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MEMORANDUM

To:	Laura Shinn, SDSU Director of Facilities Planning, Design, and Construction
From:	Sarah Lozano, Katie Laybourn, Mike Greene, Dudek
Subject:	SDSU Tula Pavilion and Tenochca Hall Renewal/Refresh Noise Technical Memorandum
Date:	January 3, 2017
Attachment(s):	Figures 1–2, Appendices A - C

Dudek evaluated potential impacts to noise associated with the proposed San Diego State University (SDSU) Tula Pavilion and Tenochca Hall Renewal/Refresh (proposed project), located in San Diego, California. This technical memorandum provides the results of that evaluation.

1 PROJECT LOCATION AND SETTING

SDSU is located adjacent to Interstate 8, approximately 8 miles east of downtown San Diego (see Figure 1, Project Location and Vicinity Map). The SDSU campus is located in the "College Area," within the City of San Diego (City) and County of San Diego, and is surrounded by urban uses, including commercial, institutional, and medical facilities. The proposed project would be located in the southeastern portion of the SDSU campus (see Figure 2, Project Site). As described below, the proposed Tenochca Community Space (TCS) and Tula Pavilion would replace the existing Tula/Tenochca Community Center; the TCS would be constructed on the site of the demolished Tula/Tenochca Community Center, and the proposed Tula Pavilion would be constructed to the northwest on the site of a paved walking path at the north end of a service vehicle parking lot.

2 PROJECT DESCRIPTION

The proposed project, referred to as the "Tula Pavilion and Tenochca Hall Renewal/Refresh," involves demolishing the existing Tula/Tenochca Community Center and replacing it with two separate buildings, the Tula Pavilion and Tenochca Community Space (TCS). The proposed TCS would be two stories in height and approximately 13,000 gross square feet (gsf) in size. The proposed TCS building would provide a variety of student gathering spaces, including student lounges, a kitchen for student use, and areas visible to televisions that front the outdoor grounds. The proposed Tula Pavilion would be a one-story building and approximately 12,000 gsf. The Tula interior space would include one large assembly space, and an adjoining large classroom/seminar room that can be divided into three smaller rooms and a banquet room. On the exterior, a courtyard would provide an outdoor venue for private events, and otherwise would be open to public use and circulation.

In addition, the proposed TCS would be constructed at the site of the existing Tula/Tenochca Community Center and would replace the student common spaces at the existing Tula/Tenochca Community Center, such as the security check-in point, student lounge space, laundry and Star Center, and faculty residences. Exterior landscape improvements would include the expansion of the landscape at the commons side of the building. A new "Tenochca Backyard" would be created with outdoor room and lawn areas. The existing pool between the proposed TCS and existing Maya Hall would be enclosed with new fencing, surrounded by new palm trees, and furnished with new furniture and tables to create a sense of place at the pool deck. No further renovations to the pool area would be proposed as part of the project. Construction of the proposed TCS would require approximately 8,700 square feet (sf) of concrete and approximately 850 cubic yards (cy) of structural fill.

Further, the proposed Tula Pavilion would replace those spaces that serve public gathering and large assembly functions at the existing Tula/Tenochca Community Center and would be constructed north of the existing Tula/Tenochca Community Center on a site presently designated as Lot 4A. The proposed building would also incorporate exterior elements, including a courtyard on the north end and an open arcade that wraps around the west side of the building, for a total exterior space of approximately 6,000 sf. The proposed Tula Pavilion would be constructed as a steel-framed building with a wood roof, a reinforced concrete foundation system, and stucco exterior. Construction would require approximately 10,000 sf of concrete and approximately 2,000 cy of backfill.

The anticipated start date for demolition of the Tula/Tenochca Community Center and construction of the proposed Tula Pavilion and TCS is June 2017, with an anticipated duration for construction of 15 months. The total gsf to be demolished is approximately 20,000 gsf. The total gsf to be constructed is approximately 25,000 gsf of interior space. See Table 1 for additional project demolition and construction details.

Table 1
Tula Pavilion and Tenochca Hall Renewal/Refresh Project Details

	Tula Community Center	Tenochca Community Space	Tula Pavilion
Project Phase	Demolition	Construction	Construction
Gross Square Footage	19,872	12,638	12,181 + 5,988 (exterior) = 18,169
Stories	Two stories	Two stories	One story

Table 1
Tula Pavilion and Tenochca Hall Renewal/Refresh Project Details

	Tula Community Center	Tenochca Community Space	Tula Pavilion
Project Phase	Operation	Operation	Operation
Uses	• Lobby • Meeting rooms • Restrooms • Kitchen • Storage • Custodial • "Star Center" • Offices • TV lounge • Recreation • Laundry • Faculty apartments	• Lobby • Restrooms • Storage • "Star Center" • Offices • TV lounge • Recreation • Laundry • Faculty apartments • "Backyard" outdoor room	• Assembly space • Classroom space (three rooms) • Banquet room • Storage • Custodial • Offices • Mechanical • Restrooms • Kitchen • Courtyard • Arcade

3 EXISTING CONDITIONS

The proposed project site consists entirely of developed land. The general vicinity of the proposed project site is primarily developed, with parking structures and associated roadways immediately to the east, existing campus buildings to the north and west of the site, and residential neighborhoods to the south.

The primary noise sources in the proposed project area are vehicular traffic along Montezuma Road and traffic along adjacent secondary roadways. Other noise sources in the proposed project area include background noise from occasional distant aircraft overflights, noise from recreational activities at the adjacent pool, rustling leaves, birds, and other sounds typical of academic and urban environments.

Noise Criteria

The proposed project is located on the SDSU campus, which is located in the City, and would have the potential to impact off-campus noise-sensitive land uses in the City. Although California State University (CSU), as a state agency, is not subject to local plans, policies, and guidelines related to noise, for the limited purpose of this analysis, the City noise ordinance is helpful to use as guidance on assessing noise impacts. The following are excerpts from the relevant City noise ordinance.

City of San Diego Municipal Code Noise Ordinance

The City's noise ordinance contains quantitative noise standards to reduce excessive noise within the City (City of San Diego 2008). The noise level limits are defined in terms of a 1-hour average sound level. The allowable noise level limits depend upon the land use and time of day. Single-family residences are located adjacent to the western and eastern boundaries of the proposed project. The noise ordinance limits for low-density residential development require that the 1-hour average noise level not exceed 50 dBA between the hours of 7:00 a.m. and 7:00 p.m., 45 dBA between 7:00 p.m. and 10:00 p.m., and 40 dBA between 10:00 p.m. and 7:00 a.m. The City's noise ordinance limits are summarized in Table 2.

Table 2
City of San Diego Municipal Code Noise Limits

Land Use Zone	Time of Day	1-Hour Average Sound Level (dBA)
1) Single-Family Residential	7:00 a.m. to 7:00 p.m.	50
	7:00 p.m. to 10:00 p.m.	45
	10:00 p.m. to 7:00 a.m.	40
2) Multi-Family Residential (Up to a maximum density of 1/2,000)	7:00 a.m. to 7:00 p.m.	55
	7:00 p.m. to 10:00 p.m.	50
	10:00 p.m. to 7:00 a.m.	45
3) All Other Residential	7:00 a.m. to 7:00 p.m.	60
	7:00 p.m. to 10:00 p.m.	55
	10:00 p.m. to 7:00 a.m.	50
4) Commercial	7:00 a.m. to 7:00 p.m.	65
	7:00 p.m. to 10:00 p.m.	60
	10:00 p.m. to 7:00 a.m.	60
5) Industrial or Agricultural	Anytime	75

The criteria identified in Table 2 also are applicable to stationary equipment, such as mechanical equipment.

The City's noise ordinance also regulates construction-related activity. Construction-related activity is allowed Monday through Saturday from 7:00 a.m. to 7:00 p.m. However, the construction-related activities are not to exceed an average sound level greater than 75 dBA during the 12-hour time period from 7:00 a.m. to 7:00 p.m. at or beyond the property lines of any residential-zoned property.

4 METHODOLOGY

Ambient noise measurements were taken to quantify the existing daytime noise environment in and around the proposed project site. In order to assess the magnitude of change in the noise environment that would result from the proposed project, the anticipated noise and vibration levels associated with the proposed construction-related activities were obtained from (1) reports prepared by the Federal Transit Administration (2006) and California Department of Transportation (2004), and (2) field data from files. The Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM) (2008) was used to estimate construction noise levels at the nearest occupied noise-sensitive land use. The RCNM is often used for non-roadway projects because the same types of construction equipment used for roadway projects are also used for other project types. Input variables for the RCNM consist of the receiver/land use types, the equipment type and number of each (e.g., two graders, a loader, a tractor), the duty cycle for each piece of equipment (e.g., percentage of hours the equipment typically works per day), and the distance from the noise-sensitive receiver. No topographical or structural shielding was assumed in the modeling. The RCNM has default duty-cycle values for the various pieces of equipment, which were derived from an extensive study of typical construction activity patterns. Those default duty-cycle values were used for this noise analysis. The RCNM input/output files and summary table are provided in Appendix B.

The noise levels associated with construction traffic on selected roadways was determined using the provided traffic volumes and the Federal Highway Administration's TNM 2.5 Traffic Noise Prediction Model (2004). The traffic noise modeling data are provided in Appendix C.

Because the new buildings would merely replace an existing building and its associated uses, the proposed project would not generate new or additional students, staff, or visitors to the SDSU campus. Existing campus infrastructure and available public services would provide adequate support for the new buildings. No new operational noise impacts to off-site noise-sensitive land uses would result. As such, this memorandum focuses on impacts, if any, resulting from project-related construction noise.

5 IMPACT ANALYSIS AND CONCLUSIONS

5.1 Thresholds of Significance

The following significance criteria included in Appendix G of the California Environmental Quality Act (CEQA) Guidelines (14 CCR 15000 et seq.) assist in determining the significance of a noise impact. According to Appendix G of the CEQA Guidelines, a significant impact related to noise would occur if the project would:

1. Result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

2. Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.
3. Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
4. Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
5. Be located within 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, and if so, the project would expose people residing or working in the project area to excessive noise levels.
6. Be within the vicinity of a private airstrip, and if so, the project would expose people residing or working in the project area to excessive noise levels.

Relative to Significance Threshold 1, the City's General Plan and Noise Ordinance (outlined in Section 3.2) were used to develop the following project-specific thresholds of significance:

Traffic: A significant noise impact would result if the project would increase the existing noise level by 3 dB or more in areas where the existing noise level exceeds 65 dBA CNEL. A significant noise impact would result if the project would result in an exceedance of the City's General Plan 65 dBA CNEL exterior noise criteria at an outdoor noise-sensitive use area.

Stationary Uses: A significant noise impact would result if the stationary equipment generates noise levels exceeding the City's noise ordinance criteria.

Temporary Construction Noise: A significant noise impact would result if temporary construction noise levels exceed 75 dBA L_{eq} for 12 hours within a 24-hour period at a property zoned as residential.

5.2 Impact Analysis

Would the project result in the exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Less than Significant Impact.

Construction-Related Equipment Noise. Because of the orientation of the project site, project construction would take place near and far from adjacent, existing noise-sensitive uses. For example, construction of the proposed project along the southern proposed project boundary would take place within approximately 110 feet of existing residences (multi-family housing located on the south side of Montezuma Road). However, construction would be more than 450 feet away and likely shielded from direct view by intervening structures from those residences during other times of construction. Typically (because of the size of the proposed project site), construction noise would occur at distances of approximately 220 feet from existing noise-sensitive uses.

The construction noise analysis output is included as an appendix to this report (Appendix B), and the results are summarized in Table 3. As shown in Table 3, the highest noise levels are predicted to occur during demolition and grading activities when noise levels from construction would be as high as 70 dBA equivalent continuous sound level ($L_{eq\ 12\text{-hr}}$) at the nearest existing residences, approximately 110 feet away. At more typical distances, construction noise would range from approximately 56 to 67 dBA L_{eq}. Noise during demolition and construction activities would be temporary.

At the nearest off-site, noise-sensitive land uses, the noise levels during construction-related activities would be below the City's 75-dBA (A-weighted decibel (adjusted for the frequency response of the human ear)), 12-hour average noise level criterion. Thus, a **less-than-significant impact** would occur.

Table 3
Summary of Results – Estimated Construction Noise

Construction Phase	Construction Noise at Representative Receiver Distances (12-Hour Averaged[a] L_{eq} (dBA))	
	Nearest Construction Work – 110 Feet (Approx.)	*Typical Construction Work – 220 Feet (Approx.)*
Demolition	70	67
Site preparation	68	62
Grading	70	67
Building construction	67	62
Paving	68	64
Architectural coatings	62	56

Note:
[a] Assumes an 8-hour construction workday. When averaged over a 12-hour period, the average noise level would be 1.8 decibels lower than the 8-hour average.

Construction-Related Traffic Noise. Table 4 presents the summary results of the construction traffic noise modeling. As shown, temporary increases in traffic noise related to heavy truck, worker, and vendor vehicles would be less than 1 decibel (dB) along the construction routes at all of the modeled roadway segments. A change in noise levels of less than 1 dB in the context of the community environment is not considered to be a perceptible change. Although individual truck pass-bys would be audible, the temporary increase in the number of trucks and passenger vehicles would not contribute significantly to the average hourly or daily noise environment. Therefore, noise impacts associated with construction-related traffic would be **less than significant**.

Table 4
Construction-Related Traffic Volumes and Estimated Traffic Noise Increases

Street Segment	Existing ADT	Existing with Project Construction Traffic ADT	Temporary, Construction-Related Traffic Noise Increase (dB)a
Montezuma Road			
West of Collwood Boulevard	52,330	52,456	<1
Collwood Boulevard to 55th Street	28,950	29,078	<1
55th Street to College Avenue	32,570	32,698	<1

Source: LLG 2016.
Notes: ADT = average daily traffic
[a] Derived from Federal Highway Administration's Traffic Noise Model 2.5.

Would the project result in the exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Less than Significant Impact. The heavier pieces of construction equipment used at the project site could include bulldozers, graders, loaded trucks, water trucks, pavers, and cranes. No blasting or pile driving would take place as part of project construction. Ground-borne vibration and noise information related to construction activities collected by the California Department of Transportation (Caltrans 2004) indicates that continuous vibrations with a peak particle velocity of approximately 0.1 inches/second begin to annoy people. Ground-borne vibration from the heavy equipment that would be used in connection with construction of this project is typically attenuated over short distances (i.e., within 25 to 50 feet). At the nearest off-site land uses, located approximately 110 or more feet away, groundborne vibration levels from project construction would be approximately 0.01 inches/second and thus well below the threshold of annoyance. Construction-related activities are not anticipated to expose persons to or generate excessive ground-borne vibration or noise levels. Therefore, potential impacts under this criterion would be **less than significant**.

Would the project result in the substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

No Impact. Because the new buildings would replace an existing building and its associated uses, the proposed project would not generate new or additional students, staff, or visitors to the SDSU campus. Existing campus infrastructure and available public services would provide adequate support for the new buildings. No new operational noise impacts to off-site noise-sensitive land uses would result. There would thus be **no impact**.

Would the project result in the substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Less than Significant Impact. As addressed in noise impact topic a), the highest noise levels from construction are predicted to occur during demolition and grading activities when noise levels from construction would be as high as 70 dBA $L_{eq\ 12\text{-}hr}$ at the nearest existing residences, approximately 110 feet away. At more typical distances, construction noise would range from approximately 56 to 67 dBA $L_{eq\ 12\text{-}hr}$. These noise levels would be clearly audible and at times could result in annoyance; however, they would not constitute a substantial increase in the context of the local environment (i.e., vehicle traffic on Montezuma Road and other ambient noise sources). The impact would be **less than significant**.

Construction traffic was also addressed in noise impact topic a). It was determined that construction traffic would result in an increase of less than 1 decibel (dB) along the construction routes. A change in noise levels of less than 1 dB in the context of the community environment is not considered to be a perceptible change. Thus, the impact would be **less than significant**.

For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The project site is not located close to an airport. The closest airport is Montgomery Field, which is approximately 4.7 miles northwest of the site. The project site is subject to occasional overflights by helicopters, as well as commercial and general aviation aircraft. However, the campus is not located within the 60 dBA CNEL noise contour of any airport and is not subject to aircraft noise in excess of regulatory limits. Therefore, the proposed project would not expose people residing or working in the project area to excessive noise levels associated with aircraft. There would be **no impact** related to this aspect of the project.

For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The project site is not located in the vicinity of a private airstrip. The nearest private helipad (at Sharp Grossmont Hospital) is approximately 3.5 miles east of the proposed project site. There would be **no impact** related to this aspect of the project.

5.3 Cumulative Analysis

Less than Significant Impact. Construction noise impacts primarily affect the areas immediately adjacent to the construction site. Thus, although several construction activities simultaneously may occur at several areas on campus and in the surrounding community, the increased noise would not result in significant cumulative impacts due to the distance from the proposed project construction activities.

As previously noted, the proposed project's traffic-related construction noise impacts would result in a 1 dB or less increase along the construction routes. Therefore, the increase in noise associated with proposed project construction traffic would not be cumulatively considerable and cumulative impacts would be **less than significant**.

Sincerely,

Mike Greene, INCE Bd. Cert.
Environmental Specialist/Acoustician

6 REFERENCES

Caltrans (California Department of Transportation). 2004. *Transportation- and Construction-Induced Vibration Guidance Manual*. California Department of Transportation. June 2004.

City of San Diego. 2008. City of San Diego Municipal Code, Chapter 5 (Noise Abatement and Control Ordinance), Section 59.5.0401, Sound Level Limits.

FHWA (Federal Highway Administration). 2004. FHWA Traffic Noise Model, Version 2.5. Office of Environment and Planning. Washington, DC. February 2004.

FHWA. 2008. Roadway Construction Noise Model.

FTA Federal Transit Administration. 2006. *Transit Noise and Vibration Impact Assessment*. FTA-VA-90-1003-06. Washington, DC: FTA, Office of Planning and Environment. May 2006.

LLG (Linscott, Law & Greenspan). 2016. *SDSU Tula/Tenochca Facility Traffic Impacts Analysis*.

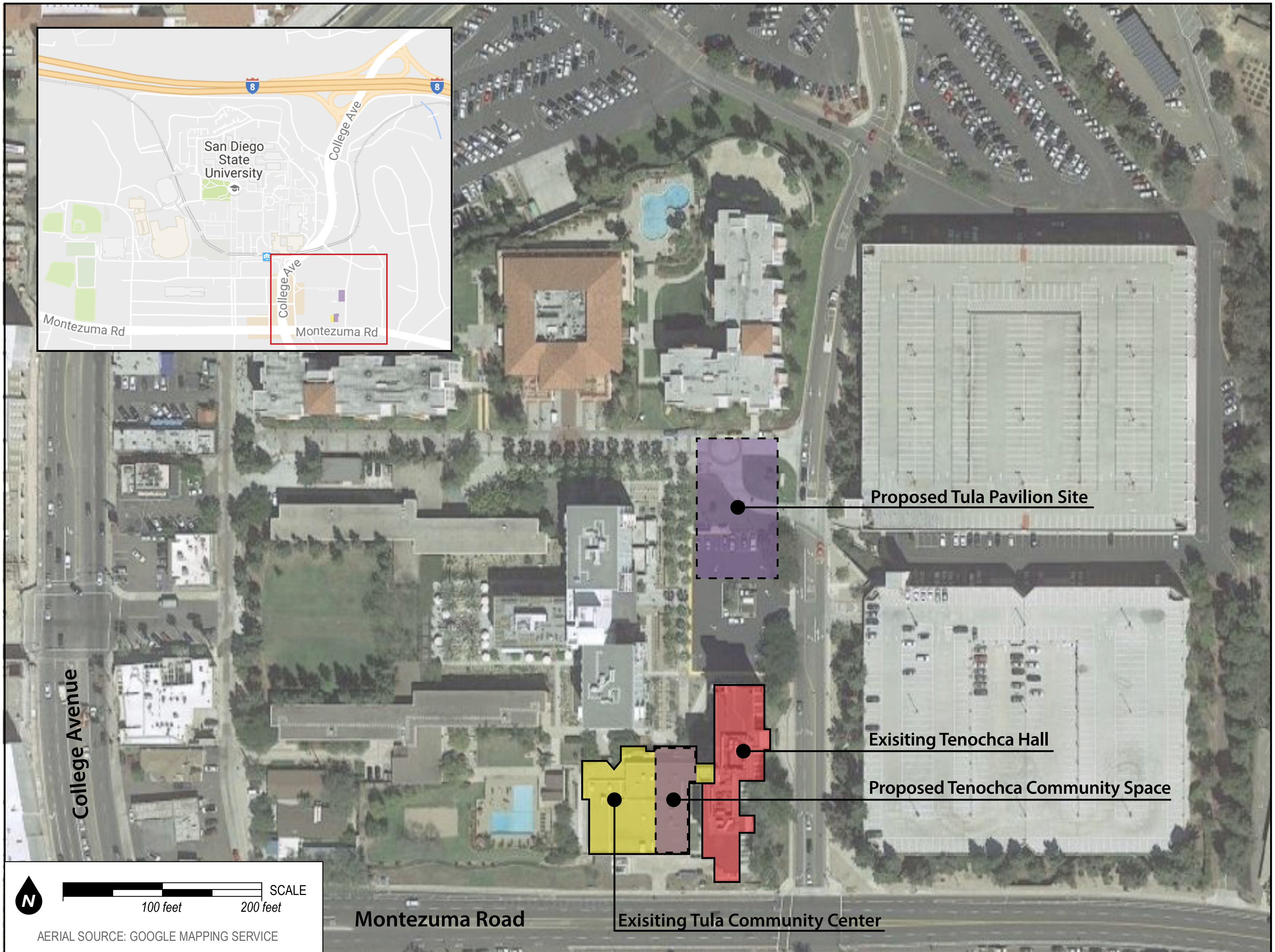
SDSU

Tula Pavilion and Tenochca Hall Renewal/Refresh Project

San Diego State University

FIGURE 1

PROJECT LOCATION AND VICINITY MAP



SDSU
Tula Pavilion and Tenochca Hall Renewal/Refresh Project

SAN DIEGO STATE UNIVERSITY

FIGURE 2
PROJECT SITE

APPENDIX A

Noise Measurement Information and Data

APPENDIX A
Noise Measurement Information and Data

Noise measurements were conducted at and adjacent to the proposed project site to characterize the existing noise environment. The sound level meter was positioned at a height of approximately 5 feet above the ground, and the measurement microphone was equipped with a windscreen. The noise measurements were conducted on November 14, 2016. The noise measurement locations are depicted as Sites M1 through M5 on Figure A-1, Noise Measurement Locations. These sites were selected to represent adjacent on-site land uses and off-site noise-sensitive receivers. As shown in Table A-1, measured average noise levels (L_{eq}) ranged from 57 dBA at Site M3 to 68 dBA at M5.

Table A-1
Measured Noise Levels

Site	Description	Date Time	L_{eq}[a]	L_{max}	L_{min}
M1	On campus, adjacent to existing pool deck west of proposed Tenochca Community Space	11/14/16 11:20 a.m.–11:30 a.m.	59.5	69.2	49.6
M2	On campus, north of Montezuma Road, west of East Campus Drive, east of Tenochca Hall	11/14/16 11:01 a.m.–11:11 a.m.	59.6	69.6	49.3
M3	South of proposed project site, south side of Montezuma Road, at residential uses	11/14/16 10:49 a.m.–10:59 a.m.	56.7	68.1	49.1
M4	On campus, west of East Campus Drive, north of proposed Tula Hall relocation site	11/14/16 10:28 a.m.–10:38 a.m.	65.1	78.4	48.6
M5	Southwest of proposed project site, south side of Montezuma Road, at residential uses	11/14/16 10:07 a.m.–10:17 a.m.	67.6	91.0	49.8

Note:
[a] Equivalent Continuous Sound Level (Time-Average Sound Level)

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APPENDIX B

Construction Noise Model
Input/Output Files

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 12/16/2016
Case Descr Tula Tenochca Halls Project SDSU Architectural Coatings

---- Receptor #1 ----

		Baselines (dBA)		
Descriptior	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Compressor (air)	No	40		77.7	110	5
Pickup Truck	No	40		75	120	5

			Results				
	Calculated (dBA)			Noise Limits (dBA)			
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Compressor (air)	65.8	61.8	N/A	N/A	N/A	N/A	N/A
Pickup Truck	62.4	58.4	N/A	N/A	N/A	N/A	N/A
Total	65.8	63.5	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Descriptior	Land Use	Daytime	Evening	Night
Typical Res	Residential	65	60	55

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Compressor (air)	No	40		77.7	220	5
Pickup Truck	No	40		75	220	5

			Results				
	Calculated (dBA)			Noise Limits (dBA)			
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Compressor (air)	59.8	55.8	N/A	N/A	N/A	N/A	N/A
Pickup Truck	57.1	53.2	N/A	N/A	N/A	N/A	N/A
Total	59.8	57.7	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat‹ 12/16/2016
Case Descr Tula Tenochca Halls Project SDSU Building Construction

---- Receptor #1 ----

		Baselines (dBA)		
Descriptior	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	110	5
Man Lift	No	20		74.7	150	5
Man Lift	No	20		74.7	110	5
Tractor	No	40	84		150	5
Front End Loader	No	40		79.1	110	5

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Crane	68.7	60.7	N/A	N/A	N/A	N/A	N/A
Man Lift	60.2	53.2	N/A	N/A	N/A	N/A	N/A
Man Lift	62.9	55.9	N/A	N/A	N/A	N/A	N/A
Tractor	69.5	65.5	N/A	N/A	N/A	N/A	N/A
Front End Loader	67.3	63.3	N/A	N/A	N/A	N/A	N/A
Total	69.5	68.7	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Descriptior	Land Use	Daytime	Evening	Night
Typical Res	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	220	5
Man Lift	No	20		74.7	250	5
Man Lift	No	20		74.7	220	5
Tractor	No	40	84		220	5
Front End Loader	No	40		79.1	250	5

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Crane	62.7	54.7	N/A	N/A	N/A	N/A	N/A
Man Lift	55.7	48.7	N/A	N/A	N/A	N/A	N/A
Man Lift	56.8	49.8	N/A	N/A	N/A	N/A	N/A
Tractor	66.1	62.2	N/A	N/A	N/A	N/A	N/A
Front End Loader	60.1	56.2	N/A	N/A	N/A	N/A	N/A
Total	66.1	64	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat 12/16/2016
Case Descr Tula Tenochca Halls Project SDSU Demolition

---- Receptor #1 ----

		Baselines (dBA)		
Descriptior	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	110	5
Concrete Mixer Truck	No	40		78.8	180	5
Concrete Saw	No	20		89.6	200	5
Dozer	No	40		81.7	250	5
Tractor	No	40	84		110	5
Front End Loader	No	40		79.1	200	5

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Concrete Mixer Truck	67	63	N/A	N/A	N/A	N/A	N/A
Concrete Mixer Truck	62.7	58.7	N/A	N/A	N/A	N/A	N/A
Concrete Saw	72.5	65.5	N/A	N/A	N/A	N/A	N/A
Dozer	62.7	58.7	N/A	N/A	N/A	N/A	N/A
Tractor	72.2	68.2	N/A	N/A	N/A	N/A	N/A
Front End Loader	62.1	58.1	N/A	N/A	N/A	N/A	N/A
Total	72.5	71.5	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Descriptior	Land Use	Daytime	Evening	Night
Typical Res	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	220	5
Concrete Mixer Truck	No	40		78.8	250	5
Concrete Saw	No	20		89.6	220	5
Dozer	No	40		81.7	250	5

Tractor	No	40	84		220	5
Front End Loader	No	40		79.1	220	5

Results

	Calculated (dBA)		Noise Limits (dBA)				
			Day		Evening		Night
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax
Concrete Mixer Truck	60.9	57	N/A	N/A	N/A	N/A	N/A
Concrete Mixer Truck	59.8	55.8	N/A	N/A	N/A	N/A	N/A
Concrete Saw	71.7	64.7	N/A	N/A	N/A	N/A	N/A
Dozer	62.7	58.7	N/A	N/A	N/A	N/A	N/A
Tractor	66.1	62.2	N/A	N/A	N/A	N/A	N/A
Front End Loader	61.2	57.3	N/A	N/A	N/A	N/A	N/A
Total	71.7	68.3	N/A	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat(12/16/2016
Case Descr Tula Tenochca Halls Project SDSU Grading

---- Receptor #1 ----

		Baselines (dBA)		
Descriptior	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	110	5
Concrete Mixer Truck	No	40		78.8	200	5
Concrete Saw	No	20		89.6	200	5
Dozer	No	40		81.7	250	5
Tractor	No	40	84		110	5
Front End Loader	No	40		79.1	250	5

Results

	Calculated (dBA)		Noise Limits (dBA)			
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Mixer Truck	67	63	N/A	N/A	N/A	N/A
Concrete Mixer Truck	61.8	57.8	N/A	N/A	N/A	N/A
Concrete Saw	72.5	65.5	N/A	N/A	N/A	N/A
Dozer	62.7	58.7	N/A	N/A	N/A	N/A
Tractor	72.2	68.2	N/A	N/A	N/A	N/A
Front End Loader	60.1	56.2	N/A	N/A	N/A	N/A
Total	72.5	71.4	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Descriptior	Land Use	Daytime	Evening	Night
Typical Res	Residential	65	60	55

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Concrete Mixer Truck	No	40		78.8	220	5
Concrete Mixer Truck	No	40		78.8	250	5
Concrete Saw	No	20		89.6	220	5
Dozer	No	40		81.7	250	5

Tractor	No	40	84		220	5
Front End Loader	No	40		79.1	220	5

Results

	Calculated (dBA)		Noise Limits (dBA)			
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Mixer Truck	60.9	57	N/A	N/A	N/A	N/A
Concrete Mixer Truck	59.8	55.8	N/A	N/A	N/A	N/A
Concrete Saw	71.7	64.7	N/A	N/A	N/A	N/A
Dozer	62.7	58.7	N/A	N/A	N/A	N/A
Tractor	66.1	62.2	N/A	N/A	N/A	N/A
Front End Loader	61.2	57.3	N/A	N/A	N/A	N/A
Total	71.7	68.3	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report dat‹ 12/16/2016
Case Descr Tula Tenochca Halls Project SDSU Paving

---- Receptor #1 ----

		Baselines (dBA)		
Descriptior	Land Use	Daytime	Evening	Night
Nearest Re	Residential	65	60	55

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Concrete Mixer Truck	No	40		78.8	110	5
Concrete Mixer Truck	No	40		78.8	150	5
Concrete Mixer Truck	No	40		78.8	200	5
Concrete Mixer Truck	No	40		78.8	200	5
Paver	No	50		77.2	110	5
Roller	No	20		80	150	5
Tractor	No	40	84		150	5

			Results			
	Calculated (dBA)			Noise Limits (dBA)		
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Mixer Truck	67	63	N/A	N/A	N/A	N/A
Concrete Mixer Truck	64.3	60.3	N/A	N/A	N/A	N/A
Concrete Mixer Truck	61.8	57.8	N/A	N/A	N/A	N/A
Concrete Mixer Truck	61.8	57.8	N/A	N/A	N/A	N/A
Paver	65.4	62.4	N/A	N/A	N/A	N/A
Roller	65.5	58.5	N/A	N/A	N/A	N/A
Tractor	69.5	65.5	N/A	N/A	N/A	N/A
Total	69.5	70.1	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Descriptior	Land Use	Daytime	Evening	Night
Typical Res	Residential	65	60	55

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	Device	Usage(%)	(dBA)	(dBA)	(feet)	(dBA)
Concrete Mixer Truck	No	40		78.8	220	5
Concrete Mixer Truck	No	40		78.8	250	5

Concrete Mixer Truck	No	40		78.8	220	5
Concrete Mixer Truck	No	40		78.8	250	5
Paver	No	50		77.2	220	5
Roller	No	20		80	220	5
Tractor	No	40	84		220	5

			Results			
	Calculated (dBA)			Noise Limits (dBA)		
			Day		Evening	
Equipment	*Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Mixer Truck	60.9	57	N/A	N/A	N/A	N/A
Concrete Mixer Truck	59.8	55.8	N/A	N/A	N/A	N/A
Concrete Mixer Truck	60.9	57	N/A	N/A	N/A	N/A
Concrete Mixer Truck	59.8	55.8	N/A	N/A	N/A	N/A
Paver	59.4	56.3	N/A	N/A	N/A	N/A
Roller	62.1	55.1	N/A	N/A	N/A	N/A
Tractor	66.1	62.2	N/A	N/A	N/A	N/A
Total	66.1	66.2	N/A	N/A	N/A	N/A

*Calculated Lmax is the Loudest value.

APPENDIX C

Traffic Noise Model
Input / Output Files

Dudek
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9 December 2016
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: 10018 / 6
RUN: SDSU Tula Tenochca Halls Proj Existing

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Montezuma Rd W of Cllwd Ave	60.0	point6	6	5,001.3	978.3	100.00				Average	
		point5	5	2,001.3	978.3	100.00					
Montezuma Rd Cllwd Blvd - 55th St	60.0	point19	19	6,001.7	977.7	100.00				Average	
		point20	20	10,001.7	977.7	100.00					
Montezuma Rd 55th St to College Blvd	60.0	point23	23	11,001.1	977.6	100.00				Average	
		point24	24	15,001.1	977.6	100.00					

Dudek 9 December 2016
MG TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: 10018 / 6
RUN: SDSU Tula Tenochca Halls Proj Existing

Roadway	Points		Segment									
Name	Name	No.	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Montezuma Rd W of Cllwd Ave	point6	6	2323	35	48	35	24	35	0	0	0	0
	point5	5										
Montezuma Rd Cllwd Blvd - 55th St	point19	19	1332	35	27	35	14	35	0	0	0	0
	point20	20										
Montezuma Rd 55th St to College Blvd	point23	23	1196	35	25	35	12	35	0	0	0	0
	point24	24										

Dudek 9 December 2016
MG TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: 10018 / 6
RUN: SDSU Tula Tenochca Halls Proj Existing

Receiver												
Name	No.	#DUs	Coordinates (ground)			Height above Ground	Input Sound Levels and Criteria				Active in Calc.
			X	Y	Z		Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	
			ft	ft	ft	ft	dBA	dBA	dB	dB	
R1 Montezuma Rd W of Cllwd Blv	5	1	3,500.0	920.0	105.00	5.00	0.00	66	10.0	8.0	Y
R2 Montezuma Rd Cllwd Blvd - 55th St	7	1	8,000.0	920.0	105.00	5.00	0.00	66	10.0	8.0	Y
R3 Montezuma Rd 55th St to College Av	9	1	13,000.0	920.0	105.00	5.00	0.00	66	10.0	8.0	Y

Dudek
MG

9 December 2016
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 10018 / 6
RUN: SDSU Tula Tenochca Halls Proj Existing
BARRIER DESIGN: INPUT HEIGHTS

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

ATMOSPHERICS: 68 deg F, 50% RH

Receiver													
Name	No.	#DUs	Existing LAeq1h	No Barrier					With Barrier				
				LAeq1h		Increase over existing		Type Impact	Calculated LAeq1h	Noise Reduction			
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal	
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB	
R1 Montezuma Rd W of Cllwd Blv	5	1	0.0	67.5	66	67.5	10	Snd Lvl	67.5	0.0	8	-8.0	
R2 Montezuma Rd Cllwd Blvd - 55th St	7	1	0.0	65.1	66	65.1	10	----	65.1	0.0	8	-8.0	
R3 Montezuma Rd 55th St to College Ave	9	1	0.0	64.7	66	64.7	10	----	64.7	0.0	8	-8.0	

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Dudek
MG

9 December 2016
TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: 10018 / 6
RUN: SDSU Tula Tenochca Halls Proj Existing

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway		Points					Flow Control			Segment	
Name	Width	Name	No.	Coordinates (pavement) X	Y	Z	Control Device	Speed Constraint	Percent Vehicles Affected	Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
Montezuma Rd W of Cllwd Blv	60.0	point6	6	5,001.3	978.3	100.00				Average	
		point5	5	2,001.3	978.3	100.00					
Montezuma Rd Cllwd Blvd - 55th St	60.0	point19	19	6,001.7	977.7	100.00				Average	
		point20	20	10,001.7	977.7	100.00					
Montezuma Rd 55th St to College Ave	60.0	point23	23	11,001.1	977.6	100.00				Average	
		point24	24	15,001.1	977.6	100.00					

Dudek
MG

9 December 2016
TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Volumes
PROJECT/CONTRACT: 10018 / 6
RUN: SDSU Tula Tenochca Halls Proj Existing

Roadway	Points												
Name	Name	No.	Segment										
			Autos		MTrucks		HTrucks		Buses		Motorcycles		
			V	S	V	S	V	S	V	S	V	S	
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	
Montezuma Rd W of Cllwd Blv	point6	6	2344	35	48	35	27	35	0	0	0	0	
	point5	5											
Montezuma Rd Cllwd Blvd - 55th St	point19	19	1351	35	27	35	17	35	0	0	0	0	
	point20	20											
Montezuma Rd 55th St to College Ave	point23	23	1217	35	25	35	15	35	0	0	0	0	
	point24	24											

Dudek
MG

9 December 2016
TNM 2.5

INPUT: RECEIVERS
PROJECT/CONTRACT: 10018 / 6
RUN: SDSU Tula Tenochca Halls Proj Existing

Receiver Name	No.	#DUs	Coordinates (ground) X	Y	Z	Height above Ground	Input Sound Levels and Criteria Existing LAeq1h	Impact Criteria LAeq1h	Sub'l	NR Goal	Active in Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
R1 Montezuma Rd W of Cllwd Blv	5	1	3,500.0	920.0	105.00	5.00	0.00	66	10.0	8.0	Y
R2 Montezuma Rd Cllwd Blvd - 55th St	7	1	8,000.0	920.0	105.00	5.00	0.00	66	10.0	8.0	Y
R3 Montezuma Rd 55th St to College Av	9	1	13,000.0	920.0	105.00	5.00	0.00	66	10.0	8.0	Y

RESULTS: SOUND LEVELS | 10018 / 6

Dudek
MG

9 December 2016
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: 10018 / 6
RUN: SDSU Tula Tenochca Halls Proj Existing
BARRIER DESIGN: INPUT HEIGHTS

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

ATMOSPHERICS: 68 deg F, 50% RH

Receiver												
Name	No.	#DUs	Existing LAeq1h	No Barrier					With Barrier			
				LAeq1h		Increase over existing		Type Impact	Calculated LAeq1h	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R1 Montezuma Rd W of Cllwd Blv	5	1	0.0	67.6	66	67.6	10	Snd Lvl	67.6	0.0	8	-8.0
R2 Montezuma Rd Cllwd Blvd - 55th St	7	1	0.0	65.3	66	65.3	10	----	65.3	0.0	8	-8.0
R3 Montezuma Rd 55th St to College Ave	9	1	0.0	64.8	66	64.8	10	----	64.8	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	3	0.0	0.0	0.0
All Impacted	1	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0