300
East of Civic Drive	9,260	67.9	R/W	95	300
West of El Cielo Road	9,260	67.9	R/W	95	300
East of El Cielo Road	3,610	63.8	R/W	R/W	117
Ramon Road					
West of Farrell Drive	33,400	78.7	326	1,029	3,252
East of Farrell Drive	41,170	79.6	401	1,265	4,000

a. A.D.T. = Year 2030+WVC Master Plan buildout daily two-way traffic volume.
b. CNEL values are given at 50 feet from the roadway centerline (see Appendix B for model assumptions).
c. All distances are measured from the centerline. R/W means the contour falls within the street right-of-way.

The 70 CNEL contour is projected to remain within the right-of-way along 26 of the 56 roadway segments analyzed (46 percent). The 65 CNEL contour will remain within the right-of-way along twelve (21 percent) of the roadway segments analyzed. Projected year 2030+WVC Master Plan vehicular noise levels are projected to remain below 60 CNEL at the right-of-way on eight (14 percent) of the roadway segments modeled in the study area. Table 4-6 shows the increase in the horizon year 2030 motor vehicle noise levels associated with the traffic increase on each roadway segment that would result from development of the WVC Master Plan.

Table 4-6
Increase in Year 2030 Motor Vehicle Noise At Fifty Feet With West Valley Campus Master Plan

Roadway Segment	Without Project[a] Buildout (CNEL)	With Project Buildout (CNEL)	Increase (dBA)
Sunrise Way			
North of Tahquitz Canyon Way	76.6	76.9	0.3
South of Tahquitz Canyon Way	75.6	75.8	0.2
North of Baristo Road	75.7	75.9	0.2
South of Baristo Road	75.9	76.0	0.1
Sunset Way			
North of Tahquitz Canyon Way	57.2	58.0	0.8
Cerritos Drive			
North of Baristo Road	51.9	51.9	0.0
South of Baristo Road	57.2	57.2	0.0
Farrell Drive			
North of Alejo Road	72.4	72.8	0.4
South of Alejo Road	72.4	72.8	0.4
North of Amado Road	72.4	72.8	0.4
South of Amado Road	72.3	72.8	0.5
North of Tahquitz Canyon Way	72.3	72.8	0.5
South of Tahquitz Canyon Way	72.0	72.6	0.6
North of Baristo Road	71.8	72.5	0.7
South of Baristo Road	71.9	72.4	0.5
North of Ramon Road	71.9	72.4	0.5
South of Ramon Road	69.9	70.1	0.2
Compadre Road			
North of Baristo Road	54.4	54.4	0.0
South of Baristo Road	56.0	56.0	0.0
Civic Drive			
North of Tahquitz Canyon Way	60.9	60.9	0.0
South of Tahquitz Canyon Way	56.7	56.7	0.0
North of Baristo Road	56.6	56.6	0.0
South of Baristo Road	50.4	50.4	0.0
El Cielo Road			
North of Tahquitz Canyon Way	70.0	70.0	0.0
South of Tahquitz Canyon Way	74.8	75.2	0.4
North of Baristo Road	74.9	75.3	0.4
South of Baristo Road	75.2	75.9	0.7
Alejo Road			
West of Farrell Drive	67.6	67.7	0.1
East of Farrell Drive	62.0	62.0	0.0

a. See Appendix B for assumptions. CNEL values are given at 50 feet from the roadway centerline. Year 2030 noise levels and traffic volumes without the WVC Master Plan buildout are provided in Appendix D.

Table 4-6 (Continued)
Increase in Year 2030 Motor Vehicle Noise
At Fifty Feet With West Valley Campus Master Plan

Roadway Segment	Without Project[a] Buildout (CNEL)	With Project Buildout (CNEL)	Increase (dBA)
Amado Road			
West of Farrell Drive	60.0	60.6	0.6
Tahquitz Canyon Way			
West of Sunrise Way	74.4	74.6	0.2
East of Sunrise Way	74.1	74.8	0.7
West of Sunset Way	74.2	74.9	0.7
East of Sunset Way	74.6	74.9	0.3
West of Farrell Drive	73.9	74.4	0.5
East of Farrell Drive	74.7	75.0	0.3
West of Civic Drive	74.7	75.0	0.3
East of Civic Drive	74.5	74.8	0.3
West of El Cielo Road	74.5	74.8	0.3
East of El Cielo Road	70.4	70.4	0.0
Baristo Road			
West of Sunrise Way	64.1	64.8	0.7
East of Sunrise Way	66.3	67.2	0.9
West of Cerritos Drive	66.4	67.2	0.8
East of Cerritos Drive	66.4	67.3	0.9
West of PS High School	66.4	66.9	0.5
East of PS High School	66.7	67.6	0.9
West of Farrell Drive	66.8	67.7	0.9
East of Farrell Drive	67.2	67.9	0.7
West of Compadre Road	67.2	67.9	0.7
East of Compadre Road	67.2	67.9	0.7
West of Civic Drive	67.2	67.9	0.7
East of Civic Drive	67.2	67.9	0.7
West of El Cielo Road	67.2	67.9	0.7
East of El Cielo Road	63.5	63.8	0.3
Ramon Road			
West of Farrell Drive	78.6	78.7	0.1
East of Farrell Drive	79.5	79.6	0.1

a. See Appendix B for assumptions. CNEL values are given at 50 feet from the roadway centerline. Year 2030 noise levels and traffic volumes without the WVC Master Plan buildout are provided in Appendix C.

The increase in off-site vehicular traffic associated with the WVC Master Plan is not projected to result in an audible motor vehicle noise increase (greater than 1.0 dBA) along any of the roadways segments evaluated. Since noise increases or decreases of 1.0 dBA cannot be perceived in the community, the motor vehicle noise impacts associated with the WVC Master Plan would be less than significant.

Cumulative Off-Site Motor Vehicle Noise Impacts

The opening year 2018 noise levels without the Phase I Project shown in Table 4-4 include the traffic generated by the near-term cumulative Jul Residential Development as well three years of the projected growth anticipated upon buildout of the *Palm Springs 2007 General Plan.* The year 2030 noise levels shown in Table 4-6 without buildout of the WVC Master Plan reflect conditions upon buildout of the *Palm Springs 2007 General Plan.*

4.3.2 On-Site Vehicular Noise Impacts

The City of Palm Springs interior noise standard for schools, libraries, and meeting halls is 45 dBA CNEL. The WVC Master Plan includes these noise-sensitive land uses at locations approximately 75 feet from the centerline of Tahquitz Canyon Way and 60 feet from the centerline of Farrell Drive and Baristo Road. Population growth and increased economic development activity within the City would occur as the General Plan is implemented. The year 2030 traffic projections without the WVC Master Plan reflect conditions upon buildout of the *Palm Springs 2007 General Plan*. The projected year 2030+WVC Master Plan noise levels at these locations must be considered to determine if the proposed land uses would be compatible with the future noise levels without mitigation.

As shown in Table 4-5, the year 2030+project noise level within the project site at 50 feet from the centerline of Tahquitz Canyon Way is projected to be 75.0 dBA CNEL. The library and conference center proposed approximately 70 feet from the centerline of Tahquitz Canyon Way would meet the 45 dBA interior noise standard with construction techniques that would achieve an exterior to interior noise reduction 30 dB. Masonry buildings with single-glazed windows achieve an exterior to interior noise reduction of 25 dB. Masonry buildings with double-glazed windows achieve an exterior to interior noise reduction of 35 dB. Consequently, it would be feasible to construct the library and the conference center at the proposed locations and meet the 45 dBA interior noise standard.

There are many different ways to achieve the required exterior to interior noise reduction. Some of the methods used include providing air conditioning; using double-paned glass; using fixed windows or reducing the size of the windows facing the roadway; using dense wall construction materials; and using insulation with an STC rating of 30 or greater. Prior to the issuance of building permits, the City of Palm Springs will require the project proponents to demonstrate that the library and conference center buildings, when constructed, will meet the 45 dBA interior City noise standard.

The year 2030+project noise level within the project site at 50 feet from the centerline of Farrell Drive is projected to 72.6 CNEL. The educational buildings proposed approximately 60 feet from the centerline of Farrell Drive would meet the 45 dBA interior noise standard with construction techniques that would achieve an exterior to interior noise reduction 30 dB. It would be feasible to construct the educational buildings at the proposed locations along Farrell Drive with a maximum interior noise level of 45 dBA CNEL. Prior to the issuance of building permits, the City of Palm Springs will require the project proponents to demonstrate that the educational buildings proposed 60 feet from the centerline of Farrell Drive, when constructed, will meet the 45 dBA interior City noise standard.

The year 2030+project noise level within the project site at 50 feet from the centerline of Baristo Road is projected to be 67.7 CNEL. To achieve an interior noise level of 45 dBA CNEL for the noise sensitive land uses on-site, an exterior to interior noise attenuation of 25 dBA would be required. Masonry buildings with single-glazed windows achieve an exterior to interior noise reduction of 25 dB. It would be feasible to construct the educational buildings at the proposed locations along Baristo Road with a maximum interior noise level of 45 dBA CNEL. Prior to the issuance of building permits, the City of Palm Springs will require the project proponents to demonstrate that the buildings proposed 60 feet from Baristo Road, when constructed, will meet the 45 dBA interior City noise standard.

The *California Uniform Building Code* (Title 24, Noise Insulation Standards) establishes interior noise levels of 45 dB CNEL for new multi-family residences due to exterior noise sources. As shown in Table 3-4, the City of Palm Springs interior noise standard is 45 dBA CNEL and exterior noise standard is 65 dBA CNEL for multiple-family residential land uses. The exterior standard applies to areas private patios or balconies (with a depth of 6 feet or more) accessed from within the dwelling. Any dormitories constructed on-site should be located and oriented to shield outdoor patio areas from intrusive motor vehicle noise. These dwelling units shall be constructed in accordance with the state interior noise standards in the *Uniform Building Code* (*California Code of Regulations, Title 24*). The indoor standard of 45 dB CNEL does not apply to bathrooms, toilets, closets, and corridors and is with windows closed and mechanical ventilation provided per the *Uniform Building Code* requirements.

4.3.3 Long-Term Stationary Noise Source Impacts

Mechanical Equipment

Potential stationary noise sources associated with the long-term operation of the WVC Master Plan and Phase I Project would include heating, ventilation, and air-conditioning (HVAC) equipment that would most likely be located on the roofs of the various buildings. HVAC equipment is typically located on the roofs of institutional buildings so that it can be screened from view and to control access to the units. Noise levels generated by the HVAC units is regulated by the City of Palm Springs Noise Ordinance and consequently is not expected to have an adverse impact on noise-sensitive receptors located in the area surrounding the project site.

There is HVAC equipment currently on the roof of the Palm Springs mall building that is much closer to the west property line than the HVAC equipment that will be used upon implementation of the WVC Master Plan and Phase I Project. The existing HVAC equipment at the Palm Springs Mall is not new. The newer HVAC equipment that would be installed in conjunction with the proposed development is substantially more efficient and generates lower sound levels than the equipment on-site currently.

Noise levels and vibration associated with the HVAC equipment shall be minimized through proper installation, per the manufacturers' specifications, and appropriate maintenance procedures. Commercial exterior grade noise control absorber-barrier combination blankets and other materials are readily available that can absorb and reduce the transmission of sound and vibration generated by mechanical equipment. Mechanical equipment can be enclosed and sound absorbing material can be configured in the walls of the enclosure to reduce the noise emitted by up to 33 decibels.

The HVAC equipment may be located within an enclosure with openings directed away from noise sensitive receptors to reduce the potential noise impacts. The closest institutional buildings to the sensitive residential area west of the site shown in the WVC Master Plan would be located approximately 320 feet from the west property line. HVAC noise generated within the project site shall be regulated by the City Noise Ordinance.

Loading Dock Noise

The WVC Master Plan proposes a service and emergency vehicle access consolidated with a loading and delivery area centrally located between the library and the conference center, on the north side of the Phase I Project improvement area. This area would be equidistant and nearly 470 feet from the closest current and future noise-sensitive receptors to the west, north, and east. The adjacent buildings should shield this area to the extent that the residual noise levels generated by loading operations would be imperceptible compared to the background noise levels generated by traffic along Tahquitz Canyon Way. Solid waste collection trucks would pick-up refuse dumpsters within this area where a loading/delivery/receiving area would be located as well as an emergency vehicle/ambulance access to the central plaza of the campus to facilitate the rapid response of law enforcement personnel and equipment in a secure area in the event of an emergency on campus. The service area access would face Tahquitz Canyon Way which would be the shortest route used by Fire Department and law enforcement vehicles.

Parking Lot Noise

All of the noise sensitive land uses surrounding the site are currently exposed to parking lot noise generated within the project site. Noise levels generated within the parking lot are unlikely to exceed the maximum levels permitted by the City Noise Ordinance. Noise associated with activities in the parking lot may be a source of annoyance during the more sensitive evening and nighttime hours. The loudest noise sources are expected to be car engines upon start up, pedestrians talking, and the slamming of car doors and trunks. Campus security personnel will respond to situations that result in excessive noise and warn individuals of the penalties associated with violations of the City Noise Ordinance.

4.4 Year 2030 Off-Site Vehicular Noise Impacts By Alternative

Four potentially feasible project alternatives were evaluated and compared to the proposed project. These alternatives included: (1) the No-Project Alternative, (2) the More Intense Alternative, (3) the North Campus Alternative, and (4) the West Valley Campus Repurposed Mall Alternative. The trip generation forecast associated with each of the project alternatives was taken from Table 3-14 of the *College of the Desert West Valley Campus Master Plan and Phase I Project Traffic Impact Study (*July 15, 2015) prepared by Endo Engineering.

The North Campus Alternative would be located west of Indian Canyon Drive, between Tramview Road and the Whitewater River/Chino Creek flood control levee, on approximately 101 acres within the a 510–acre Campus Park Specific Plan. The other three alternatives would be located on the Palm Springs Mall site.

Three of the alternatives would include a college campus and a library. The No-Project Alternative would retain the existing Palm Springs Mall building (assuming full occupancy) as well as the Jack in the Box fast food restaurant and the Camelot Theatres.

4.4.1 The No-Project Alternative

With the No-Project Alternative, the existing Palm Springs Mall building, the Jack in the Box restaurant, and the Camelot Theatres would remain, with the 315,119 S.F. of gross leasable floor area within the mall fully occupied. Assuming full occupancy of the site per the existing entitlements, the site-generated traffic volumes would total 13,640 weekday trips. This alternative would result in a lower peak hour trip generation than the proposed project but an equivalent weekday trip generation. Consequently, the off-site motor vehicle noise impacts would be similar to the preferred project on weekdays but slightly higher on Saturdays.

4.4.2 More Intense Alternative

The More Intense Alternative would be similar to the proposed project, but with future uses 25 percent more intense. The number of enrolled college students would be 25 percent greater, and the floor area of the library would be increased by 25 percent. The More Intense Alternative also include the construction of up to 60 dormitory units within the site that would be noise-sensitive uses. With this alternative, the site-generated traffic volumes (16,480 weekday trips) would be 22 percent greater than the proposed WVC Master Plan. This alternative would result in the highest weekday trip generation of any of the project alternatives.

4.4.3 North Campus Alternative

The trip generation associated with the North Campus Alternative would be similar to that evaluated with the proposed WVC Master Plan except it would not include the trips associated with the existing Jack in the Box restaurant or the Camelot Theatres. This alternative would be constructed in a less centralized location within the City of Palm Springs and accessed via different roadways. The site-generated traffic volumes with this alternative would total 11,520 weekday trips (85 percent of the trip generation of the proposed WVC Master Plan). The north campus site is essentially three times the size of the Palm Springs Mall site. There are fewer noise-sensitive receptors in close proximity to the north campus site.

4.4.4 West Valley Campus Repurposed Retail Mall Alternative

Future development with the West Valley Campus Repurposed Retail Mall Alternative would be the same as that evaluated with the proposed WVC Master Plan. The site-generated traffic volumes would total 13,540 weekday trips. This alternative would have similar operational noise impacts to the proposed WVC Master Plan, but may have different construction-related noise impacts. This alternative would avoid the noise impacts associated with the demolition of the mall building and the removal of the building debris and other excavated materials by haul trucks. However, construction activities would still be required to upgrade of the buildings to comply with current seismic standards and upgrade the parking lot to meet current ADA standards.

4.4.5 Relative Noise Impacts of Alternatives

The off-site operational noise impacts associated with the three alternatives that would be located on the Palm Springs Mall site can be compared by comparing the external trip generation associated with these alternatives. The trip generation associated with the No-Project Alternative would be similar to that with the West Valley Campus Repurposed Retail Mall Alternative and the proposed WVC Master Plan. These three alternatives would also have similar off-site noise impacts. The More Intense Alternative would generate 22 percent more trips on weekdays, and therefore result in a greater off-site noise impact. However, the off-site noise impacts associated with all three of these alternatives appears to be less than significant. Off-site operational noise levels associated with traffic volumes twenty-two percent greater than the proposed WVC Master Plan would not result in an audible noise increase on any roadway link evaluated in the study area.

Sensitive noise receptors located adjacent to the project site would experience similar noise impacts from the three alternatives located on the Palm Springs Mall site as the proposed WVC Master Plan. The No-Project Alternative would result in less construction activity and generate operational noise levels similar to the former noise levels when it was fully operational. The West Valley Campus Repurposed Retail Mall Alternative would require substantial construction activity to upgrade the existing mall structure to meet current seismic safety standards. If a substantial portion of this reconstruction would occur within the mall building, the existing structure would shield neighboring noise-sensitive land uses. The More Intense Alternative would require more construction activity and result in more enrolled students, more teachers, more refuse collection, and more deliveries to the ancillary retail uses within the campus. As a result, this alternative would be expected to generate the most construction and operational noise, and have the greatest potential to impact neighboring noise-sensitive receptors.

The noise impacts associated with the North Campus Alternative were previously addressed in the *College Park Specific Plan Noise Impact Study* (May 25, 2010) prepared by Endo Engineering. The North Campus Alternative was determined to result in an audible increase in the noise levels along several roadway segments near the campus. Since the projected noise levels along these roadway links would not exceed the *Palm Springs 2007 General Plan* noise standards for single-family residential land uses, the projected noise increases were not considered significant. With the North Campus Alternative, no demolition would be required and existing noise-sensitive residential land uses exist only south of Tramview Road. Therefore, the North Campus Alternative would have a lower potential for construction noise impacts as well as operational noise impacts on adjacent sensitive noise receptors associated with any outdoor campus activities.

5.0 NOISE MITIGATION MEASURES

Noise standards are implemented at various points in the planning and design of a development. At the preliminary planning levels, the land use type and density near noisy transportation facilities can be controlled. Later, at more detailed planning levels, proper structure arrangement and orientation can be evaluated, with approval conditioned upon setbacks, landscaped buffers, etc., that can resolve potential noise compatibility issues. When deemed necessary, detailed noise abatement requirements are established at the final stages of the planning process such as architectural design, acoustic construction techniques, and the erection of noise barriers. Long-term acoustic impacts can be mitigated more effectively through proper site design than through the use of noise reducing construction techniques.

5.1 General Methods to Reduce Noise Impacts

There are several basic techniques available to minimize the adverse effects of noise on noise-sensitive receptors. Classical engineering principles suggest controlling the noise source, whenever feasible, and protecting noise receptors when noise source control measures are inadequate. Many of the noise source control mechanisms are applied by the Federal and state governments.

Various strategies and techniques are available to address construction noise mitigation, depending on the complexitiy of the project, the amount and type of work required, and the sensitivity of the area beyond the project boundary. The same level of detail is not required for all projects. The level of construction-related information provided for the Phase I Project should be greater than that for the long range Master Plan to be implemented over a much longer period. Even though the magnitude of the impact construction noise may have on a community may not be known early in the project development stages, measures can be implemented at each phase of development that can help to reduce the anticipated noise impacts at sensitive receptors.

5.1.1 Construction Noise Mitigation Options

Grading and building permits are required by the City of Palm Springs prior to the initiation of vibration-intensive construction activities near sensitive land uses, such as pile driving, the prolonged use of jackhammers, or vibratory rollers. Reviewing the application for these permits provides an opportunity for the City of Palm Springs to evaluate the site-specific techniques proposed to reduce groundborne vibration levels and minimize impacts during construction. Prior to the issuance of these permits, the City of Palm Springs may attach conditions of approval, as needed, to ensure that the measures employed would be adequate to protect surrounding land uses from structural damage and protect the public health, safety, and welfare of residents.

Standard construction practices are typically required in contract specifications to reduce demolition and construction noise levels near noise-sensitive receptors. Prior to the issuance of grading and building permits, the City of Palm Springs has the authority to require the implementation of the best available noise abatement construction practices to minimize noise generated during demolition and construction activities. This action would be consistent with the goals and policies in the Noise Element of the *City of Palm Springs 2007 General Plan* to ensure that the noise exposure of adjacent noise-sensitive receptors will be reduced to the maximum extent possible.

Best available noise abatement construction practices may range from prohibiting the use of radios on-site to the proper maintenance of equipment and the use of noise suppression devices and built-in noise control shielding. The City may require construction practices such as: (1) the location of staging areas as far from sensible receptors as feasible; (2) on-site truck routing to minimize back-up alarms near sensitive receptors; (3) equipment to be turned off immediately when not in use; (4) the erection of temporary noise barriers or screens around particularly noisy activities; (5) the use on mainline electrical power available at the site, rather than portable generators; (6) the use of hydraulic breaking or bursting techniques rather than impact breaking methods during demolition; (7) the use of heavy construction equipment with rubber tires, rather than metal treads; and (8) the use of newer rather than older equipment to reduce both noise and air pollutant emissions.

Contract specifications typically require the construction contractor to be governed by the provisions of the local agency General Plan and Municipal Code. However, site-specific contract specifications and special provisions may be included that require the written notification of residents and other landowners within 300 feet of the site of the proposed project and construction activities. This can provide a mechanism for the distribution of contact information including the designated individual responsible for receiving public input and addressing site-specific noise issues and dealing with noise complaints from adjacent residents, institutions, and businesses. A contact individual's name, phone number, e-mail address and a website address can be essential components of an effective mitigation strategy.

The effective control of construction noise can be achieved by considering the following techniques: (1) alternative design options; (2) mitigation at the source; (3) mitigation along the path; and (4) mitigation at the receiver. Abatement opportunities can be considered for a variety of areas and features. Design options may range from modifications to the project layout to changes in the sequence of operations and the use of alternative construction methods. Storage areas should be designated in locations removed from sensitive receptors. Haul roads should be designated in locations where adjacent land uses are not considered noise sensitive and the noise increases caused by the additional truck traffic would not result in impacts. Existing buildings and perimeter walls can be considered for use as noise shielding during certain construction operations.

The sequencing and scheduling of construction operations are equally important in addressing and mitigating construction-related noise. It may be possible to schedule several noisy operations concurrently to take advantage of the fact that the combined noise levels produced may not be significantly greater than the levels produced by the separate construction operations. Structures that are to be constructed in conjunction with the project that would shield noise-sensitive areas, may be constructed in the initial stages of the construction process to reduce the subsequent noise exposure of the sensitive receivers.

Alternatives to standard construction techniques may be available that are more practical and cost-effective in dealing with construction noise. For example, impact pile driving can produce noise levels in excess of acceptable limits, even when feasible noise reduction methods are implemented. Various dampening and shielding methods can attain some reduction, but rarely reduce the noise to acceptable levels for receptors close to the pile driving activity. The use of vibration or hydraulic insertion techniques, drilled, or augered holes for cast-in-place piles are alternatives that may produce significantly lower noise levels than traditional impact pile driving. Another example is compressors, most of which are powered by diesel fuel or gasoline engines and are contained or have baffles to abate noise levels. Electric compressors are significantly quieter than diesel or gasoline engine powered compressors.

Contract specifications and special provisions are produced during the design stages of project development and may be included in the contract plans and contract documents. Ideally, the use of these documents is considered in conjunction with other control methods to achieve an overall construction noise strategy. Contract specifications could contain compliance requirements for the contractor defining two types of noise criteria limits: (1) relative lot-line limits, such as those in the City Noise Ordinance, and (2) absolute equipment emissions limits. Contract specifications may contain an absolute noise criterion which can be applied to generic classes of heavy equipment to limit noise emissions such as an equipment-specific A-weighted L_{max} noise limit evaluated at a reference distance of 50 feet. Newer equipment is generally quieter than old equipment. The use of electric powered equipment is typically quieter than diesel, and hydraulic powered equipment is quieter than pneumatic power.

Time constraints and the use of equipment regulations can be an effective technique to reduce the impacts caused during sensitive time periods. Operating noise equipment only when necessary and switching it off when it is not in use can minimize noise impacts. The contract specifications can require the use of the equipment with the lowest noise emissions rating.

Contractor training programs can be required at the site related to project-specific noise requirements, specifications, equipment operations, noise issues, and noise-critical areas adjacent to the site. The improper operation or the inappropriate use of equipment can increase noise levels. Poor loading, unloading, excavation, and hauling techniques may result in increased noise levels. Regular service of equipment is essential to keep it operating quietly. Vendors and haul truck drivers should be informed of the staging areas and designated truck routes to be used as well as the need to limit idling time while within the site to no longer than five minutes.

Source control requirements are the most effective form of mitigation because they occur before potentially offensive noise levels are emitted. The preferential use of quieter equipment can reduce the overall construction noise and may eliminate the need for additional mitigation. The air intake and exhaust cycle of internal combustion engines, which is responsible for much of the noise emitted at construction sites, can be controlled by requiring the use of adequate muffler systems. Employing shields attached to equipment per the manufacturers' specifications is effective, particularly for stationary equipment (such as shielded compressors) where a substantial noise reduction is required. Dampening of metal surfaces can reduce noise due to vibration. Sound aprons hung from equipment or the frames attached to the equipment made of rubber or PVC layers with sound absorptive material facing the machine can be used when the shielding must be frequently removed. Temporary enclosures may be constructed surrounding stationary work activities that can be erected and dismantled relatively easily.

5.1.2 Techniques to Achieve Long-Term Land Use Noise Compatibility

Acoustic site planning, architectural design, acoustic construction techniques and the erection of noise barriers are all effective methods for reducing noise impacts when source control mechanisms are insufficient to achieve the desired results. Acoustic site planning involves the careful arrangement of land uses, lots and buildings to minimize intrusive noise levels. The placement of noise compatible land uses between the roadway and more sensitive uses is an effective planning technique. The use of buildings as noise barriers with entries facing away from the source of noise, can shield sensitive activities, entrances and common open space areas. Clustered and planned developments can maximize the amount of open space available for landscaped buffers in place of continuous noise barriers next to heavily traveled roadways. All of these strategies have been employed in the development of the proposed site plan.

Acoustic architectural design involves the incorporation of noise reducing strategies in the design and layout of individual structures. Building heights, room arrangements, window size and placement, fixed windows (with mechanical ventilation provided per Uniform Building Code requirements), balcony and courtyard design, and the provision of air conditioning all play an important role in shielding noise sensitive activities from intrusive noise levels. Roof designs that reflect the noise back toward the roadway also reduce noise intrusion into adjacent developments. These strategies will be used to achieve the necessary reduction from the exterior noise levels to achieve 45 dBA CNEL within the buildings constructed to implement the WVC Master Plan.

Acoustic construction is the treatment of various parts of a building to reduce interior noise levels. Acoustic wall design, doors, ceilings and floors, as well as dense building materials, the use of acoustic windows (double-glazed, double-paned, thick, non-openable, or small with air-tight seals) and the inclusion of maximum air spaces in attics and walls are all available options. These treatments may be utilized to achieve 45 dBA CNEL within the dormitories, the library, or conference center.

Exterior to Interior Noise Attenuation

Normal residential construction techniques generally provide a 20 dBA reduction from outside to inside noise levels with windows closed. New energy insulation requirements for buildings can produce up to 25 dBA exterior to interior noise reductions with windows closed and 10 dBA reductions with open windows. Commercial construction with fixed windows can provide a 30 dBA reduction from outside to inside noise levels. Consequently, residential buildings with exterior noise exposures up to 70 dBA and commercial buildings with exterior noise exposures up to 75 dBA can achieve 45 dBA interior noise levels with standard construction techniques.

Noise Barriers

Any solid barrier that hides the passing vehicles from view on abutting properties will reduce traffic noise. To be an adequate noise shield, the mass and stiffness of the barrier must be sufficient to prevent bending or buckling and it must not vibrate easily or leak air. Up to 15 dBA reductions can be achieved using noise barriers such as berms and walls made of stucco, reinforced concrete, concrete blocks, or precast concrete panels. The existing perimeter wall along the west site boundary varies in height, but appears to be adequate to provide a noise attenuation of approximately 5 to 8 dBA.

5.2 Measures Required of All Projects

The contractors responsible for implementing the proposed project shall comply with all applicable federal, state and local laws related to noise. Cal OSHA implements the Occupational Health and Safety Act of 1970 (29 Code of Federal Regulations [CFR] 1910.95), which regulates the exposure of workers over an 8-hour workday where noise levels exceed 90 dBA. Hearing protection will be required in areas where the noise exposure exceeds 85 dBA and these areas shall be posted as "high noise areas."

Noise and groundborne vibration impacts during demolition and construction activities shall be regulated through the Construction Site Regulations (Section 8.04.220 of the *Palm Springs Municipal Code)*, the environmental specifications in the construction contract, and the Noise Control Act of 1972, which sets noise emission standards for construction machinery. If the demolition or construction noise produced at the property line disturbs the peace and quiet of any person of normal sensitivity, the contractor shall comply with the Construction Site Regulations set forth in the *Palm Springs Municipal Code* (Section 8.04.220) which limit construction work to the hours between 7:00 a.m. and 7:00 p.m. on weekdays and between 8:00 a.m. and 5:00 p.m. on Saturdays and prohibit construction work on Sundays and six national holidays. Stationary sources of noise shall comply with the provisions of the City of Palm Springs Noise Ordinance.

5.3 Specific Recommendations

The City of Palm Springs has identified temporary construction noise as an area of concern in the *Palm Springs 2007 General Plan* because construction noise frequently provokes community annoyance and complaints. The *Palm Springs 2007 General Plan* includes noise goals and policies developed to protect residential areas and other sensitive land uses from impacts associated with exposure to excessive noise. Consequently, all feasible noise reducing measures should be incorporated in the construction specifications to ensure that the potential for adverse noise impacts on the adjacent community is reduced to the maximum extent feasible.

Consistent with those policies the following measures are recommended for consideration and, if feasible incorporation in the project construction specifications to minimize to the greatest extent possible potential short-term demolition and construction activity noise impacts. The applicant and the City of Palm Springs should consider these noise reduction measures in developing site-specific conditions of approval prior to the issuance of grading or building permits to ensure that the demolition and construction-related noise exposure of adjacent noise-sensitive receptors will be reduced to the maximum extent feasible.

1. All construction equipment and associated noise control equipment shall be maintained in proper working order in accordance with the manufacturers' specifications.

2. During the demolition and construction activities, a contact person shall be designated to investigate, document, evaluate, and attempt to resolve legitimate project-related noise complaints. This person's name and contact information shall be posted conspicuously at the site during the demolition and construction activities. The designated contact person shall contact individuals making a complaint within

24 hours to determine the noise source that resulted in the complaint and then implement all feasible measures to reduce the noise at the source.

3. The staging of concrete mixer trucks adjacent to noise-sensitive residential areas west and north of the project site shall be prohibited prior to 7:00 a.m. on weekdays and prior to 8:00 a.m. on Saturdays.

4. The staging of haul trucks required to remove building debris and other excavated materials adjacent to noise-sensitive areas west and north of the project site shall be prohibited prior to 7:00 a.m. on weekdays and prior to 8:00 a.m. on Saturdays.

5. The on-site staging and routing of heavy construction equipment shall minimize the need for heavy vehicles to travel in reverse within the site to avoid the activation of continuous vehicle reverse warning alarms, which are one of the most commonly cited nuisance noises associated with construction activities. These alarms generate 1000 Hertz pure tone beeps at 97 to 112 dBA, which exceeds the noise levels associated with long-term hearing loss.

6. Prior to issuance of grading or building permits, the contractor shall identify the site-specific measures to be implemented to attenuate construction noise levels during demolition and construction activities per the environmental specifications in the construction contract. These specifications may include but are not limited to the following:

   - The contractor shall comply with all local sound control and noise level rules, regulations and ordinances which apply to any and all work performed pursuant to the contract.
   - All feasible best practice demolition and construction techniques shall be implemented to minimize noise impacts on adjacent noise-sensitive land uses.
   - A construction truck routing plan shall be developed and submitted to the City of Palm Springs for review and approval that demonstrates, to the extent feasible, avoidance of routes with adjacent noise-sensitive receptors.
   - Every effort should be made to create the greatest distance between noise sources and sensitive receptors during construction activities.
   - Stockpiling and vehicle staging areas should be located as far as practical from noise-sensitive receptors.
   - Parking, refueling and servicing operations for all heavy equipment and on-site construction vehicles shall be located as far as practical from existing homes, churches, and other noise-sensitive land uses.
   - Stationary equipment should be placed such that emitted noise is directed away from noise-sensitive receptors.
   - The noisiest construction operations shall be arranged to occur together in the construction program to avoid continuing periods of greater annoyance.

7. Prior to the issuance of building permits, the applicant shall demonstrate to the City's satisfaction that the structures to be constructed within the site shall incorporate noise reduction features sufficient to achieve the City of Palm Springs noise standards shown in Table 3-4.

Appendices

A. Noise Glossary
B. Noise Model Assumptions
C. Year 2018 Ambient Exterior Noise Exposure
D. Year 2030 Ambient Exterior Noise Exposure

Appendix A
Noise Glossary

A-Weighted Sound Level (dBA) -- An A-weighted sound level is the sound pressure level in decibels as measured on a sound level meter using the A-weighting 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 and provides good correlation with subjective reactions to noise.

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

Barrier -- A natural or man-made object that interrupts the path of sound from the sound from the sound source to the sound receiver.

Community Noise Equivalent Level (CNEL) -- CNEL is the average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five decibels to sound levels occurring during the evening from 7 p.m. to 10 p.m. and addition of ten decibels to sound levels occurring during the night from 10 p.m. to 7 a.m. The 5 and 10 decibel penalties are applied to account for increased noise sensitivity during the evening and nighttime hours. The CNEL represents the daily energy noise exposure averaged on an annual basis. The State of California uses the dBA CNEL noise index to relate community noise exposure to compatibility criteria.

CNEL -- See Community Noise Equivalent Level.

Day-Night Average Noise Level (Ldn) -- The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of 10 decibels to sound levels occurring during the nighttime from 10 p.m. to 7 a.m. The 10-decibel penalty is applied to account for increased noise sensitivity during the nighttime hours. The Ldn represents the daily energy noise exposure averaged on an annual basis and is typically within 1 dBA of the CNEL value.

dB -- See Decibel.

dBA -- See A-Weighted Sound Level.

Decibel (dB) -- A decibel is a unit of measurement on a logarithmic scale which describes the magnitude of a particular quantity of sound pressure or power with respect to a standard reference value. A decibel is equal to 10 times the logarithm (to the base 10) of the ratio of the measured sound pressure squared to a reference pressure (i.e., 20 micro-pascals) squared.

Design Noise Level -- The noise level selected by the designer after consideration of applicable standards for various land use or activity categories to be used for determining traffic noise impacts and the assessment of the noise abatement treatment for a particular highway section.

EPA -- Environmental Protection Agency.

Equivalent Sound Level (Leq) -- An Leq is the sound level corresponding to a steady state sound level containing the same total energy as a time varying sound level over a given sample period.

FHWA -- Federal Highway Administration.

Frequency (Hz) -- The frequency is the number of times per second that a sound pressure signal oscillates about the prevailing atmosphere. The unit of frequency is the hertz.

Habitable Room -- A habitable room is defined as any room meeting the requirements of the Uniform Building Code or other applicable regulations that 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.

Hz -- A unit of measurement of frequency, numerically equal to cycles per second (See Frequency).

Intrusive Noise -- That noise exceeding the existing ambient noise at a given location is termed an intrusive noise. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence and tonal or informational content, as well as prevailing ambient noise level.

Leq -- See Equivalent Sound Level.

Ldn -- See Day-Night Average Noise Level.

Line Source -- A noise source which generates sound along a line rather than at a single fixed point.

L Percentile -- L percentiles represent the A-weighted sound level exceeded for the identified percent of the sample time. For example, a value of 55 dBA L_{10} would mean that 55 dBA was exceeded 10 percent of the time. Other L percentiles commonly used include L_{50}, L_{90}, L_{99}, etc. The L_{50} corresponds to the average level of noise. The L_{10} corresponds to peaks of noise in the time history of environmental noise.

Noise -- Noise is any unwanted sound, or sound that 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".

Noise Attenuation -- Noise attenuation is the ability of a material substance, or medium to reduce the noise level from one place to another or between one room and another. Noise attenuation is specified in decibels.

Noise Contours -- The lines drawn around a noise source indicating constant or equal level of noise exposure from that source are termed noise contours. CNEL and Ldn are typical standards used for comparison.

Noise-Sensitive Area -- An area of regular and intensive human usage where the usage is impaired or restricted when subjected to excessive levels of noise.

Noise Sensitive Land Use -- Noise-sensitive land uses are land uses associated with indoor and/or outdoor human activities that may be subject to stress and/or significant interference from noise. They include residential (single-family 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; and public or private educational facilities, libraries, churches and places of public assembly.

Outdoor Living Area -- Outdoor living area is a term used to define spaces that are associated with residential land uses and are typically used for passive recreational activities. Such spaces include patio areas, barbecue areas, Jacuzzi areas, etc. Outdoor areas usually not included in this definition are front yard areas, driveways, greenbelts, maintenance areas and storage areas associated with residential land uses.

Point Source -- A stationary device that creates sounds while fixed or motionless.

Shadow Zone -- Area of reduced sound levels adjacent to a natural or man-made barrier.

Appendix B
Noise Model Assumptions

I. Temporal Traffic Distribution Assumed (Percent)

Secondary and Larger Highways

Type of Vehicle	Overall	Day	Evening	Night
Automobile	92	69.30	12.90	9.60
Medium Truck	3	1.44	0.06	1.50
Heavy Truck	5	2.40	0.10	2.50

Riverside County Department of Health acoustical parameters for County highways.

Collector and Smaller Streets

Type of Vehicle	Overall	Day	Evening	Night
Automobile	97.4	73.6	13.6	10.22
Medium Truck	1.84	0.90	0.04	0.90
Heavy Truck	0.74	0.35	0.04	0.35

Riverside County Department of Health acoustical parameters for County highways.

II. ***Road Grade Assumptions*** -- level terrain and roadway.

III. ***Roadway Widths Assumed*** -- were based upon the *College of the Desert West Valley Campus Master Plan and Phase I Project Traffic Impact Study* (Endo Engineering, dated July 15, 2015) and Endo Engineering field observations.

IV. ***Speeds Assumed*** -- were as shown on the following table.

V. ***RD-77-108 Input Parameters*** -- see the tables on the following pages.

VI. ***Alpha--*** was assumed to be zero (3 decibels per doubling of distance).

Appendix B
Noise Model Assumptions

Roadway Segment	Speed[a] (mph)	Half-Width[b] (feet)	Percent Trucks[c] (% - Medium)	
Sunrise Way				
North of Tahquitz Canyon Way	40	24	8.00	37.50
South of Tahquitz Canyon Way	35	24	8.00	37.50
North of Baristo Road	35	24	8.00	37.50
South of Baristo Road	35	24	8.00	37.50
Sunset Way				
North of Tahquitz Canyon Way	25	6	2.58	71.32
Cerritos Drive				
North of Baristo Road	25	6	2.58	71.32
South of Baristo Road	25	6	2.58	71.32
Farrell Drive				
North of Alejo Road	45	24	2.58	71.32
South of Alejo Road	45	24	2.58	71.32
North of Amado Road	45	24	2.58	71.32
South of Amado Road	45	24	2.58	71.32
North of Tahquitz Canyon Way	45	24	2.58	71.32
South of Tahquitz Canyon Way	45	24	2.58	71.32
North of Baristo Road	45	24	2.58	71.32
South of Baristo Road	45	24	2.58	71.32
North of Ramon Road	45	24	2.58	71.32
South of Ramon Road	45	24	2.58	71.32
Compadre Road				
North of Baristo Road	25	6	2.58	71.32
South of Baristo Road	25	6	2.58	71.32
Civic Drive				
North of Tahquitz Canyon Way	30	6	2.58	71.32
South of Tahquitz Canyon Way	30	6	2.58	71.32
North of Baristo Road	30	6	2.58	71.32
South of Baristo Road	30	6	2.58	71.32
El Cielo Road				
North of Tahquitz Canyon Way	45	6	8.00	37.50
South of Tahquitz Canyon Way	45	24	8.00	37.50
North of Baristo Road	45	24	8.00	37.50
South of Baristo Road	45	24	8.00	37.50
Alejo Road				
West of Farrell Drive	45	6	2.58	71.32
East of Farrell Drive	35	6	2.58	71.32

a. Speed is based upon posted speed limits or conditions observed during field reconnaissance.
b. The half-width is the distance from the roadway centerline to the center of the outermost travel lane.
c. Truck mix provided by Riverside County Department of Health. The format is truck mix percentage of ADT, followed by the percentage of all trucks that are assumed to be medium-duty (2-axle) trucks.

Appendix B (Continued)
Noise Model Assumptions

Roadway Segment	Speed[a] (mph)	Half-Width[b] (feet)	Percent Trucks[c] (% - Medium)	
Amado Road				
West of Farrell Drive	40	6	2.58	71.32
Tahquitz Canyon Way				
West of Sunrise Way	40	24	8.00	37.50
East of Sunrise Way	40	24	8.00	37.50
West of Sunset Way	40	24	8.00	37.50
East of Sunset Way	40	24	8.00	37.50
West of Farrell Drive	40	24	8.00	37.50
East of Farrell Drive	40	24	8.00	37.50
West of Civic Drive	40	24	8.00	37.50
East of Civic Drive	40	24	8.00	37.50
West of El Cielo Road	40	24	8.00	37.50
East of El Cielo Road	40	24	8.00	37.50
Baristo Road				
West of Sunrise Way	40	6	2.58	71.32
East of Sunrise Way	40	12	2.58	71.32
West of Cerritos Drive	40	12	2.58	71.32
East of Cerritos Drive	40	6	2.58	71.32
West of PS High School	40	12	2.58	71.32
East of PS High School	40	12	2.58	71.32
West of Farrell Drive	40	12	2.58	71.32
East of Farrell Drive	40	12	2.58	71.32
West of Compadre Road	40	12	2.58	71.32
East of Compadre Road	40	12	2.58	71.32
West of Civic Drive	40	12	2.58	71.32
East of Civic Drive	40	12	2.58	71.32
West of El Cielo Road	40	12	2.58	71.32
East of El Cielo Road	40	12	2.58	71.32
Ramon Road				
West of Farrell Drive	45	24	8.00	37.50
East of Farrell Drive	45	24	8.00	37.50

a. Speed is based upon posted speed limits or conditions observed during field reconnaissance.
b. The half-width is the distance from the roadway centerline to the center of the outermost travel lane.
c. Truck mix provided by Riverside County Department of Health. The format is truck mix percentage of ADT, followed by the percentage of all trucks that are assumed to be medium-duty (2-axle) trucks.

Appendix C
Year 2018 Ambient Exterior Noise Exposure

Roadway Segment	A.D.T.[a] (Veh/Day)	CNEL @ 50 Feet[b]	Distance to Contours (Ft.)[c] 70 dBA	65 dBA	60 dBA
Sunrise Way					
North of Tahquitz Canyon Way	22,880	76.3	189	592	1,871
South of Tahquitz Canyon Way	21,790	75.3	151	471	1,486
North of Baristo Road	22,380	75.4	154	482	1,521
South of Baristo Road	23,110	75.6	161	504	1,593
Sunset Way					
North of Tahquitz Canyon Way	1,580	56.8	R/W	R/W	R/W
Cerritos Drive					
North of Baristo Road	470	51.5	R/W	R/W	R/W
South of Baristo Road	1,580	56.8	R/W	R/W	R/W
Farrell Drive					
North of Alejo Road	14,610	71.4	65	193	606
South of Alejo Road	14,870	71.5	66	197	620
North of Amado Road	15,010	71.6	68	202	634
South of Amado Road	15,660	71.8	71	211	664
North of Tahquitz Canyon Way	16,310	71.9	72	216	680
South of Tahquitz Canyon Way	13,050	71.0	60	176	553
North of Baristo Road	12,220	70.7	57	165	516
South of Baristo Road	11,590	70.4	54	154	482
North of Ramon Road	12,070	70.6	56	161	504
South of Ramon Road	9,440	69.6	47	129	401
Compadre Road					
North of Baristo Road	900	54.4	R/W	R/W	R/W
South of Baristo Road	1,220	55.7	R/W	R/W	R/W
Civic Drive					
North of Tahquitz Canyon Way	2,740	60.6	R/W	R/W	57
South of Tahquitz Canyon Way	1,050	56.4	R/W	R/W	R/W
North of Baristo Road	1,010	56.3	R/W	R/W	R/W
South of Baristo Road	240	50.0	R/W	R/W	R/W
El Cielo Road					
North of Tahquitz Canyon Way	4,780	69.7	47	147	463
South of Tahquitz Canyon Way	12,880	74.5	126	392	1,236
North of Baristo Road	13,260	74.7	132	410	1,295
South of Baristo Road	14,290	75.0	141	439	1,387
Alejo Road					
West of Farrell Drive	4,260	65.6	R/W	57	180
East of Farrell Drive	2,970	61.7	R/W	R/W	74

a. A.D.T. = average daily two-way traffic volume.
b. CNEL is provided at 50 feet from all roadway centerlines .
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.

Appendix C (Continued)
Year 2018 Ambient Exterior Noise Exposure

Roadway Segment	A.D.T.[a] (Veh/Day)	CNEL @ 50 Feet[b]	Distance to Contours (Ft.)[c] 70 dBA	65 dBA	60 dBA
Amado Road					
West of Farrell Drive	1,430	59.7	R/W	R/W	R/W
Tahquitz Canyon Way					
West of Sunrise Way	12,500	73.7	106	326	1,029
East of Sunrise Way	13,040	73.9	110	341	1,077
West of Sunset Way	13,210	73.9	110	341	1,077
East of Sunset Way	12,860	73.8	108	334	1,052
West of Farrell Drive	12,180	73.6	103	319	1,005
East of Farrell Drive	14,850	74.4	123	383	1,208
West of Civic Drive	14,900	74.4	123	383	1,208
East of Civic Drive	14,130	74.2	118	366	1,154
West of El Cielo Road	14,120	74.2	118	366	1,154
East of El Cielo Road	5,390	70.0	50	141	439
Baristo Road					
West of Sunrise Way	3,750	63.9	R/W	39	122
East of Sunrise Way	6,120	66.1	R/W	64	198
West of Cerritos Drive	6,150	66.1	R/W	64	198
East of Cerritos Drive	6,430	66.2	R/W	66	207
West of PS High School	6,190	66.2	R/W	65	203
East of PS High School	6,710	66.5	R/W	70	217
West of Farrell Drive	6,860	66.6	R/W	71	222
East of Farrell Drive	6,280	66.2	R/W	65	203
West of Compadre Road	5,960	66.0	R/W	62	194
East of Compadre Road	5,060	65.3	R/W	R/W	165
West of Civic Drive	4,960	65.2	R/W	R/W	161
East of Civic Drive	4,860	65.1	R/W	R/W	158
West of El Cielo Road	4,890	65.1	R/W	51	158
East of El Cielo Road	3,100	63.2	R/W	R/W	102
Ramon Road					
West of Farrell Drive	25,100	77.4	242	763	2,411
East of Farrell Drive	29,830	78.2	291	917	2,898

a. A.D.T. = average daily two-way traffic volume.
b. CNEL is provided at 50 feet from all roadway centerlines .
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.

Appendix D
Year 2030 Ambient Exterior Noise Exposure

Roadway Segment	A.D.T.[a] (Veh/Day)	CNEL @ 50 Feet[b]	Distance to Contours (Ft.)[c] 70 dBA	65 dBA	60 dBA
Sunrise Way					
North of Tahquitz Canyon Way	24,550	76.6	202	634	2,005
South of Tahquitz Canyon Way	23,500	75.6	161	504	1,593
North of Baristo Road	24,130	75.7	165	516	1,630
South of Baristo Road	24,870	75.9	172	540	1,707
Sunset Way					
North of Tahquitz Canyon Way	1,720	57.2	R/W	R/W	R/W
Cerritos Drive					
North of Baristo Road	510	51.9	R/W	R/W	R/W
South of Baristo Road	1,710	57.2	R/W	R/W	R/W
Farrell Drive					
North of Alejo Road	18,040	72.4	80	242	763
South of Alejo Road	18,000	72.4	80	242	763
North of Amado Road	18,000	72.4	80	242	763
South of Amado Road	17,770	72.3	78	237	745
North of Tahquitz Canyon Way	17,770	72.3	78	237	745
South of Tahquitz Canyon Way	16,770	72.0	74	221	696
North of Baristo Road	15,840	71.8	71	211	664
South of Baristo Road	16,080	71.9	72	216	680
North of Ramon Road	16,080	71.9	72	216	680
South of Ramon Road	10,110	69.9	49	138	429
North of Baristo Road	900	54.4	R/W	R/W	R/W
South of Baristo Road	1,320	56.0	R/W	R/W	R/W
Civic Drive					
North of Tahquitz Canyon Way	2,960	60.9	R/W	R/W	61
South of Tahquitz Canyon Way	1,130	56.7	R/W	R/W	R/W
North of Baristo Road	1,090	56.6	R/W	R/W	R/W
South of Baristo Road	260	50.4	R/W	R/W	R/W
El Cielo Road					
North of Tahquitz Canyon Way	5,160	70.0	50	157	496
South of Tahquitz Canyon Way	13,650	74.8	135	420	1,325
North of Baristo Road	14,060	74.9	138	429	1,356
South of Baristo Road	15,110	75.2	147	460	1,453
Alejo Road					
West of Farrell Drive	6,770	67.6	R/W	91	286
East of Farrell Drive	3,200	62.0	R/W	R/W	79

a. A.D.T. = average daily two-way traffic volume.
b. CNEL is provided at 50 feet from all roadway centerlines.
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.

Appendix D (Continued)
Year 2030 Ambient Exterior Noise Exposure

Roadway Segment	A.D.T.[a] (Veh/Day)	CNEL @ 50 Feet[b]	Distance to Contours (Ft.)[c] 70 dBA	65 dBA	60 dBA
Amado Road					
West of Farrell Drive	1,530	60.0	R/W	R/W	R/W
Tahquitz Canyon Way					
West of Sunrise Way	14,670	74.4	123	383	1,208
East of Sunrise Way	13,870	74.1	115	357	1,128
West of Sunset Way	14,050	74.2	118	366	1,154
East of Sunset Way	15,370	74.6	129	401	1,265
West of Farrell Drive	13,270	73.9	110	341	1,077
East of Farrell Drive	15,840	74.7	132	410	1,295
West of Civic Drive	15,830	74.7	132	410	1,295
East of Civic Drive	15,000	74.5	126	392	1,236
West of El Cielo Road	14,990	74.5	126	392	1,236
East of El Cielo Road	5,820	70.4	54	154	482
Baristo Road					
West of Sunrise Way	3,970	64.1	R/W	41	128
East of Sunrise Way	6,420	66.3	R/W	67	207
West of Cerritos Drive	6,460	66.4	R/W	68	212
East of Cerritos Drive	6,750	66.4	R/W	69	217
West of PS High School	6,490	66.4	R/W	68	212
East of PS High School	7,070	66.7	R/W	73	227
West of Farrell Drive	7,230	66.8	R/W	74	233
East of Farrell Drive	7,790	67.2	R/W	81	255
West of Compadre Road	7,790	67.2	R/W	81	255
East of Compadre Road	7,790	67.2	R/W	81	255
West of Civic Drive	7,790	67.2	R/W	81	255
East of Civic Drive	7,790	67.2	R/W	81	255
West of El Cielo Road	7,790	67.2	R/W	81	255
East of El Cielo Road	3,320	63.5	R/W	R/W	109
Ramon Road					
West of Farrell Drive	33,050	78.6	319	1,005	3,178
East of Farrell Drive	39,920	79.5	392	1,236	3,909

a. A.D.T. = average daily two-way traffic volume.
b. CNEL is provided at 50 feet from all roadway centerlines.
c. All distances are measured from the centerline. R/W means the contour falls within the right-of-way.