Appendix I

Noise Technical Memorandum

NOISE TECHNICAL MEMORANDUM

To:	Kara Peterson; San Diego State University
From:	Nick Segovia, Dudek
Subject:	SDSU Imperial Valley Off-Campus Center – Calexico, Affordable Student Housing Project – Noise Technical Memorandum
Date:	December 12, 2024
cc:	Mollie Brogdon, Sarah Lozano, Dudek; Michael Haberkorn, Gatzke Dillon & Ballance
Attachments:	A – Figures B – Baseline Noise Measurement Field Data C – Construction Noise Prediction Model Worksheets D – Traffic Noise Modeling Calculations E – Operation Noise Prediction Model Inputs

Dudek is pleased to provide these noise technical analyses for the proposed California State University (CSU)/San Diego State University (SDSU) Calexico Affordable Student Housing Project (Project or proposed Project), to be located at the SDSU Imperial Valley Off-Campus Center, located in Calexico, California. The potential for significant noise-related impacts from construction and operation of the project is assessed in accordance with the California Environmental Quality Act (CEQA) Guidelines. As a state entity, CSU is not subject to local planning regulations, including those of the City of Calexico (City) or Imperial County (County). However, to the extent feasible, consideration is given to relevant City and County noise regulations.

This memorandum presents quantitative estimates of project on-site construction and post-construction operational noise emission levels relative to the surrounding sound environment, which consists of existing urban uses, including commercial, institutional, and medical facilities near the project site. Construction vibration is also estimated using Federal Transit Administration (FTA) techniques in the absence of explicit City thresholds, and traffic noise impacts are discussed qualitatively.

1 Project Overview and Background

In September 2003, the CSU certified an environmental impact report for the SDSU Imperial Valley Master Plan Project (State Clearinghouse No. 2002051010) and approved a Campus Master Plan for the expansion and improvement of the SDSU Imperial Valley Off-Campus Center, which includes locations in Calexico and Brawley, both located in Imperial County (SDSU 2003). The Off-Campus Center is an extension of SDSU's main campus in San Diego and furthers the University's regional educational mission to provide additional educational opportunities to the outlying communities of Imperial County. The previously certified and approved Campus Master Plan and EIR provided the authorization necessary for enrollment of 850 full-time equivalent (FTE)[1] students at the Off-Campus

1 A full-time equivalent (FTE) student is one full-time student taking 15 course credits, or 3 part-time students each taking 5 course credits.

Center, corresponding associated faculty and staff, and a framework for development of the facilities necessary to serve this projected enrollment and campus population.

The Off-Campus Center - Calexico is approximately 8.3 acres in size and is located in the City of Calexico (City). Most of the Calexico location is built out, consisting of several educational and support facilities. The environmental impacts associated with development of the Off-Campus Center – Calexico were evaluated at a program level of review in the 2003 EIR. In the CSU's continuing effort to build out the Imperial Valley Off-Campus Center and provide additional educational opportunities, SDSU presently proposes construction and operation of a four-building complex that would provide affordable student housing at the Calexico location for 80 students and a resident manager. Additional details regarding the proposed housing is provided below.

2 Project Location and Existing Conditions

The Off-Campus Center – Calexico is located at 720 Heber Avenue in downtown Calexico, approximately 0.5 miles north of the United States–Mexico border (see Figure 1, Regional Map). Regional access to the Off-Campus Center is provided via SR-111 and SR-98 to the north. The Calexico location is bordered by four streets: Heber Avenue to the west, Sherman Street to the north, Blair Avenue to the east, and 7th Street to the south. Residential uses bound the Calexico complex to the north, east, south, and west. Other surrounding uses include Calexico High School, located northeast, and Calexico City Hall, located immediately south. The Off-Campus Center - Calexico currently consists of 17 buildings and an associated surface parking lot (see Figure 2, Vicinity Map, and Figure 3A, Existing Campus Master Plan).

As a state entity, the CSU/SDSU is not subject to local government plans, regulations, and guidelines, such as those contained in the City's General Plan. The above notwithstanding, for information purposes, the Off-Campus Center - Calexico is zoned as Open Space and is designated as Public Facilities in the City's General Plan (City of Calexico 2015a).

The proposed Project site is approximately 0.58 acres in size (25,320 square feet) and is located at the southeast corner of the campus, at the northwest corner of East 7th Street and Blair Avenue (see Figure 2). The entirety of the Project site has previously been graded and is relatively flat in nature, with an average elevation of 3.5 feet above mean sea level. The Project site encompasses the locations identified in the Campus Master Plan as future Building 21 (see Figure 3A and Figure 3B, Proposed Campus Master Plan). The Project site consists of vacant and undeveloped land with two trees located along the northern boundary of the site. A chain-link fence separates the Project site from the recently removed temporary Campus Buildings 201, which were located immediately west of the Project site.

3 Project Description

3.1 Affordable Student Housing Complex

The proposed Project would involve the construction of a single-story, four-building complex approximately 12,840 square feet in size that would provide for affordable student housing. The complex would include three student housing buildings, including one smaller live-in unit building, and a community building. Two of the three proposed residential buildings would each be approximately 5,500 square feet in size and would include five four-bedroom, two-bathroom apartment units, totaling 40 student beds per building (two student beds per bedroom, 80 student beds in total). The third proposed residential building would be a live-in manager unit that would consist of a single two-bedroom, one-bathroom apartment. The proposed live-in unit would also include approximately 100 square feet of office space that is intended to provide a space for tenant meetings, social services, or counseling. All apartment units would also be equipped with a living area and kitchen. The proposed community building program would be approximately 840 square feet and include laundry, mail, restroom, electrical, and maintenance facilities. The mail room would be located outside, under the shaded amenity patio of the community building (see Table 1).

Table 1. Affordable Student Housing Complex Area Calculations

	Quantity	Area (Square Feet)	Beds
Residential Buildings (3)			
4-Bedroom, 8-Bed Unit	5	5,150	40
4-Bedroom, 8-Bed Unit	5	5,150	40
Live-In Unit	1	1,000	2
Office (Included in Live-In Unit)	N/A	N/A	N/A
Subtotal	*11*	*11,300*	*82*
Community Building (1)			
Laundry Room	1	300	N/A
Service Rooms	4	450	N/A
Restroom	2	100	N/A
Mail/Package (Outside)	1	270	N/A
Subtotal	*N/A*	*1,150*	*N/A*
Other			
Trash/Recycling Enclosure	1	850	N/A
Open Space	N/A	2,300	N/A
Landscaping/hardscaping	N/A	12,500	N/A
Subtotal	*N/A*	*13,650*	*N/A*
Combined Total	**N/A**	**26,100**	**82**

Note: N/A = not applicable.
All square foot amounts presented in the table are approximate amounts only and may not add to the site plan area totals described in this document due to rounding.

Other on-site proposed amenities include a courtyard, bike racks, and a community waste enclosure. The courtyard would be approximately 1,600 square feet and would be centrally located in the proposed complex (see Figure 4, Site Plan). Approximately 15 bike racks would be provided throughout the Project site. A community waste enclosure at the northeast corner of the Project site would allow residents a convenient place to dispose of waste and recyclables.

3.1.1 Operation

The Off-Campus Center - Calexico, including the Project site, is owned and operated by the CSU/SDSU. The CSU Board of Trustees, on behalf of SDSU, is the lead agency responsible for certifying the adequacy and completeness of this document and approval of the proposed Project. SDSU and the IVCCD have received joint funding under the State of California Higher Education Student Housing Grant Program to construct the proposed Project.

To support basic housing needs for students in the Imperial Valley, SDSU and IVCCD have executed a 30-year master lease agreement that details operation of the Project. This agreement dictates that 40 of the 82 proposed student beds would be reserved for IVCCD students who attend the Imperial Valley College in Imperial. Likewise, 40 of the proposed 82 beds, would be reserved for SDSU Off-Campus Center - Calexico students. A 2-bedroom unit would also provide living space for on-site management. SDSU would be responsible for operating, managing, and maintaining the proposed Project once operational.

Student beds made available under the proposed Project would be leased/rented to eligible low-income students. Eligible low-income students are defined as having 30% of 50% of the Annual Median Income for Imperial County. In the event, after a good faith outreach effort, there is not sufficient demand from students meeting the eligibility requirements within 90 days of the start of the fall semester, unassigned beds may be leased at market rates to SDSU and IVCCD students not meeting the low-income eligibility requirements. In addition to meeting the low-income criteria, eligible students would be required to be enrolled students and take a minimum average of 12 degree-applicable units per semester term, or the quarterly equivalent (with exceptions permitted), to facilitate timely degree completion.

3.1.2 Other Project Elements

Building and Site Design

The proposed buildings have been designed to reflect the character and massing of the existing Off-Campus Center - Calexico, as well as the surrounding neighborhood. Building design is centered around a courtyard-style housing complex and would consist of smooth stucco walls with downspouts and rafters, punctuated by composite terra cotta–colored roof tile accents and windows. Maximum building heights would range from 14 feet to 18 feet.

Landscaping, Other Site Improvements, and Lighting

The Project would include approximately 16,000 square feet of on-site landscaping and hardscape improvements (i.e., pedestrian walkways). All proposed landscaping would consist of drought-tolerant, indigenous plants. The landscape scheme would include shrubs, hedges, and a variety of trees. A total of 39 trees would be added to the Project site including five fan palms, eight mesquite trees, six evergreen elms, and 20 yucca trees.

All exterior on-site lighting would be hooded or shielded, directed downward, and would be compliant with applicable standards for lighting control and light pollution reduction (i.e., Title 24, American National Standards Institute/Illuminating Engineering Society).

The proposed complex would be secured via an iron security fence that would measure 6 feet in height and run approximately 64 linear feet, connecting to the proposed buildings. Access to the complex would only be available to residents and their guests via two pedestrian gates located at the northwestern corner and southern portion of the proposed complex. The gates would be equipped with security card access for residents.

Utilities and Public Services

New points of connection for domestic water, fire supply water, sewer, storm drainage and electrical connections from existing utility lines would be required to serve the proposed Project. Potable water service, as well as sewer collection services at the Project site, would be provided by the City. The Project would connect to an existing sanitary sewer maintenance access line located in Blair Avenue via new 6-inch mains. Connections for water (including domestic, fire, and irrigation) would be from an existing water main located in Blair Avenue. Distribution water pipes would be extended underground to serve each proposed building. A new water meter would be located in the proposed maintenance room in the community building. Adequate water treatment capacity and supply and sewer treatment capacity exists within the City's water and sewer system to accommodate the Project; therefore, no capacity upgrades to infrastructure would be necessary.

Stormwater drainage includes two stormwater catch basins. One basin would be located on the eastern boundary of the Project site, and the second would be situated immediately east of the existing chain-link fence at the western boundary of the Project site. The proposed catch basins would function as both water quality and flood control features, by filtering out surface water contaminants and slowing stormwater runoff prior to stormwater discharge into the City's stormwater system via one new storm drain located in the southeast corner of the Project site.

Electrical services within the Project area are provided by Imperial Irrigation District, which provides electric power to over 158,000 customers in the Imperial Valley in addition to areas of Riverside and San Diego counties (IID 2024). New utility connections and infrastructure would be required to support electrical services on site. The Project would connect to on-site electrical power infrastructure via an existing 12kV, three phase, three wire, 60 Hertz overhead line routed along East 7th Street. No natural gas usage is proposed for the Project.

The Project would require a new point of connection for on-site telecommunications and would connect to the existing AT&T communications via the on-campus minimum point of entry.

Access, Circulation, and Parking

Regional access to the Project site is provided via SR-111 and SR-98 to the north. Local access is provided via Blair Avenue and East 7th Street. Parking to the Project site is available in the existing campus parking lot, immediately north of the Project site, which has sufficient capacity to serve the proposed Project. On-site circulation improvements would consist of additional paved pathway/pedestrian walkway features throughout the proposed complex and along the northern boundary of the Project site (see Figure 4). Emergency access would be provided directly adjacent to the Project site on East 7th Street and Blair Avenue.

3.1.3 Design Standards and Energy Efficiency

In May 2014, the CSU Board of Trustees broadened the application of sustainable practices to all areas of the university by adopting the first systemwide sustainability policy, which applies sustainable principles across all areas of university operations, including facility operations and utility management. In May 2024, the CSU Sustainability Policy was updated to expand on existing sustainability goals (CSU 2024). The CSU Sustainability Policy seeks to integrate sustainability into all facets of the CSU, including academics, facility operations, the built environment, and student life (CSU 2018). Relatedly, the state has also strengthened energy-efficiency requirements in the California Green Building Standards Code (Title 24 of the California Code of Regulations).

As a result, all CSU new construction, remodeling, renovation, and repair projects, including the proposed Project, would be designed with consideration of optimum energy utilization, low life cycle operating costs, and compliance with all applicable state energy codes and regulations. Progress submittals during design are monitored for individual envelope, indoor lighting, and mechanical system performances. In compliance with these goals, the proposed Project would be equipped with solar ready design features that would facilitate and optimize the future installation of a solar photovoltaic (PV) system.

3.1.4 Off-Site Improvements

Off-site improvements would include the resurfacing of a portion of Blair Avenue adjacent to the eastern boundary of the Project site that would be disturbed as a result of trenching to make necessary connections to the existing water main and sanitary sewer maintenance access. Any area disturbed as a result of this connection within Blair Avenue would be resurfaced to existing conditions. All off-site improvements would occur within the Blair Avenue right-of-way.

3.1.5 Construction

Construction would be performed by qualified contractors. Plans and specifications would incorporate stipulations regarding standard CSU/SDSU requirements and acceptable construction practices, such as those set forth in the SDSU Stormwater Management Plan, CSU Seismic Policy, The CSU Office of the Chancellor Guidelines, and the CSU Sustainability Policy, regarding grading and demolition, safety measures, vehicle operation and maintenance, excavation stability, erosion control, drainage alteration, groundwater disposal, public safety, and dust control.

Construction Timeline

Construction of the proposed Project would take approximately 17 months to complete and is estimated to begin as early as January 2025 and be completed by May 2026, with occupancy planned for fall 2026. Construction activities would generally occur Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m., with the potential for weekend construction on Saturday between 9:00 a.m. and 5:00 p.m. No construction would occur on Sundays or holidays or at night.

Construction Activities

A construction mobilization or staging area would be located immediately northeast of the proposed Project site and would occupy approximately 8,000 square feet. The area would be located east of existing Campus Building 6, west of Blair Avenue, and south of the existing parking lot (see Figure 2 and Figure 3A). To accommodate use of this area, four trees would be removed.

Construction would include site preparation, grading and excavation, utility installation/trenching, building foundation pouring, building construction, and landscaping. Excavation depths are anticipated to be 3 feet below grade. The majority of waste (i.e., excavated gravel/soil) generated during Project construction would be balanced/used within the site. Approximately 2,600 cubic yards of soil would be removed from the site and exported to Republic Services Allied Imperial Landfill, approximately 12 miles north. The entire Project site, including construction mobilization area (approximately 34,000 square feet in total) would be disturbed as a result of Project construction. Two trees would be removed from the Project site to accommodate the proposed Project.

Table 2 displays the construction equipment anticipated to be used during construction.

Table 2. Anticipated Construction Equipment

Aerial Lifts	Pressure Washers
Air Compressors	Pumps
Cement and Mortar Mixers	Rollers
Concrete/Industrial Saws	Rough Terrain Forklifts
Dumpers/Tenders	Rubber-Tired Dozers
Excavators	Rubber-Tired Loaders
Forklifts	Scrapers
Generator Sets	Signal Boards
Graders	Skid Steer Loaders
Off-Highway Tractors	Surfacing Equipment
Off-Highway Trucks	Sweepers/Scrubbers
Other Construction Equipment	Tractors/Loaders/Backhoes
Other General Industrial Equipment	Trenchers
Other Material Handling Equipment	Welders
Plate Compactors	

Source: Dorsey and Nielson Construction Inc, pers. comm., 2024

Construction Waste

The Project would generate construction debris during on-site clearing activities. In accordance with Section 5.408 of the California Green Building Standards Code, the Project would implement a construction waste management plan for recycling and/or salvaging for reuse of at least 65% of nonhazardous construction/demolition debris. Additionally, the Project would be required to meet Leadership in Energy and Environmental Design v4 requirements for waste reduction during construction. Solid waste generated during construction would be hauled off site to the Republic Services Allied Imperial Landfill at 104 East Robinson Road in Imperial, California.

4 Assessment Framework

4.1 Acoustical Fundamentals

The following subsections provide a summary of acoustical terminology and concepts that the analyses utilize to evaluate potential noise and vibration impacts associated with the project.

4.1.1 Sound, Noise, and Acoustics

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

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

Frequency

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

Addition of Decibels

A logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3 dB increase. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would combine to produce 73 dB. Three sources of equal loudness together (e.g., three cars passing simultaneously) would produce a sound level 5 dB louder than one source.

A-weighted Decibels

The decibel scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Although the intensity of the sound is a purely physical quantity, the perceived loudness is determined by the characteristics of the human ear.

Human hearing is limited in the range of audible frequencies and in the way it perceives the SPL in that range. In general, people are most sensitive to the frequency range of 1,000–8,000 Hz and perceive sounds within that range better than sounds in higher or lower frequencies. To approximate the response of the human ear, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies, and expressed as "A-weighted" decibels (dBA).

The A-weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Table 3 describes typical A-weighted noise levels for various noise sources.

Table 3. Typical A-Weighted Noise Levels for Common Indoor and Outdoor Sources

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Diesel truck at 50 feet at 50 mph	85	Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area, daytime	75	—
Gas lawn mower, 100 feet	70	Vacuum cleaner at 10 feet
Commercial area	65	Normal speech at 3 feet
Heavy traffic at 300 feet	60	—

Table 3. Typical A-Weighted Noise Levels for Common Indoor and Outdoor Sources

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	55	Large business office
Quiet urban daytime	50	Dishwasher next room
	45	—
Quiet urban nighttime	40	Theater, large conference room (background)
Quiet suburban nighttime	35	—
	30	Library
Quiet rural nighttime	25	Bedroom at night, concert hall (background)

Source: Caltrans 2013.
Notes: dBA = A-weighted decibel; mph = miles per hour.

Human Response to Changes in Noise Levels

As discussed above, doubling sound energy results in a 3 dB increase in sound. However, a measured doubling of sound energy usually does not correspond to a subjective human perception of a doubling of loudness.

Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1 dB changes in sound levels when exposed to steady, single-frequency (“pure-tone”) signals in the mid-frequency (1,000 Hz–8,000 Hz) range (Caltrans 2013). However, in typical noisy environments, changes in noise of 1 to 2 dB are generally not perceptible. In typical environments, people begin detecting sound level increases at 3 dB. A 5 dB increase is generally perceived as a distinctly noticeable increase, and a 10 dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy (e.g., doubling the number of cars on a highway), which would result in a 3 dB increase, would generally be perceived as barely detectable by the average healthy human.

Noise Descriptors

Noise in our daily environment fluctuates over time at varying rates. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors utilized in this analysis.

- **Energy Equivalent Level** (L_{eq}): L_{eq} represents an energy average of the sound level occurring over a specified period. L_{eq} is not an arithmetic average of varying decibel levels over a period of time; it accounts for greater sound energy represented by higher decibel contributions.
- **Maximum Sound Level** (L_{max}): L_{max} is the highest instantaneous sound level measured during a specified period.
- **Community Noise Equivalent Level** (CNEL): CNEL is the energy average of the A-weighted sound levels occurring over a 24-hour period, with a 10 dB penalty applied to sound occurring during the nighttime hours (between 10:00 p.m. and 7:00 a.m.) and a 5 dB penalty applied to the sound occurring during evening hours (between 7:00 p.m. and 10:00 p.m.).

Sound Propagation

When sound propagates over a distance, it changes in level and frequency. The manner in which noise reduces with distance depends on the following factors.

- **Geometric Spreading** – Sound from a localized source (i.e., an ideal point source) propagates uniformly outward in a spherical pattern (or hemispherical when near a surface). The sound level decreases at a rate of 6 dB for each doubling of distance from a point source. Roadways consist of several localized noise sources on a defined path, and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels decrease at a rate of 3 dB for each doubling of distance from a line source.
- **Ground Absorption** – The propagation path of noise from a sound emission source to a receptor is usually horizontal and close to the ground. Under these conditions, noise decrease from ground absorption and reflective wave canceling can add to the decrease associated with geometric spreading. For acoustically “hard” paths over which sound may traverse (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess sound decrease due to ground absorption is assumed. For acoustically absorptive or “soft” sites (i.e., those sites with an absorptive ground surface between the source and the receptor, such as fresh-fallen snow, soft dirt, or dense vegetative ground cover), an additional ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to cylindrical spreading for line source sound propagation, the excess sound decrease due to ground absorption results in an overall drop-off rate of 4.5 dB per doubling of distance.
- **Atmospheric Effects** – Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. SPLs can also be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects when distances between a source and receptor are large.
- **Shielding by Natural or Human-Made Features** – A large object or barrier in the path between a noise source and a receptor can substantially decrease noise levels at the receptor. The decrease provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receptor specifically to reduce noise. A barrier that breaks the line of sight between a source and a receptor will typically result in at least 5 dB of noise reduction. Taller barriers provide increased noise reduction. While a line of trees may visually occlude the direct line between a source and a receptor, its actual noise-reducing effect is usually negligible because it does not create a solid barrier. Deep expanses of dense wooded areas, on the other hand, can offer noise reduction under the right conditions.

4.1.2 Vibration Characteristics

Vibration is oscillatory movement of mass (typically a solid) over time. It is described in terms of frequency and amplitude and, unlike sound, can be expressed as displacement, velocity, or acceleration. Vibration impacts to buildings are generally discussed in terms of inches per second (ips) peak particle velocity (PPV), and unless the same PPV metric is also used as an assessment metric for receiving structure interiors, the potential for annoyance to occupants within those buildings can be evaluated with vibration velocity levels (L_v) or root-mean-square vibration decibels (VdB), which are calculated from PPV and application of a crest factor (CF) with the following expression (FTA 2018):

$$L_v = 20*LOG(PPV/[CF*V_{ref}]) = 20*LOG(PPV/[4*0.000001])$$

Common sources of vibration within communities include construction activities and railroad operations. Ground-borne vibration generated by construction projects is usually highest during pile driving, rock blasting, soil compacting, jack hammering, and demolition-related activities where sudden releases of subterranean energy or powerful impacts of tools on hard materials occur. Depending on their distances to a sensitive receptor, operation of large bulldozers, graders, loaded dump trucks, or other heavy construction equipment and vehicles on a construction site also have the potential to cause high vibration amplitudes.

4.2 Environmental Setting

The project site is surrounded by urban uses, including residential and commercial land uses. Consequently, noise sources affecting noise levels on the project site and in the vicinity would mainly include vehicular traffic from nearby roadways, existing SDSU Off-Campus Center - Calexico operations, and the indistinct background noise representing the mix of other distant and/or unseen natural and human-made noises.

4.2.1 Studied Sensitive Receptors

Noise- and vibration-sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas are typically considered noise- and vibration-sensitive receptors and may warrant unique measures for protection from intruding noise. The noise-sensitive receptors nearest to the project site are residences approximately 85 feet to the east and south.

4.2.2 Measured Outdoor Ambient Sound

Field measurements of SPL were conducted near the project site on May 2, 2024, to quantify and characterize the existing outdoor ambient sound levels. Table 4 provides the location, date, and time period at which these baseline noise level measurements were captured by an attending Dudek field investigator using a Rion-branded Model NL-52 sound level meter equipped with a 0.5-inch, pre-polarized condenser microphone with pre-amplifier. The sound level meter meets the current American National Standards Institute standard for a Type 1 (Precision Grade) sound level meter. The accuracy of the sound level meter was verified using a field calibrator before and after the measurements, and the measurements were conducted with the microphone positioned approximately 5 feet above the ground.

As shown in Table 4, four short-term (ST) noise level measurement locations that represent existing noise-sensitive receivers (ST1–ST4) were selected near the project site to quantify and characterize the representative existing outdoor ambient noise environment of the area. These locations are depicted as receivers ST1–ST4 in Figure 5, Baseline Outdoor Ambient Noise Measurement Locations. The measured L_{eq} and L_{max} noise levels recorded at the ST locations are provided in Table 4. The primary noise sources at the sites identified in Table 4 consisted of traffic along adjacent roadways, distant conversations/yelling, the sounds of leaves rustling, birdsong, and an on-campus generator. As shown in Table 4, the measured SPL ranged from approximately 52.3 dBA L_{eq} at ST2 to 60.9 dBA L_{eq} at ST1. Beyond the summarized information presented in Table 4, detailed noise measurement data are included in Attachment B, Baseline Noise Measurement Field Data.

Table 4. Measured Baseline Outdoor Ambient Noise Levels

Site Position Tag	Location or Address	Date, Time	L_{eq} (dBA)	L_{max} (dBA)
ST1	On western project site boundary, east of SDSU IVC CLAT classrooms	05/02/2024, 9:30 a.m. to 9:45 a.m.	60.9	63.8
ST2	North of project site within laydown area	05/02/2024, 9:51 a.m.to 10:06 a.m.	52.3	58.9
ST3	East of project site along East 7th Street	05/02/2024, 10:11 a.m. to 10:26 a.m.	59.5	66.2
ST4	South of project site along East 7th Street	05/02/2024, 10:30 a.m. to 10:45 a.m.	59.5	64.2

Source: Attachment B, Baseline Noise Measurement Field Data.
Notes: L_{eq} = energy equivalent continuous sound level (time-averaged sound level); dBA = A-weighted decibel; L_{max}= maximum sound level during the measurement interval; ST = short-term noise measurement locations; SDSU IVC = San Diego State University Imperial Valley Campus.

4.3 Regulatory Setting

4.3.1 Federal Regulations and Guidance

Federal Transit Administration

In its Transit Noise and Vibration Impact Assessment guidance manual, FTA recommends a daytime construction noise level threshold of 80 dBA L_{eq} over an 8-hour period (FTA 2018) when detailed construction noise assessments are performed to evaluate potential impacts to community residences surrounding a project. Although this FTA guidance is not a regulation, it can serve as a quantified standard in the absence of such noise limits at the state and local jurisdictional levels.

With respect to vibration, Table 5 presents FTA guidance thresholds for assessing building damage risk and human annoyance. Similar to the guidance for construction noise, the values in Table 5 represent recommended assessment guidance when local regulations lack such standards.

Table 5. Federal Transit Administration Vibration Threshold Guidance

Vibration Receptor	Vibration Assessment Metric	
	Peak Particle Velocity (PPV, ips)	Approximate Root Mean Square VdB*
Potential Damage to Structures by Building/Structural Category		
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102

Table 5. Federal Transit Administration Vibration Threshold Guidance

Vibration Receptor	Vibration Assessment Metric	
	Peak Particle Velocity (PPV, ips)	Approximate Root Mean Square VdB*
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90
Residential Building Occupant Human Response		
Frequent events *(more than 70 events per day)*		72
Occasional events *(30–70 events per day)*		75
Infrequent events *(fewer than 30 events per day)*		80
Institutional Land Use (Primarily Daytime Use) Occupant Human Response		
Frequent events *(more than 70 events per day)*		75
Occasional events *(30–70 events per day)*		78
Infrequent events *(fewer than 30 events per day)*		83

Source: FTA 2018.
Notes: PPV = peak particle velocity; ips = inches per second; VdB = vibration decibels.
* Root mean square VdB is calculated from the PPV using a crest factor of 4 and is with respect to 1 micro-inch per second.

4.3.2 State Guidance

The California Department of Transportation (Caltrans) Transportation and Construction Vibration Guidance Manual (Caltrans 2020) offers guidance comparable to the FTA guidance presented in Table 5 but includes recommended thresholds (expressed as PPV) for building damage risk and occupant annoyance that distinguish between "transient" sources (e.g., detonation of explosive charges or a dropped ball during building demolition) and "continuous" or "frequently intermittent" vibration sources. The latter two categories would be comparable to the "frequent" and "occasional" FTA event frequency categories in Table 5.

4.3.3 Local Regulations and Guidance

Because SDSU is a component of the CSU, which is a state agency, the proposed project is not subject to local government planning and land use plans, policies, or regulations. However, for informational purposes, SDSU has considered the following planning documents, and the project site's location within, and relationship to, each as summarized in the following subsections.

Imperial County General Plan Noise Element

Stationary Operational Noise

Section IV of the County's General Plan Noise Element identifies compatible exterior noise levels for various land use types (County of Imperial 2015). The maximum allowable noise exposure varies depending on the land use.

The maximum acceptable exterior noise level for residential uses and other noise-sensitive uses (including kindergarten through 12th grade schools, libraries, hospitals, daycare facilities, hotels, motels) is 60 dBA CNEL. Table 6 reproduces Table 6 from the County's General Plan Noise Element (County of Imperial 2015).

Table 6. Imperial County Noise/Land Use Compatibility Guidelines

Land Use Category	Exterior Noise Exposure (dBA CNEL)					
	55–60	60--65	65–70	70–75	75–80	80-85
Residential	*Normally Acceptable*	*Conditionally Acceptable*	*Conditionally Acceptable*	*Normally Unacceptable*	*Clearly Unacceptable*	*Clearly Unacceptable*
Transient Lodging—Motels, Hotels	*Normally Acceptable*	*Conditionally Acceptable*	*Conditionally Acceptable*	*Conditionally Acceptable*	*Normally Unacceptable*	*Clearly Unacceptable*
Schools, Libraries, Churches, Hospitals, Nursing Homes	*Normally Acceptable*	*Conditionally Acceptable*	*Conditionally Acceptable*	*Normally Unacceptable*	*Normally Unacceptable*	*Clearly Unacceptable*
Auditoriums, Concert Halls, Amphitheaters	*Conditionally Acceptable*	*Conditionally Acceptable*	*Conditionally Acceptable*	*Clearly Unacceptable*	*Clearly Unacceptable*	*Clearly Unacceptable*
Sports Arena, Outdoor Spectator Sports	*Conditionally Acceptable*	*Conditionally Acceptable*	*Conditionally Acceptable*	*Normally Unacceptable*	*Clearly Unacceptable*	*Clearly Unacceptable*
Playgrounds, Neighborhood Parks	*Normally Acceptable*	*Normally Acceptable*	*Normally Acceptable*	*Conditionally Acceptable*	*Clearly Unacceptable*	*Clearly Unacceptable*
Golf Courses, Riding Stables, Water Recreation, Cemeteries	*Normally Acceptable*	*Normally Acceptable*	*Normally Acceptable*	*Conditionally Acceptable*	*Conditionally Acceptable*	*Clearly Unacceptable*
Office Buildings, Business Commercial and Professional	*Normally Acceptable*	*Normally Acceptable*	*Conditionally Acceptable*	*Conditionally Acceptable*	*Normally Unacceptable*	*Clearly Unacceptable*
Industrial, Manufacturing Utilities, Agriculture	*Normally Acceptable*	*Normally Acceptable*	*Normally Acceptable*	*Conditionally Acceptable*	*Normally Unacceptable*	*Clearly Unacceptable*

Source: County of Imperial 2015.
Notes: dBA = A-weight decibel; CNEL = Community Noise Equivalent Level.
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 insulation features included in the design.
Normally Unacceptable: New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.
Clearly Unacceptable: New construction or development clearly should not be undertaken.

Part 4 of Section IV of the County's General Plan Noise Element also provides guidelines for the evaluation of significant noise impacts with respect to the CNELs set forth in Table 6, specifically providing limits for noise level increases over the existing outdoor ambient noise levels (County of Imperial 2015):

a. If the future noise level after the project is completed will be within the "normally acceptable" noise levels shown in the Noise/Land Use Compatibility Guidelines, but will result in an increase of 5 dB CNEL or greater, the project will have a potentially significant noise impact and mitigation measures must be considered.
b. If the future noise level after the project is completed will be greater than the "normally acceptable" noise levels shown in the Noise/Land Use Compatibility Guidelines, a noise increase of 3 dB CNEL or greater shall be considered a potentially significant noise impact and mitigation measures must be considered.

Section IV of the County's General Plan Noise Element also identifies compatible exterior noise levels for various land use types at the property line (County of Imperial 2015). The maximum allowable noise exposure varies depending on the land use, as shown in Table 7 below.

Table 7. Imperial County Property Line Noise Limits

Land Use	Time	Applicable Limit One-Hour Average Sound Level (Decibels)
Residential Zones	7:00 a.m. to 10:00 p.m.	50
	10:00 p.m. to 7:00 a.m.	45
Multi-residential Zones	7:00 a.m. to 10:00 p.m.	55
	10:00 p.m. to 7:00 a.m.	50
Commercial Zones	7:00 a.m. to 10:00 p.m.	60
	10:00 p.m. to 7:00 a.m.	55
Light Industrial/Industrial Park Zones	Anytime	70
General Industrial Zones	Anytime	75

Source: County of Imperial 2015.
Notes: One-hour average sound level = L_{eq} (energy equivalent level).

The County also establishes a 45 dBA CNEL threshold for interior noise levels for detached single-family dwellings, or 50 dB averaged over a 1-hour period for schools, libraries, offices, and other noise-sensitive areas where the occupancy is normally only in the daytime.

Construction Noise

Part 3 of Section IV of the County's General Plan Noise Element sets forth that "construction noise, from a single piece of equipment or a combination of equipment, shall not exceed 75 dB L_{eq} when averaged over an eight (8) hour period, and measured at the nearest sensitive receptor.... Construction equipment operation shall be limited to the hours of 7 a.m. to 7 p.m., Monday through Friday, and 9 a.m. to 5 p.m. on Saturday. No commercial construction operations are permitted on Sunday or holidays" (County of Imperial 2015).

City of Calexico Municipal Code

Stationary Operational Noise

Section 8.46.031 of the City's Municipal Code establishes maximum exterior noise levels for various land use types. The maximum allowable noise exposure varies depending on the land use, as shown in Table 8 below.

Table 8. City of Calexico Exterior Noise Level Limits

Land Use	Time	Applicable Limit One-hour Average Sound Level (Decibels)
Residential – Low Density	7:00 a.m. to 10:00 p.m.	50
	10:00 p.m. to 7:00 a.m.	40
Residential – High Density	7:00 a.m. to 10:00 p.m.	60
	10:00 p.m. to 7:00 a.m.	50
Commercial	7:00 a.m. to 10:00 p.m.	60
	10:00 p.m. to 7:00 a.m.	50
Industrial	7:00 a.m. to 10:00 p.m.	70
	10:00 p.m. to 7:00 a.m.	55

Source: City of Calexico Municipal Code Section 8.46.031.
Notes: One-hour average sound level = L_{eq} (energy equivalent level).

Section 8.46.035 of the City's Municipal Code also establishes maximum interior noise levels for multifamily residential land uses of 45 dBA from 7:00 a.m. to 10:00 p.m. and 35 dBA from 10:00 p.m. to 7:00 a.m.. If the measured ambient noise level differs from the permissible level, the allowable interior noise level shall be adjusted in 5 dB increments in each category as appropriate to reflect the measured ambient noise level.

Construction Noise

Section 8.46.042 of the City's Municipal Code prohibits construction activities "between the hours of five p.m. of each day and eight a.m. the next day if the noise or other sound produced by such work is of such intensity or quality that it disturbs the peace and quiet of any other person of normal sensitivity."

4.4 Thresholds of Significance

The following significance criteria, included for analysis in this acoustical assessment, are based on Appendix G of the CEQA Guidelines (14 CCR 15000 et seq.) and will be used to determine the significance of potential noise impacts. Noise impacts would be significant if the project would result in:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
b) Generation of excessive ground-borne vibration or ground-borne noise levels.

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

Quantitative thresholds of significance have been established for the purposes of this analysis based on the local polices and regulations described in Section 4.3.3 and are listed below.

- **Construction noise** – For purposes of this assessment, SDSU will apply the County's construction noise threshold of not exceeding 75 dBA for an 8-hour period, between 7:00 a.m. and 7:00 p.m., when received at any property zoned as residential.
- **Construction vibration** – The County and City do not explicitly provide thresholds for construction vibration. Therefore, for purposes of this analysis, for building damage risk to these existing off-site residential buildings, the threshold would be 0.3 ips PPV per Caltrans guidance with respect to continuous or intermittent sources (e.g., construction activities). The building occupant annoyance threshold within such a structure would be 0.2 ips PPV.
- **Project-attributed stationary source noise emission to the community** – For purposes of this analysis, Project-attributed stationary source noise will be assessed considering the maximum exterior L_{eq} for single-family residential land uses of 50 dBA hourly L_{eq} during daytime hours (7:00 a.m. to 10:00 p.m.) and 40 dBA hourly L_{eq} during nighttime hours (10:00 p.m. to 7:00 a.m.) as shown in Table 8, per Section 8.46.030 of the City's Municipal Code.
- **Off-site traffic noise exposure** – For purposes of this analysis, a direct roadway noise impact would be considered significant if increases in roadway traffic noise levels attributed to the proposed project were greater than 3 dBA CNEL at an existing noise-sensitive land use.
- **Exterior to interior traffic noise intrusion** – For purposes of this analysis, traffic noise intrusion to the project would be considered significant if interior noise levels exceed 45 dBA from 7:00 a.m. to 10:00 p.m. or if the adjusted allowable interior noise level with respect to higher existing ambient noise levels is exceeded, as discussed in Section 8.46.035 of the City's Municipal Code.
- **Exposure of project workers or visitors to excessive aviation noise** – Typically, and for purposes of this analysis, project areas where outdoor workers or visitors may be present that intersect the 65 dBA CNEL aviation noise contour of a public or private airport would be considered a potentially significant noise impact.

5 Impact Assessment

5.1 Approach and Methodology

5.1.1 Construction

The following methodology was utilized to reasonably estimate total project-attributed construction noise exposure at the nearest off-site noise-sensitive receptor, an existing home 95 feet east of the project site, along Blair Avenue.

This predictive analysis locates multiple sound-emitting sources (i.e., operating stationary and mobile equipment) associated with each construction phase as close as the nearest project site boundary with respect to the noise-sensitive receptor position—approximately 95 feet. This approach is conservative and "worst case," as construction equipment would normally be operating across the entire project site as construction work proceeds. Only under a worst case would multiple pieces of heavy construction equipment be concurrently operating as close as 95 feet to the noise-sensitive receptor and its neighbors along Blair Avenue.

Based on information provided by SDSU's construction management team, the construction activities that are expected to occur, grouped by phase, are shown in Table 9.

Table 9. Construction Scenario Assumptions

Construction Phase	Equipment		
	Equipment Type	Quantity	Usage Hours
Site Preparation	Grader	1	8
	Tractors/Loaders/Backhoes	2	8
	Roller	1	8
	Dump Truck	1	8
Grading	Grader	1	8
	Tractors/Loaders/Backhoes	2	8
	Roller	1	8
	Dump Truck	1	8
Building Construction	Aerial Lifts (electric)	3	8
	Forklifts	1	8
	Tractors/Loaders/Backhoes	2	8
	Cement and Mortar Mixers	5	8
	Welders	2	8
Paving/Architectural Coating	Air Compressors	1	8
	All other equipment greater than 5 horsepower	1	8

Source: Dorsey and Nielson Construction Inc, pers. comm., 2024.

Using the roster from Table 9 as guidance for input parameters, and as detailed in the worksheets appearing in Attachment C, combined construction noise emission for each listed phase was predicted with a model that emulates the Federal Highway Administration Roadway Construction Noise Model and utilizes its reference sound level data and "acoustical usage factors" by equipment type (FHWA 2008).

Vibration

Ground-borne vibration decreases rapidly, even over short distances. The decreasing of ground-borne vibration as it propagates from source to receptor through intervening soils and rock strata can be estimated with expressions found in FTA and Caltrans guidance. To examine potential building damage risk using PPV as the evaluation metric, vibration velocity level can be estimated with the following expression (FTA 2018):

$$PPV_{rcvr} = PPV_{ref} * (25/D)^n$$

where PPV_{rcvr} is the predicted vibration velocity at the receiver position, PPV_{ref} is the reference value at 25 feet from the vibration source, D is the actual horizontal distance to the receiver, and "n" is the Wiss exponent that FTA defines as 1.5 to generally characterize the propagation of vibration through soil/strata between the source and the receptor position.

5.1.2 Operations

Roadway Traffic Noise

The project is expected to generate 87 daily trips to the roadway system. Utilizing this information as well as additional traffic data provided in Attachment D, Traffic Noise Modeling Calculations, the Federal Highway Administration's Highway Traffic Noise Prediction Model RD-77-108 was used to estimate potential noise impacts at adjacent noise-sensitive uses. Information used in the model included average daily traffic (from on-site traffic counts taken during the investigator-attended outdoor ambient baseline SPL survey on May 5, 2024), posted traffic speeds, day/evening/night mix percentage, and truck mix percentage. Consistent with Caltrans guidance (Caltrans 2013), this analysis assumes 80% of the average daily traffic occurs during daytime hours (7:00 a.m. to 7:00 p.m.), 5% during the evening (7:00 p.m. to 10:00 p.m.), and 15% during the nighttime (10:00 p.m. to 7:00 a.m.). The truck percentages used in the noise model for existing arterials were 2.0% medium trucks and 1.0% heavy trucks, generally consistent with similar studies where such arterial roadways accept truck traffic.

The change in roadway noise levels was predicted for two scenarios; existing year 2025 and existing year 2025 plus project traffic noise levels are calculated for roadway segments bounded by intersections within the project area and listed as follows:

- Blair Avenue – from Sherman Street to 7th Street
- 7th Street – from Blair Avenue to Giles Avenue
- 7th Street – from Heber Avenue to Blair Avenue

Additionally, as illustrated in Section 5.2, Analysis Results, the model results were used to estimate the exterior to interior traffic noise intrusion to the occupants of the project, once operational.

Stationary Source Noise

Using DataKustik's CadnaA software, which models three-dimensional outdoor sound propagation based on International Organization for Standardization 9613-2 algorithms and relevant reference data, an operational scenario of the project was modeled for purposes of this analysis (ISO 1996). The modeled scenario included operating assumptions for the anticipated noise sources, specifically, heating, ventilation, and air conditioning (HVAC) units representative of SPL data for packaged terminal air conditioner units provided by SDSU, placed on the first-floor exterior windows of the modeled Off-Campus Center - Calexico Affordable Student Housing units. HVAC units associated with the building are expected to operate at any time up to 24 hours a day, 365 days a year, with an expected overall sound power level of 64 dBA. Additionally, an exterior on-site transformer located at the southwest corner of Building C was modeled, with an expected overall sound power level of 72 dBA. In addition to the HVAC sound source inputs, the following parameters are included in this CadnaA-supported stationary noise source assessment:

- Ground effect acoustical absorption coefficient equal to 0.8, which represents a mix of ground types over which project sound would travel across and beyond the project site, considering acoustically reflective roadway surfaces surrounding the site and acoustically absorptive "soft" vegetated ground cover, loose soils, and granular aggregate

- Reflection order of 1, which allows for a single reflection of sound paths on encountered structural surfaces, such as the rooftop "canopies"
- Conservative consideration of topography: both the project site and the grade of the nearest residential community to the east are, on average, at the same elevation above sea level, as is reflective of the true similarities in elevation between the proposed housing units and eastern residences
- Calm meteorological conditions (i.e., no wind) with 68°F and 50% relative humidity

Details of the CadnaA modeling input parameters (e.g., modeled sources) can be found in Attachment E, Operation Noise Prediction Model Inputs.

Vibration

Once operational, the project would not be expected to feature major on-site producers of ground-borne vibration. Anticipated HVAC systems are designed and manufactured to feature rotating and reciprocating components (e.g., fans and refrigeration compressors) that are well-balanced with isolated vibration within or external to the equipment casings.

5.2 Analysis Results

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

On-Site Construction Noise (Temporary)

2003 Imperial Valley Campus Master Plan Project EIR

Table 3.9-1 of the 2003 Imperial Valley Campus Master Plan Project EIR identifies predicted construction noise levels at the Brawley Campus site, where construction equipment would operate at a nearest distance of 300 feet from noise-sensitive receptors. No impacts associated with the construction of the proposed Brawley Campus site were expected. The 2003 EIR does not provide predicted construction noise levels for the proposed Calexico Campus project site, but does establish that construction activities would be of a "lesser degree" than the construction of the Brawley Campus site (SDSU 2003).

SDSU Imperial Valley Off-Campus Center – Calexico, Affordable Student Housing Project

Using a Roadway Construction Noise Model–emulating Excel workbook, the predicted noise level exposures from the proposed construction activities at the nearest studied residential noise-sensitive receptor are summarized in Table 10. The nearest residential noise-sensitive receptor is represented by the outdoor ambient noise measurement location ST4 (as shown Table 4) and is the closest distance to each construction phase area on the project site. Although the prediction results in Table 10 are presented as 8-hour L_{eq} values, they are essentially equivalent to hourly L_{eq} values since Table 9 indicates that construction equipment would operate 8 hours during a typical work shift within the City's established construction period.

Table 10. On-Site Construction Noise Model Results Summary without Mitigation (Noise-Sensitive Receptor at ST4 – Residence)

Construction Phase (from Table 8)	Construction Noise (dBA 8-hour L_{eq}) at ST4* - Nearest Residential Noise-Sensitive Receptor			
	Construction Noise Levels	Exceed City's 75 dBA 8-hour L_{eq} Threshold? (Yes/No)	Existing Noise Levels at ST4*	Temporary Noise Level Increase
Site Preparation	75.6	Yes	59.5	16.1
Grading	75.6	Yes		16.1
Building Construction	76.9	Yes		17.4
Paving/Architectural Coating	75.0	Yes		15.5

Notes: dBA = A-weighted decibel; L_{eq} = energy equivalent continuous sound level.
*See Table 4 for the measured outdoor ambient noise levels at measurement location ST4.
Source: See Attachment C, Construction Noise Prediction Model Worksheets, for complete results.

Project construction noise at the nearest noise-sensitive receptor would be higher than the measured ambient levels of the project site (see Table 4), so nearby sensitive receptors may experience temporary noise level increases of up to 24.6 dBA. The predicted construction noise levels at the noise-sensitive receptor appearing in Table 10 would exceed the City's 75 dBA 8-hour L_{eq} threshold if mitigation is not incorporated. Table 11 shows the predicted noise level exposures from the proposed construction activities at the nearest studied noise-sensitive receptor with a 6-foot-tall temporary construction noise barrier incorporated.

Table 11. On-Site Construction Noise Model Results Summary with Mitigation (Noise-Sensitive Receptor – Residence)

Construction Phase (from Table 9)	Construction Noise (dBA 8-hour L_{eq}) at ST4* - Nearest Residential Noise-Sensitive Receptor			
	Construction Noise Levels	Exceed City's 75 dBA 8-hour L_{eq} Threshold? (Yes/No)	Existing Noise Levels at ST4*	Temporary Noise Level Increase
Site Preparation	73.4	No	59.5	13.9
Grading	73.4	No		13.9
Building Construction	74.6	No		15.1
Paving/Architectural Coating	72.8	No		13.3

Notes: dBA = A-weighted decibel; L_{eq} = energy equivalent continuous sound level.
*See Table 4 for the measured outdoor ambient noise levels at measurement location ST4.
Source: See Attachment C, Construction Noise Prediction Model Worksheets, for complete results.

Implementation of **Mitigation Measure (MM) NOI-1** (see below) would require SDSU, prior to the commencement of construction activities, to direct the contractor to install a 6-foot-tall temporary construction noise barrier along the southern and eastern project boundaries to remain in place throughout the entire construction process. As a result, all predicted construction noise levels at the noise-sensitive receptor appearing in Table 11 would be below the City's 75 dBA 8-hour L_{eq} threshold. Attachment C shows the predicted construction noise levels before and after the installation of a 6-foot-tall temporary noise barrier. Construction noise at the nearest noise-sensitive receptor would be higher than the measured ambient levels of the project site (see Table 4), so nearby sensitive receptors may experience temporary noise level increases of up to 22.3 dBA. On this basis, and with a 6-foot-tall temporary construction noise barrier incorporated during project construction, construction noise levels would be **less-than-significant with mitigation incorporated.**

Operation Noise

Roadway Traffic Noise

2003 Imperial Valley Campus Master Plan Project EIR

The 2003 Imperial Valley Campus Master Plan Project EIR states that the proposed Calexico Campus would produce an additional 830 ADT to an estimated existing 5000 ADT based on field observations performed by ISE (SDSU 2003). The project-related 830 ADT trip generation would increase traffic noise levels within a range of 0.5 to 1 dBA CNEL, which would not constitute an impact, and aggregate levels would still fall below the 65 dBA CNEL that is compatible for the proposed project expansion use without mitigation (SDSU 2003).

SDSU Imperial Valley Off-Campus Center – Calexico, Affordable Student Housing Project

Because the proposed project would not increase student enrollment and would serve the previously approved campus enrollment, substantial changes to localized traffic patterns are not anticipated (see Dudek Trip Generation and Vehicle Miles Traveled (VMT) Screening Analysis). Table 11 summarizes the predicted increases in traffic noise attributable to the project along the area roadways (Blair Avenue and 7th Avenue). As appearing in Table 12, impacts associated with roadway traffic noise would not increase existing traffic noise levels by more than 3 dBA CNEL and would therefore be **less than significant.**

Table 12. Traffic Noise Levels with and without Project

Street Name	From	To	Noise Level *without* Project (dBA CNEL)	Noise Level *with* Project (dBA CNEL)	Project Increase (dBA CNEL)
Blair Avenue	Sherman Street	7th Street	56.4	56.5	0.1
7th Street	Blair Avenue	Giles Avenue	54.9	55.2	0.3
7th Street	Heber Avenue	Blair Avenue	55.2	55.5	0.3

Source: Dudek 2024.
Notes: dBA = A-weighted decibel; CNEL = Community Noise Equivalent Level.

Additionally, the CNEL values appearing in Table 12 suggest that corresponding hourly L_{eq} values associated with roadway traffic noise after the project is operational would not exceed the City's daytime (7:00 a.m. to 10:00 p.m.) or nighttime (10:00 p.m. to 7:00 a.m.) interior noise thresholds of 45 dBA and 35 dBA L_{eq}, respectively. For example, the occupant of a project housing unit facing Blair Avenue with a partially open window would experience a 15 dB reduction from exterior to interior traffic noise intrusion, or a 25 dB reduction with a closed window. Thus, an exterior traffic noise level of 56.5 dBA hourly L_{eq}

(existing plus project noise) along Blair Avenue would be reduced to an interior noise level of 41.5 dBA hourly L_{eq} when a window is partially open, or 31.5 dBA hourly L_{eq} when a window is closed.

After applying these same exterior-to-interior decibel reductions attributed to building sound insulation, both predicted scenario noise levels appearing in Table 12 would be below the City's 45 dBA CNEL interior noise limit during daytime hours, and during nighttime hours, interior noise levels would likely be even lower as Caltrans assumes that 15% of average daily traffic would occur at night (Caltrans 2013). Therefore, a potential exterior-to-interior traffic noise intrusion impact would be **less than significant.**

Stationary Sources

2003 Imperial Valley Campus Master Plan Project EIR

The 2003 Imperial Valley Campus Master Plan Project EIR does not provide an analysis for project-related stationary noise sources.

SDSU Imperial Valley Off-Campus Center – Calexico, Affordable Student Housing Project

Predicted noise exposure levels attributed to concurrent operation of project on-site stationary sources (i.e., HVAC systems) as modeled appear in Table 13. The predicted levels at the studied noise-sensitive receptor locations would not exceed the City's exterior noise level threshold for single-family residential land uses (at the property line) of 50 dBA hourly L_{eq} during daytime hours (7:00 a.m. to 10:00 p.m.) or 40 dBA hourly L_{eq} during nighttime hours (10:00 p.m. to 7:00 a.m.); therefore, potential noise impacts associated with project operation would be **less than significant.**

Table 13. Project Operation Noise Prediction Model Results Summary

Modeled Receptor	Modeled Property Line Receptor Distance from Project Boundary	Predicted Operation Noise (dBA hourly L_{eq}) at Indicated Modeled Property Line Receptor
R1	85 feet northeast	19.6
R2	85 feet east	21.4
R3	85 feet east	23.6
R4	90 feet south	32.8
R5	100 feet south	29.3

Notes: dBA = A-weighted decibel; L_{eq} = energy equivalent continuous sound level.

Figure 6, Predicted Stationary Source Operation Noise from Proposed Project, correspondingly illustrates (for this same modeled full operation scenario) predicted project stationary equipment operation sound levels across a horizontal plane approximately 5 feet above grade (i.e., a first-floor or pedestrian listening elevation) over the project site and beyond into the surrounding vicinity.

Mitigation Measure

MM-NOI-1 Prior to the commencement of construction activities, CSU/SDSU, or its designee, shall direct the construction contractor to install a 6-foot-tall temporary construction noise barrier (either solid plywood or chain link fencing with sound blankets) along the southern and eastern Project boundaries to remain in place throughout the entire construction process.

b) Would the project result in generation of excessive ground-borne vibration or ground-borne noise levels?

On-Site Construction Activities

2003 Imperial Valley Campus Master Plan Project EIR

The 2003 Imperial Valley Campus Master Plan Project EIR does not provide an analysis for project-related ground-borne vibration or ground-borne noise levels.

SDSU Imperial Valley Off-Campus Center – Calexico, Affordable Student Housing Project

Using the expressions described in Section 5.1.1, Construction, ground-borne vibration velocity levels attributed to anticipated on-site usage of a dozer, loader, and vibratory roller at the nearest off-site noise-sensitive receptor to the construction of the project were calculated.

For example, the project's paving phase would appear to occur as close as 95 feet to the western façade of the nearest off-site receptor along Blair Avenue. At this distance, and using a reference ground-borne PPV of 0.21 ips for the roller at a distance of 25 feet, the estimated PPV at the receiving building façade and likely closest interior occupied space can be estimated as follows:

$$PPV_{rcvr} = 0.21*(25/95)^{1.5} = 0.028 \text{ ips}$$

As shown in Table 14, predicted ground-borne vibration velocity levels are below the Caltrans guidance-based 0.3 ips PPV threshold for avoiding building damage to older residential structures, as well as the 0.2 ips PPV threshold for occupant annoyance.

Subsequent on-site construction activities would involve greater quantities of equipment but would be less vibratory than a roller and/or their distances to the studied sensitive receptors would be much greater. Hence, ground-borne vibration propagating from these more distant or lower magnitude sources of on-site vibration would be substantially less than the estimates in Table 14 and the Caltrans guidance-based vibration exposure thresholds. Therefore, on the basis of compliance with these standards, impacts associated with construction vibration would be **less than significant.**

Table 14. Predicted On-Site Construction Vibration at Nearest Noise-Sensitive Receptor

Studied Receptor (Description)	Anticipated Vibration Source Closest Distance (feet)	Predicted PPV (ips) and VdB (rms) for Indicated Equipment Type					
		Dozer		Loader		Roller	
		PPV	VdB	PPV	VdB	PPV	VdB
Residence 95 feet East along Blair Avenue	95	0.012	70	0.012	70	0.028	77

Notes: PPV (ips) = peak particle velocity (inches per second); VdB (rms) = vibration decibels (root mean square).

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

2003 Imperial Valley Campus Master Plan Project EIR

The 2003 Imperial Valley Campus Master Plan Project EIR does not discuss impacts associated with aviation noise levels.

SDSU Imperial Valley Off-Campus Center – Calexico, Affordable Student Housing Project

The Calexico International Airport is approximately 6,000 feet, or 1.15 miles from the Project site. The Compatibility Map for Calexico International Airport shown in the Imperial County General Plan Noise Element does not provide noise contours (County of Imperial 2015). However, the Calexico International Airport is not a major airport, and due to the distance of approximately 1.15 miles from the Project site, construction workers and post-construction Project operational or maintenance staff on site are not likely be exposed to excessive noise levels. Thus, there would be a **less-than-significant** impact associated with aviation noise levels

6 Conclusions

As analyzed herein, potential noise and vibration-related impacts to the surrounding community associated with Project construction and operations would be less than significant with implementation of recommended mitigation measures during Project construction.

7 References

Caltrans (California Department of Transportation). 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol*. September 2013. https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf.

Caltrans. 2020. *Transportation and Construction Vibration Guidance Manual*. Sacramento, California: Caltrans, Division of Environmental Analysis, Environmental Engineering, Hazardous Waste, Air, Noise, Paleontology Office. April 2020. https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf.

County of Imperial. 2015. "Noise Element." In the *Imperial County General Plan.* Revised October 6, 2015. https://www.icpds.com/assets/planning/noise-element-2015.pdf.

CSU (The California State University). 2018. *Sustainability in the California State University – The First Assessment of the 2014 Sustainability Policy (2014–2017)*. February 2018. Accessed January 23, 2024. https://www2.calstate.edu/impact-of-the-csu/sustainability/Documents/2014-17-Sustainability.pdf.

CSU. 2024. "California State University Sustainability Policy." Revised May 15, 2024. Accessed June 2024.

Dorsey, J. and Nielson Construction Inc. 2024. Data Request Form for the SDSU Off-Campus Center – Calexico, Affordable Student Housing Project. Zoom meeting communication and documentation between J. Dorsey (OCMI), Nielson Construction Inc., and Sarah Lozano (Dudek). May 24, 2024.

Dudek. 2024. SDSU Imperial Valley Off-Campus Center – Calexico, Affordable Student Housing Project --Trip Generation and Vehicle Miles Traveled (VMT) Screening Analysis. June 2024.

FHWA (Federal Highway Administration). 2008. Roadway Construction Noise Model (RCNM), Software Version 1.1. U.S. Department of Transportation, Research and Innovative Technology Administration, John A. Volpe National Transportation Systems Center, Environmental Measurement and Modeling Division. Washington, D.C. December 8, 2008.

FTA (Federal Transit Administration). 2018. *Transit Noise and Vibration Impact Assessment Manual*. FTA Report No. 0123. September 2018. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

IID (Imperial Irrigation District). 2024. "About IID Energy." Accessed April 2024. https://www.iid.com/energy/about-iid-energy.

ISO (International Organization for Standardization). 1996. "Standard 9613-2, Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation."

SDSU (San Diego State University). 2003. *Environmental Impact Report and Initial Study for SDSU Imperial Valley Master Plan Project.* Final. SCH No. 200251010. https://imperialvalley.sdsu.edu/about/brawley/environmental-impact-reports.

Attachment A

Figures

SOURCE: ESRI

DUDEK

0 4 8 Miles

FIGURE 1
Regional Map

Technical Memorandum for the SDSU Imperial Valley Off-Campus Center - Calexico Affordable Student Housing Project

SOURCE: AERIAL-ESRI MAPPING SERVICE 2023; DEVELOPMENT-SDSU 2024

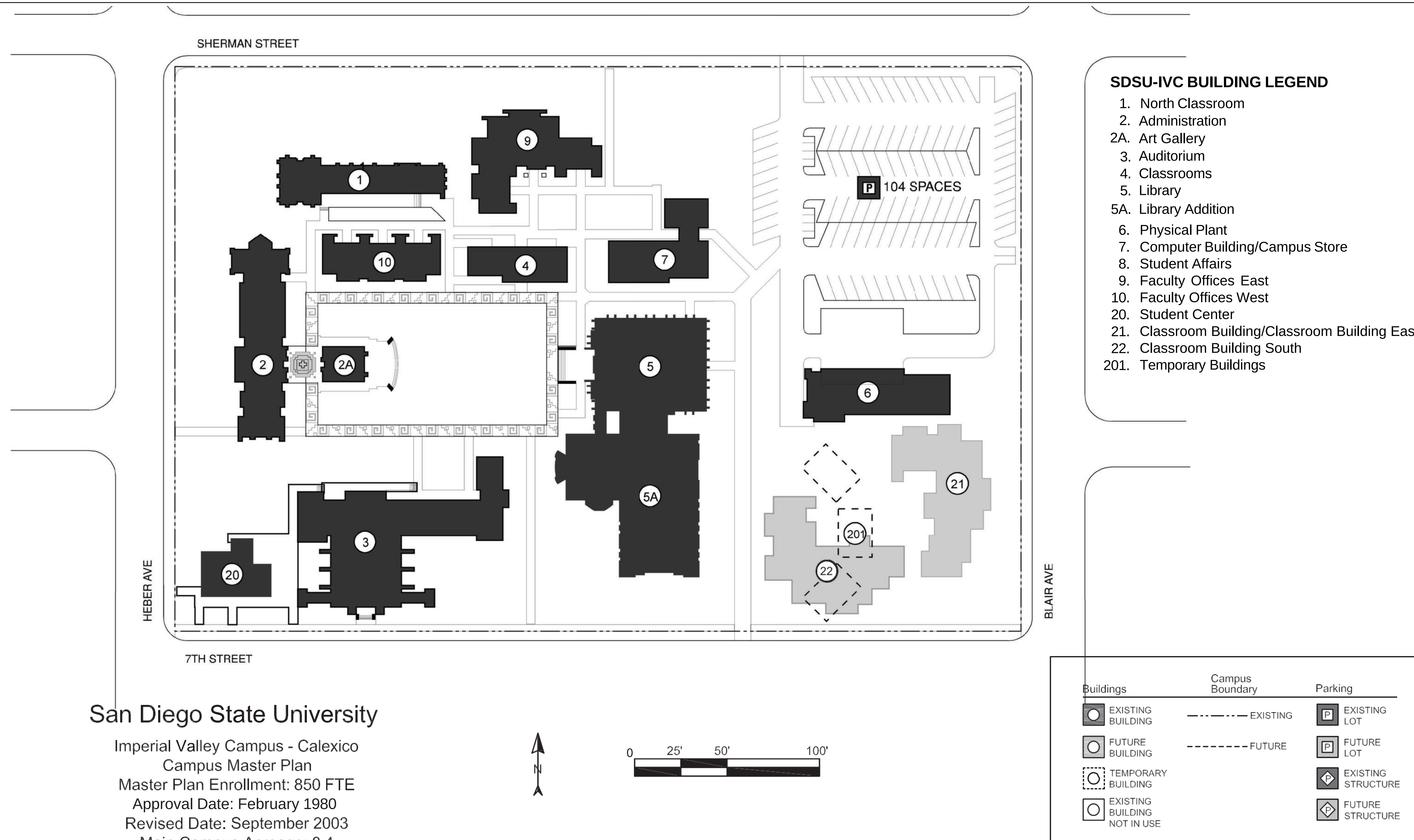
DUDEK

0 100 200 Feet

FIGURE 2

Vicinity Map

Technical Memorandum for the SDSU Imperial Valley Off-Campus Center - Calexico Affordable Student Housing Project



SDSU-IVC BUILDING LEGEND

1. North Classroom
2. Administration
2A. Art Gallery
3. Auditorium
4. Classrooms
5. Library
5A. Library Addition
6. Physical Plant
7. Computer Building/Campus Store
8. Student Affairs
9. Faculty Offices East
10. Faculty Offices West
20. Student Center
21. Classroom Building/Classroom Building East
22. Classroom Building South
201. Temporary Buildings

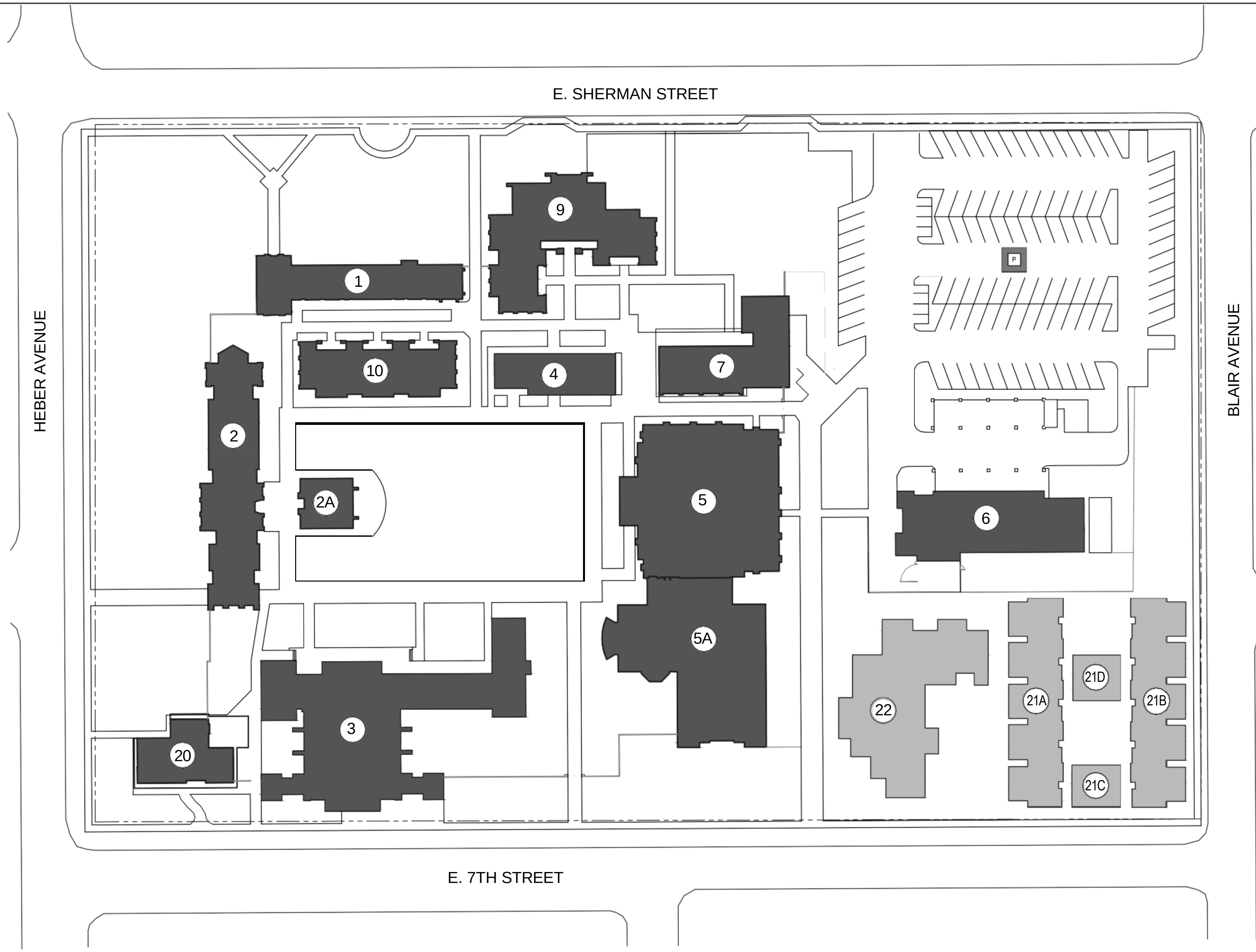
San Diego State University

Imperial Valley Campus - Calexico
Campus Master Plan
Master Plan Enrollment: 850 FTE
Approval Date: February 1980
Revised Date: September 2003
Main Campus Acreage: 8.4

SOURCE: SDSU 2003

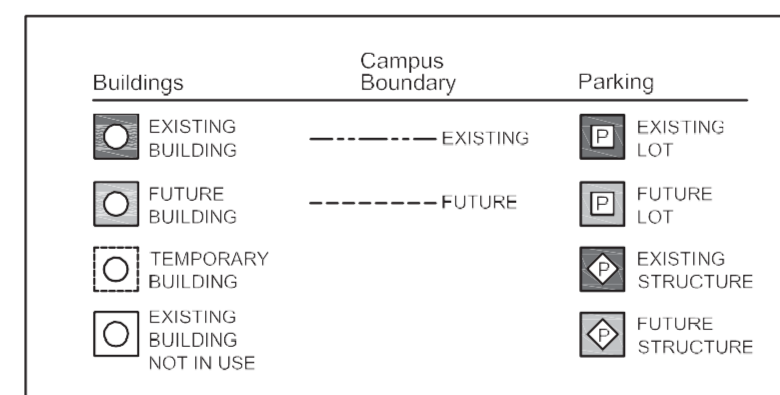
FIGURE 3A

Existing Campus Master Plan

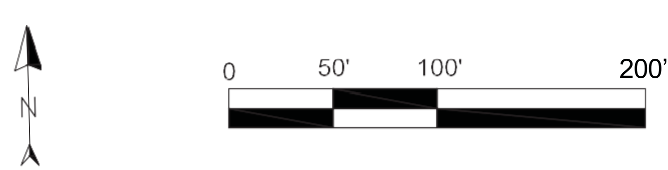


SDSU-IVC BUILDING LEGEND

1. North Classroom
2. Administration
2A. Art Gallery
3. Auditorium
4. Classrooms
5. Library
5A. Library Addition
6. Physical Plant
7. Computer Building/Campus Store
8. Student Affairs
9. Faculty Offices East
10. Faculty Offices West
20. Student Center
21A. Student Housing West
21B. Student Housing East
21C. Student Housing Office
21D. Student Housing Community Center
22. Classroom Building South

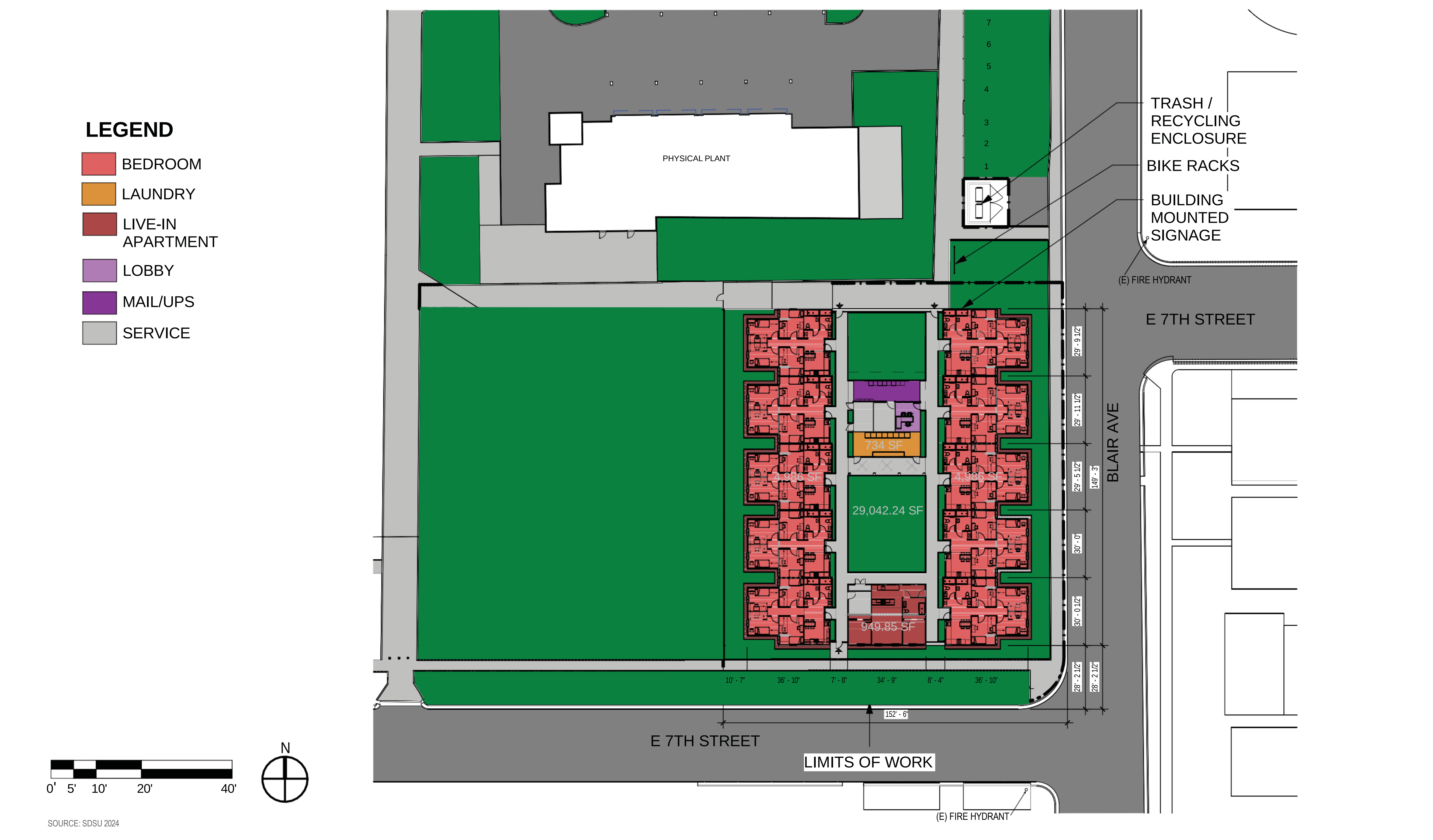


PROPOSED
San Diego State University
Imperial Valley Campus - Calexico
Campus Master Plan
Master Plan Enrollment: 850 FTE
Approval Date: 1980
Revised Date: September 2003
Main Campus Acreage: 8.4



SOURCE: SDSU 2024

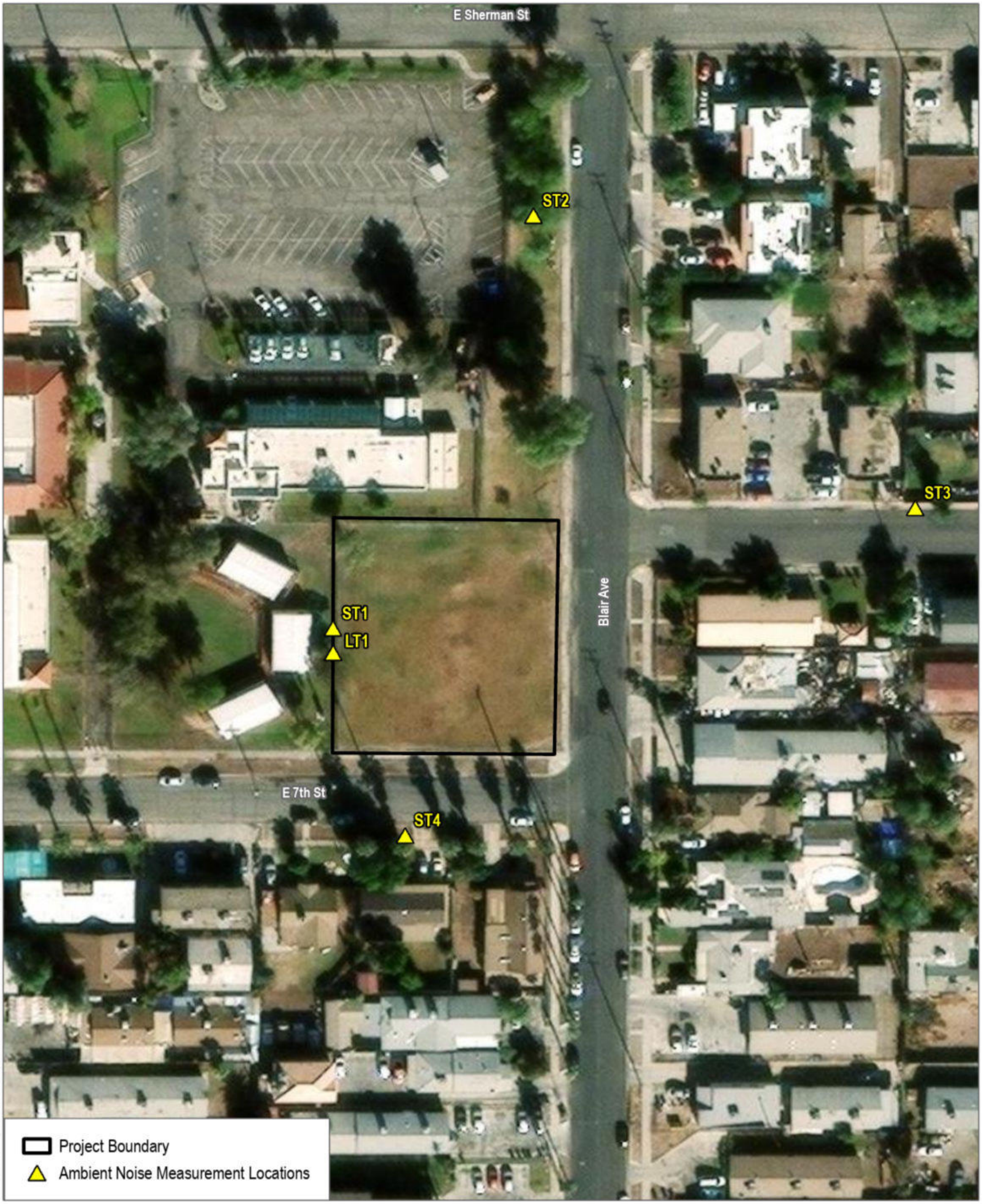
FIGURE 3B
Proposed Campus Master Plan



SOURCE: SDSU 2024

FIGURE 4

Site Plan



SOURCE: Esn World Imagery; Open Street Map 2024

DUDEK

0 46 92 Feet

FIGURE 5

Baseline Outdoor Ambient Noise Measurement Locations

Technical Memorandum for the SDSU Imperial Valley Off-Campus Center – Calexico, Affordable Student Housing Project

SOURCES: Google 2024; SDSU Calexico 2024; Dudek 2024

DUDEK

0 68 136 Feet

FIGURE 6

Predicted Stationary Source Operation Noise from Proposed Project

SDSU Calexico Campus Affordable Student Housing Project (Imperial County, CA)

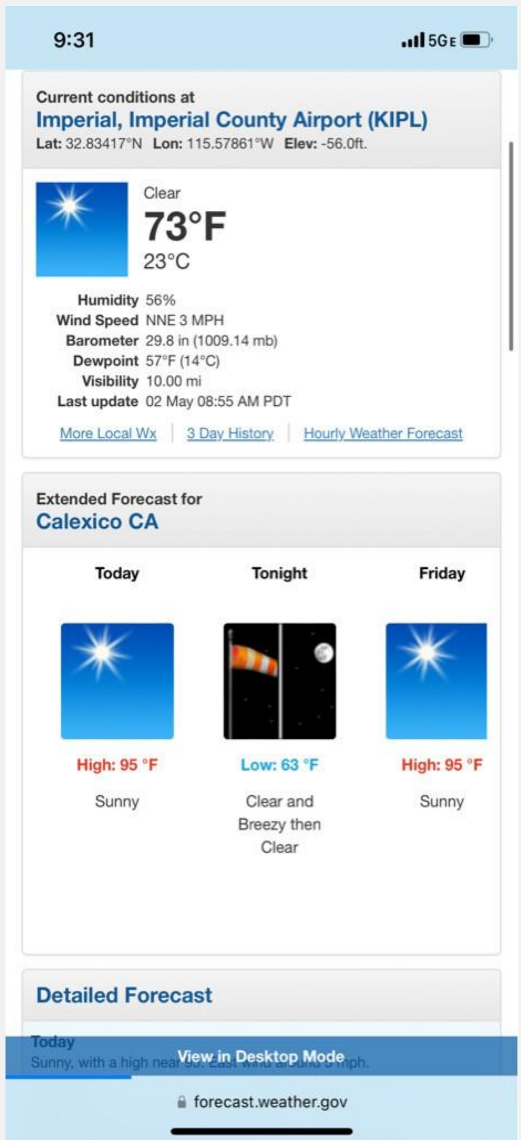
Attachment B

Baseline Noise Measurement Field Data

FORMS FIELD DATA REPORT

Field Noise Measurement Data

Record: 1896	
Project Name	*SDSU Calexico*
Project #	*15464.05*
Date	*2024-05-02*

Meteorological Conditions	
Upload NOAA Forecast	

Temp (F)	*73*
Humidity % (R.H.)	*56*
Wind	*Calm*
Wind Speed (MPH)	*3*
Wind Direction	*North*
Sky	*Clear*

Instrument and Calibrator Information	
Instrument Name List	*(SAC) NL-62*
Instrument Name	*(SAC) NL-62*
Instrument Name Lookup Key	*(SAC) NL-62*
Manufacturer	*Rion*
Model	*NL-62*
Serial Number	*350815*
Calibration Date	
Calibrator Name	*(SAC) Rion NC-74*
Calibrator Name	*(SAC) Rion NC-74*
Calibrator Name Lookup Key	*(SAC) Rion NC-74*
Calibrator Manufacturer	*Rion*
Calibrator Model	*NC-74*
Calibrator Serial #	*34167529*
Pre-Test (dBA SPL)	*93.6*
Post-Test (dBA SPL)	*94*

Windscreen	*Yes*
Weighting?	*A-WTD*
Slow/Fast?	*Slow*
ANSI?	*Yes*

Monitoring	
Record #	*1*
Site ID	*ST1/LT1*
Site Location Lat/Long	*32.671711, -115.491260*
Begin (Time)	*09:30:00*
End (Time)	*09:45:00*
Leq	*60.9*
Lmax	*63.8*
Lmin	*56.8*
Other Lx?	*L90, L50, L10*
L90	*58.6*
L50	*60.7*
L10	*62.9*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Generator*
Other Noise Sources (Background)	*Birds, Distant Dog Barking, Distant Traffic*
Other Noise Sources Additional Description	*Loud on-campus generator, home construction across the street, intermittent traffic*
Is the same instrument and calibrator being used as previously noted?	*Yes*

Are the meteorological conditions the same as previously noted?	*Yes*

Description / Photos	
Terrain	*Soft*

Site Photos	
Photo	

Comments / Description	*Facing W + LT1*

Site Photos	
Photo	
Comments / Description	*Facing N*

FORMS FIELD DATA REPORT

Site Photos	
Photo	
Comments / Description	*Facing E*

Monitoring	
Record #	*2*
Site ID	*ST2*
Site Location Lat/Long	*32.672571, -115.490876*

FORMS FIELD DATA REPORT

Begin (Time)	*09:51:00*
End (Time)	*10:06:00*
Leq	*52.3*
Lmax	*58.9*
Lmin	*47.5*
Other Lx?	*L90, L50, L10*
L90	*48.2*
L50	*50.1*
L10	*55.7*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Conversations / Yelling, Distant Traffic*
Other Noise Sources Additional Description	*Traffic on Blair St, nearby home construction, distant on-campus generator noise*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Source Info and Traffic Counts	
Number of Lanes	*2*
Lane Width (feet)	*10*
Roadway Width (feet)	*20*
Roadway Width (m)	*6.1*
Distance to Roadway (feet)	*50*

Distance to Roadway (m)	*15.3*
Distance Measured to Centerline or Edge of Pavement?	*Centerline*
Estimated Vehicle Speed (MPH)	*25*
Posted Speed Limit Sign (MPH)	*25*

Traffic Counts	
Vehicle Count Summary	*A 37, MT 0, HT 0, B 0, MC 0*
Select Method for Recording Count Duration	*Enter Manually*
Counting Both Directions?	*Yes*
Count Duration (minutes)	*15*
Vehicle Count Tally	
Select Method for Vehicle Counts	*Use Counter (+/-)*
Number of Vehicles - Autos	*37*
Number of Vehicles - Medium Trucks	*0*
Number of Vehicles - Heavy Trucks	*0*
Number of Vehicles - Buses	*0*
Number of Vehicles - Motorcyles	*0*

Description / Photos	
Terrain	*Mixed*

Site Photos

Photo	
Comments / Description	*Facing N*

Site Photos

Photo	
Comments / Description	*Facing E*

Site Photos

Photo	
Comments / Description	*Facing S*

Monitoring	
Record #	*3*
Site ID	*ST3*
Site Location Lat/Long	*32.671923, -115.490058*

FORMS FIELD DATA REPORT

Begin (Time)	*10:11:00*
End (Time)	*10:26:00*
Leq	*59.5*
Lmax	*66.2*
Lmin	*55.1*
Other Lx?	*L90, L50, L10*
L90	*55.8*
L50	*59.2*
L10	*61*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Aircraft, Distant Traffic*
Other Noise Sources Additional Description	*On-campus generator, traffic*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Source Info and Traffic Counts	
Number of Lanes	*2*
Lane Width (feet)	*10*
Roadway Width (feet)	*20*
Roadway Width (m)	*6.1*
Distance to Roadway (feet)	*20*

Distance to Roadway (m)	*6.1*
Distance Measured to Centerline or Edge of Pavement?	*Centerline*
Estimated Vehicle Speed (MPH)	*25*
Posted Speed Limit Sign (MPH)	*25*

Traffic Counts	
Vehicle Count Summary	*A 13, MT 0, HT 0, B 0, MC 0*
Select Method for Recording Count Duration	*Enter Manually*
Counting Both Directions?	*Yes*
Count Duration (minutes)	*15*
Vehicle Count Tally	
Select Method for Vehicle Counts	*Use Counter (+/-)*
Number of Vehicles - Autos	*13*
Number of Vehicles - Medium Trucks	*0*
Number of Vehicles - Heavy Trucks	*0*
Number of Vehicles - Buses	*0*
Number of Vehicles - Motorcyles	*0*

Description / Photos	
Terrain	*Hard*

FORMS FIELD DATA REPORT

Site Photos

Photo	
Comments / Description	*Facing E*

Site Photos

FORMS FIELD DATA REPORT

Photo	
Comments / Description	*Facing S*

Site Photos

FORMS FIELD DATA REPORT

Photo	
Comments / Description	*Facing W*

Monitoring	
Record #	*4*
Site ID	*ST4*
Site Location Lat/Long	*32.671408, -115.491059*

FORMS FIELD DATA REPORT

Begin (Time)	*10:30:00*
End (Time)	*10:45:00*
Leq	*59.5*
Lmax	*64.2*
Lmin	*54.3*
Other Lx?	*L90, L50, L10*
L90	*55.4*
L50	*58.1*
L10	*63*
Other Lx (Specify Metric)	*L*
Primary Noise Source	*Traffic*
Other Noise Sources (Background)	*Birds, Distant Conversations / Yelling, Distant Traffic*
Other Noise Sources Additional Description	*On-campus generator noise, traffic, nearby home construction*
Is the same instrument and calibrator being used as previously noted?	*Yes*
Are the meteorological conditions the same as previously noted?	*Yes*

Source Info and Traffic Counts	
Number of Lanes	*2*
Lane Width (feet)	*10*
Roadway Width (feet)	*20*
Roadway Width (m)	*6.1*
Distance to Roadway (feet)	*20*

Distance to Roadway (m)	*6.1*
Distance Measured to Centerline or Edge of Pavement?	*Centerline*
Estimated Vehicle Speed (MPH)	*25*
Posted Speed Limit Sign (MPH)	*25*

Traffic Counts	
Vehicle Count Summary	*A 14, MT 0, HT 0, B 0, MC 0*
Select Method for Recording Count Duration	*Enter Manually*
Counting Both Directions?	*Yes*
Count Duration (minutes)	*15*
Vehicle Count Tally	
Select Method for Vehicle Counts	*Use Counter (+/-)*
Number of Vehicles - Autos	*14*
Number of Vehicles - Medium Trucks	*0*
Number of Vehicles - Heavy Trucks	*0*
Number of Vehicles - Buses	*0*
Number of Vehicles - Motorcyles	*0*

Description / Photos	
Terrain	*Mixed*

Site Photos

Photo	
Comments / Description	*Facing N*

Site Photos

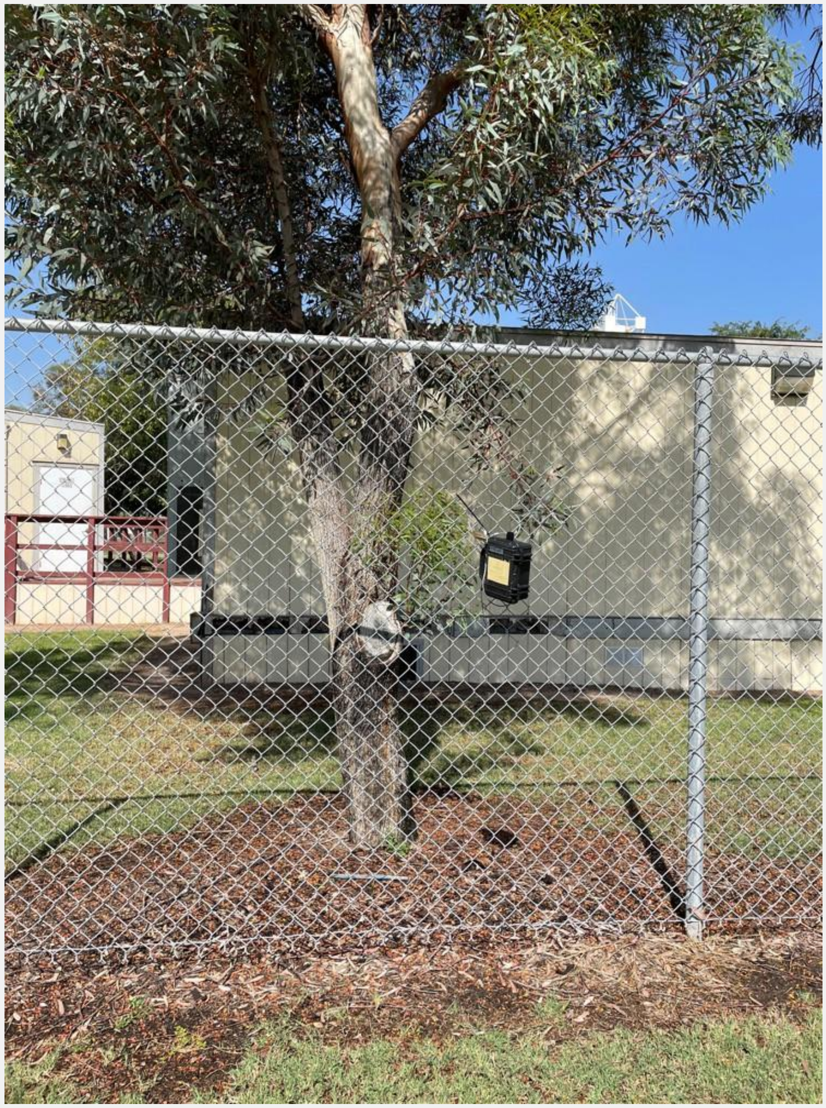
Photo	
Comments / Description	*Facing W*

Site Photos

Photo	
Comments / Description	*Facing E*

Description / Photos	
Terrain	*Soft*

Site Photos

Photo	
Comments / Description	*LT1 facing W*

Site Photos

Photo	
Comments / Description	*LT1 facing N*

Site Photos

FORMS FIELD DATA REPORT

Photo	
Comments / Description	*LT1 facing S*

Site Photos

Photo	
Comments / Description	*On-campus generator (significant noise contributor)*

Attachment C

Construction Noise Prediction Model Worksheets

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase at residential land use, per Imperial County = 75

allowable hours over which Leq is to be averaged, Imperial County = 8

0 = temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	*Temporary Barrier Insertion Loss (dB)*	*Additional Noise Reduction*	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Site Preparation	grader	1	40	85		95	0.1		77.3	8	480	73
	backhoe	2	40	78		95	0.1		70.3	8	480	69
	roller	1	20	80		95	0.1		72.3	8	480	65
	dump truck	1	40	76		95	0.1		68.3	8	480	64
										Total for Site Preparation Phase:		75.6
Grading	grader	1	40	85		95	0.1		77.3	8	480	73
	backhoe	2	40	78		95	0.1		70.3	8	480	69
	roller	1	20	80		95	0.1		72.3	8	480	65
	dump truck	1	40	76		95	0.1		68.3	8	480	64
										Total for Grading Phase:		75.6
Building Construction	man lift	3	20	75	"aerial lifts (electric)"	95	0.1		67.3	8	480	65
	man lift	1	20	75	"forklifts"	95	0.1		67.3	8	480	60
	backhoe	2	40	78		95	0.1		70.3	8	480	69
	concrete mixer truck	5	40	79		95	0.1		71.3	8	480	74
	front end loader	1	40	79	"skid steer loader"	95	0.1		71.3	8	480	67
	welder / torch	2	40	73		95	0.1		65.3	8	480	64
										Total for Building Construction Phase:		76.9
Paving / Architectural coating	compressor (air)	1	40	78		95	0.1		70.3	8	480	66
	all other equipment > 5 HP	1	50	85		95	0.1		77.3	8	480	74
										Total for Paving / Architectural coating Phase:		**75.0**

Construction Activity	Equipment	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
Site Preparation	grader	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	roller	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	dump truck	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Grading	grader	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	roller	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	dump truck	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Building Construction	man lift	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	man lift	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	concrete mixer truck	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	front end loader	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	welder / torch	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Paving / Architectural coating	compressor (air)	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	all other equipment > 5 HP	5	5	0	10	85	95	11.2	85.1	95.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase at residential land use, per Imperial County = 75

allowable hours over which Leq is to be averaged, Imperial County = 8

6 = temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	*Temporary Barrier Insertion Loss (dB)*	*Additional Noise Reduction*	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Site Preparation	grader	1	40	85		155	0.1		71.7	8	480	68
	backhoe	2	40	78		155	0.1		64.7	8	480	64
	roller	1	20	80		155	0.1		66.7	8	480	60
	dump truck	1	40	76		155	0.1		62.7	8	480	59
									Total for Site Preparation Phase:			**69.9**
Grading	grader	1	40	85		155	0.1		71.7	8	480	68
	backhoe	2	40	78		155	0.1		64.7	8	480	64
	roller	1	20	80		155	0.1		66.7	8	480	60
	dump truck	1	40	76		155	0.1		62.7	8	480	59
									Total for Grading Phase:			**69.9**
Building Construction	man lift	3	20	75	"aerial lifts (electric)"	155	0.1		61.7	8	480	59
	man lift	1	20	75	"forklifts"	155	0.1		61.7	8	480	55
	backhoe	2	40	78		155	0.1		64.7	8	480	64
	concrete mixer truck	5	40	79		155	0.1		65.7	8	480	69
	front end loader	1	40	79	"skid steer loader"	155	0.1		65.7	8	480	62
	welder / torch	2	40	73		155	0.1		59.7	8	480	59
									Total for Building Construction Phase:			**71.2**
Paving / Architectural coating	compressor (air)	1	40	78		155	0.1		64.7	8	480	61
	all other equipment > 5 HP	1	50	85		155	0.1		71.7	8	480	69
									Total for Paving / Architectural coating Phase:			**69.3**

Construction Activity	Equipment	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
Site Preparation	grader	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	roller	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	dump truck	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Grading	grader	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	roller	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	dump truck	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Building Construction	man lift	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	man lift	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	backhoe	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	concrete mixer truck	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	front end loader	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	welder / torch	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Paving / Architectural coating	compressor (air)	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	all other equipment > 5 HP	5	5	0	70	85	155	70.2	85.1	155.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase at residential land use, per Imperial County = 75

allowable hours over which Leq is to be averaged, Imperial County = 8

6 = temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	*Temporary Barrier Insertion Loss (dB)*	*Additional Noise Reduction*	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Site Preparation	grader	1	40	85		95	2.3		75.1	8	480	71
	backhoe	2	40	78		95	2.3		68.1	8	480	67
	roller	1	20	80		95	2.3		70.1	8	480	63
	dump truck	1	40	76		95	2.3		66.1	8	480	62
									Total for Site Preparation Phase:			**73.4**
Grading	grader	1	40	85		95	2.3		75.1	8	480	71
	backhoe	2	40	78		95	2.3		68.1	8	480	67
	roller	1	20	80		95	2.3		70.1	8	480	63
	dump truck	1	40	76		95	2.3		66.1	8	480	62
									Total for Grading Phase:			**73.4**
Building Construction	man lift	3	20	75	"aerial lifts (electric)"	95	2.3		65.1	8	480	63
	man lift	1	20	75	"forklifts"	95	2.3		65.1	8	480	58
	backhoe	2	40	78		95	2.3		68.1	8	480	67
	concrete mixer truck	5	40	79		95	2.3		69.1	8	480	72
	front end loader	1	40	79	"skid steer loader"	95	2.3		69.1	8	480	65
	welder / torch	2	40	73		95	2.3		63.1	8	480	62
									Total for Building Construction Phase:			**74.6**
Paving / Architectural coating	compressor (air)	1	40	78		95	2.3		68.1	8	480	64
	all other equipment > 5 HP	1	50	85		95	2.3		75.1	8	480	72
									Total for Paving / Architectural coating Phase:			**72.8**

Construction Activity	Equipment	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
Site Preparation	grader	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	backhoe	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	roller	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	dump truck	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
Grading	grader	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	backhoe	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	roller	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	dump truck	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
Building Construction	man lift	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	man lift	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	backhoe	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	concrete mixer truck	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	front end loader	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	welder / torch	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
Paving / Architectural coating	compressor (air)	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3
	all other equipment > 5 HP	5	5	6	10	85	95	10.0	85.0	95.0	0.06	2.6	11.0	5.0	0.6	0.7	2.3

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase at residential land use, per Imperial County = 75

allowable hours over which Leq is to be averaged, Imperial County = 8

6 = temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	*Temporary Barrier Insertion Loss (dB)*	*Additional Noise Reduction*	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Site Preparation	grader	1	40	85		155	0.2		71.5	8	480	68
	backhoe	2	40	78		155	0.2		64.5	8	480	64
	roller	1	20	80		155	0.2		66.5	8	480	60
	dump truck	1	40	76		155	0.2		62.5	8	480	59
									Total for Site Preparation Phase:			**69.8**
Grading	grader	1	40	85		155	0.2		71.5	8	480	68
	backhoe	2	40	78		155	0.2		64.5	8	480	64
	roller	1	20	80		155	0.2		66.5	8	480	60
	dump truck	1	40	76		155	0.2		62.5	8	480	59
									Total for Grading Phase:			**69.8**
Building Construction	man lift	3	20	75	"aerial lifts (electric)"	155	0.2		61.5	8	480	59
	man lift	1	20	75	"forklifts"	155	0.2		61.5	8	480	55
	backhoe	2	40	78		155	0.2		64.5	8	480	64
	concrete mixer truck	5	40	79		155	0.2		65.5	8	480	69
	front end loader	1	40	79	"skid steer loader"	155	0.2		65.5	8	480	62
	welder / torch	2	40	73		155	0.2		59.5	8	480	59
									Total for Building Construction Phase:			**71.0**
Paving / Architectural coating	compressor (air)	1	40	78		155	0.2		64.5	8	480	61
	all other equipment > 5 HP	1	50	85		155	0.2		71.5	8	480	69
									Total for Paving / Architectural coating Phase:			**69.2**

Construction Activity	Equipment	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
Site Preparation	grader	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	backhoe	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	roller	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	dump truck	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
Grading	grader	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	backhoe	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	roller	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	dump truck	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
Building Construction	man lift	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	man lift	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	backhoe	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	concrete mixer truck	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	front end loader	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	welder / torch	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
Paving / Architectural coating	compressor (air)	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2
	all other equipment > 5 HP	5	5	6	70	85	155	70.0	85.0	155.0	0.01	0.7	11.0	5.0	0.6	0.7	0.2

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Lesser of or available Lmax	Spec. 721 Lmax	Measured L_{max} @50ft (dBA, slow)
All Other Equipment > 5 HP	No	50	85	85	-- N/A --
Auger Drill Rig	No	20	84	85	84
Backhoe	No	40	78	80	78
Bar Bender	No	20	80	80	-- N/A --
Blasting	Yes	-- N/A --	94	94	-- N/A --
Boring Jack Power Unit	No	50	80	80	83
Chain Saw	No	20	84	85	84
Clam Shovel (dropping)	Yes	20	87	93	87
Compactor (ground)	No	20	80	80	83
Compressor (air)	No	40	78	80	78
Concrete Batch Plant	No	15	83	83	-- N/A --
Concrete Mixer Truck	No	40	79	85	79
Concrete Pump Truck	No	20	81	82	81
Concrete Saw	No	20	90	90	90
Crane	No	16	81	85	81
Dozer	No	40	82	85	82
Drill Rig Truck	No	20	79	84	79
Drum Mixer	No	50	80	80	80
Dump Truck	No	40	76	84	76
Excavator	No	40	81	85	81
Flat Bed Truck	No	40	74	84	74
Front End Loader	No	40	79	80	79
Generator	No	50	72	72	81
Generator (<25KVA, VMS signs)	No	50	70	70	73
Gradall	No	40	83	85	83
Grader	No	40	85	85	-- N/A --
Grapple (on backhoe)	No	40	85	85	87
Horizontal Boring Hydr. Jack	No	25	80	80	82
Hydra Break Ram	Yes	10	90	90	-- N/A --
Impact Pile Driver	Yes	20	95	95	101
Jackhammer	Yes	20	85	85	89
Man Lift	No	20	75	85	75
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	90
Pavement Scarafier	No	20	85	85	90
Paver	No	50	77	85	77
Pickup Truck	No	40	55	55	75
Pneumatic Tools	No	50	85	85	85
Pumps	No	50	77	77	81
Refrigerator Unit	No	100	73	82	73
Rivit Buster/chipping gun	Yes	20	79	85	79
Rock Drill	No	20	81	85	81
Roller	No	20	80	85	80
Sand Blasting (Single Nozzle)	No	20	85	85	96
Scraper	No	40	84	85	84
Shears (on backhoe)	No	40	85	85	96
Slurry Plant	No	100	78	78	78
Slurry Trenching Machine	No	50	80	82	80
Soil Mix Drill Rig	No	50	80	80	-- N/A --
Tractor	No	40	84	84	-- N/A --
Vacuum Excavator (Vac-truck)	No	40	85	85	85
Vacuum Street Sweeper	No	10	80	80	82
Ventilation Fan	No	100	79	85	79
Vibrating Hopper	No	50	85	85	87
Vibratory Concrete Mixer	No	20	80	80	80
Vibratory Pile Driver	No	20	95	95	101
Warning Horn	No	5	83	85	83
Welder / Torch	No	40	73	73	74

Attachment D

Traffic Noise Modeling Calculations

Attachment D

Traffic Noise Modeling Calculations - Summary

Project: 15464.05SDSU Calexico

Number	Name	From	To	Existing	Existing + Project	Δ Existing – Existing + Project
Summary of Net Changes						
1	Blair Ave	Sherman St	7th St	56.4	56.5	0.1
2	7th St	Blair Ave	Giles Ave	54.9	55.2	0.3
3	7th St	Heber Ave	Blair Ave	55.2	55.5	0.3

(Name, From and To are grouped under the heading "Segment Description and Location".)

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Attachment D - 1

Traffic Noise Model Calculations

Project: 15464.05SDSU Calexico

Noise Level Descriptor: CNEL
Site Conditions: Hard
Traffic Input: ADT
Traffic K-Factor: 10

Segment Description and Location				Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics							Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night	CNEL, (dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
Existing Conditions																		
1	Blair Ave	Sherman St	7th St	3,404	25	50	50	97.0%	2.0%	1.0%	85.0%	10.0%	5.0%	56.4	2	7	22	69
2	7th St	Blair Ave	Giles Ave	1,196	25	25	25	97.0%	2.0%	1.0%	85.0%	10.0%	5.0%	54.9	1	2	8	24
3	7th St	Heber Ave	Blair Ave	1,288	25	25	25	97.0%	2.0%	1.0%	85.0%	10.0%	5.0%	55.2	1	3	8	26

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Attachment D - 2

Traffic Noise Model Calculations

Project: 15464.05SDSU Calexico

Noise Level Descriptor: CNEL
Site Conditions: Hard
Traffic Input: ADT
Traffic K-Factor: 10

Segment Description and Location				Input										Output				
					Speed	Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics						CNEL,	Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	(mph)	Near	Far	% Auto	% Med	% Hvy	% Day	% Eve	% Night	(dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
Existing + Project Conditions																		
1	Blair Ave	Sherman St	7th St	3,491	25	50	50	97.0%	2.0%	1.0%	85.0%	10.0%	5.0%	56.5	2	7	22	71
2	7th St	Blair Ave	Giles Ave	1,283	25	25	25	97.0%	2.0%	1.0%	85.0%	10.0%	5.0%	55.2	1	3	8	26
3	7th St	Heber Ave	Blair Ave	1,375	25	25	25	97.0%	2.0%	1.0%	85.0%	10.0%	5.0%	55.5	1	3	9	28

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Attachment E

Operation Noise Prediction Model Inputs

Point Sources

Name	Sel.	M.	ID	Result. PWL Day (dBA)	Evening (dBA)	Night (dBA)	Lw / Li Type	Value	norm. dB(A)	Correction Day dB(A)	Evening dB(A)	Night dB(A)	Sound Reduction R	Area (ft²)	Attenuatio	Operating Time Day (min)	Special (min)	Night (min)	K0 (dB)	Freq. (Hz)	Direct.	Height (ft)		Coordinate X (ft)	Y (ft)	Z (ft)
Condenser Unit			LMU543H	63.7	63.7	63.7	Lw	LMU		0	0	0							0		(none)	3.5	g	743.48	594.84	21.5
Condenser Unit			LMU543H	63.7	63.7	63.7	Lw	LMU		0	0	0							0		(none)	3.5	g	743.48	600.76	21.5
Condenser Unit			LMU543H	63.7	63.7	63.7	Lw	LMU		0	0	0							0		(none)	3.5	g	843.89	600.27	21.5
Condenser Unit			LMU543H	63.7	63.7	63.7	Lw	LMU		0	0	0							0		(none)	3.5	g	843.89	593.75	21.5
Condenser Unit			LMU543H	63.7	63.7	63.7	Lw	LMU		0	0	0							0		(none)	3.5	g	843.75	658.66	21.5
Condenser Unit			LMU543H	63.7	63.7	63.7	Lw	LMU		0	0	0							0		(none)	3.5	g	843.84	662.11	21.5
Condenser Unit			LMU543H	63.7	63.7	63.7	Lw	LMU		0	0	0							0		(none)	3.5	g	843.75	655.39	21.5
Condenser Unit			LMU543H	63.7	63.7	63.7	Lw	LMU		0	0	0							0		(none)	3.5	g	742.34	659.09	21.5
Condenser Unit			LMU543H	63.7	63.7	63.7	Lw	LMU		0	0	0							0		(none)	3.5	g	742.26	664.43	21.5
Condenser Unit			LMU543H	63.7	63.7	63.7	Lw	LMU		0	0	0							0		(none)	3.5	g	742.26	654.35	21.5
Solar Transformer			SOLT	73	73	73	Lw	MVT		0	0	0			-0.6				0		(none)	4	r	733.63	551.2	4
Condenser Unit			LMU543H	63.7	63.7	63.7	Lw	LMU		0	0	0							0		(none)	4	r	794.9	551.2	4

Buildings

Name	Sel.	M.	ID	RB	Residents	Absorption	Height Begin (ft)
Housing East		+	HE	x	0		18
Housing West		+	HW	x	0		18
Housing South		+	HS	x	0		18
Laundry_Mail_Lobby		+	LML	x	0		14
Roof Canopy		+	CAN	x	0		
Roof Canopy		+	CAN	x	0		
Roof Canopy		+	CAN	x	0		
Roof Canopy		+	CAN	x	0		

Sound Levels (local)

Name	ID	Type	1/3 Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
LG LMU543HV Condenser	LMU	Lw		0	73	64	65	62	58	53	49	44	63.7	74.5	LG LMU543HV Condenser (Heating, OBCF [Hz])
Medium Voltage Transformer	MVT	Lw	A	30	49	61	63	69	66	62	57	48	72.4	81.1	SILLMAN 65 dB ref, EEI EPPENG calcs