ENVIRONMENTAL SETTING

Project Location and Description:

The proposed Second Street Crossing shopping center is located on Second Street, north of Interstate 80 (I-80) and the Union Pacific Railroad (UPRR), and west of Mace Boulevard, in the City of Davis, California. The project proposes the construction of five commercial/retail buildings encompassing approximately 183,000 sq. ft. The "major" retailer to be included in the project is Target, which will occupy a proposed 126,000 sq. ft. building (plus 10,000 sq. ft. of proposed Garden Center) on the west side of the project site. Please refer to the project site plan presented as Figure 1.

Acoustical Terminology:

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that human hearing can detect. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second, or Hertz (Hz). Human hearing is generally capable of detecting sound between 20 Hz and 20,000 Hz.

Human hearing is generally capable of processing these pressure variations (sound) over an extremely broad dynamic range; therefore, the measurement of sound directly in terms of pressure would require a very large and awkward range of numbers. The logarithmic treatment of these numbers – converting measured sound pressure (Pa) into sound pressure level (decibels, dB) – was developed primarily to limit the range of numbers; the decibel scale allows for 5 orders of magnitude in sound pressure to be expressed as a range of 100 dB.

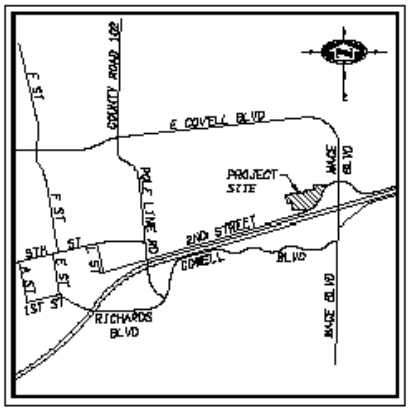
The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by the A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way human hearing perceives noise. For this reason, the A-weighted sound level has become a standard tool for environmental noise assessment. All noise levels reported in this section are in terms of A-weighting.

Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool used to measure the ambient noise level is the average, or equivalent sound level (L_{eq}), which corresponds to a steady-state, A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation for the Day/Night Average Level (L_{dn}).

The L_{dn} is based on the average noise level over a continuous 24-hour period, with a +10 dB weighting applied to noise occurring during nighttime (10 p.m. - 7 a.m.) hours. The nighttime penalty is based on the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to

disguise short-term variations in the noise environment.

Figure 1
Second Street Crossing
Davis, California



VICINITY MAP
NTS.

24-Hour Measurement Site

Short-Term Measurement Site

150'

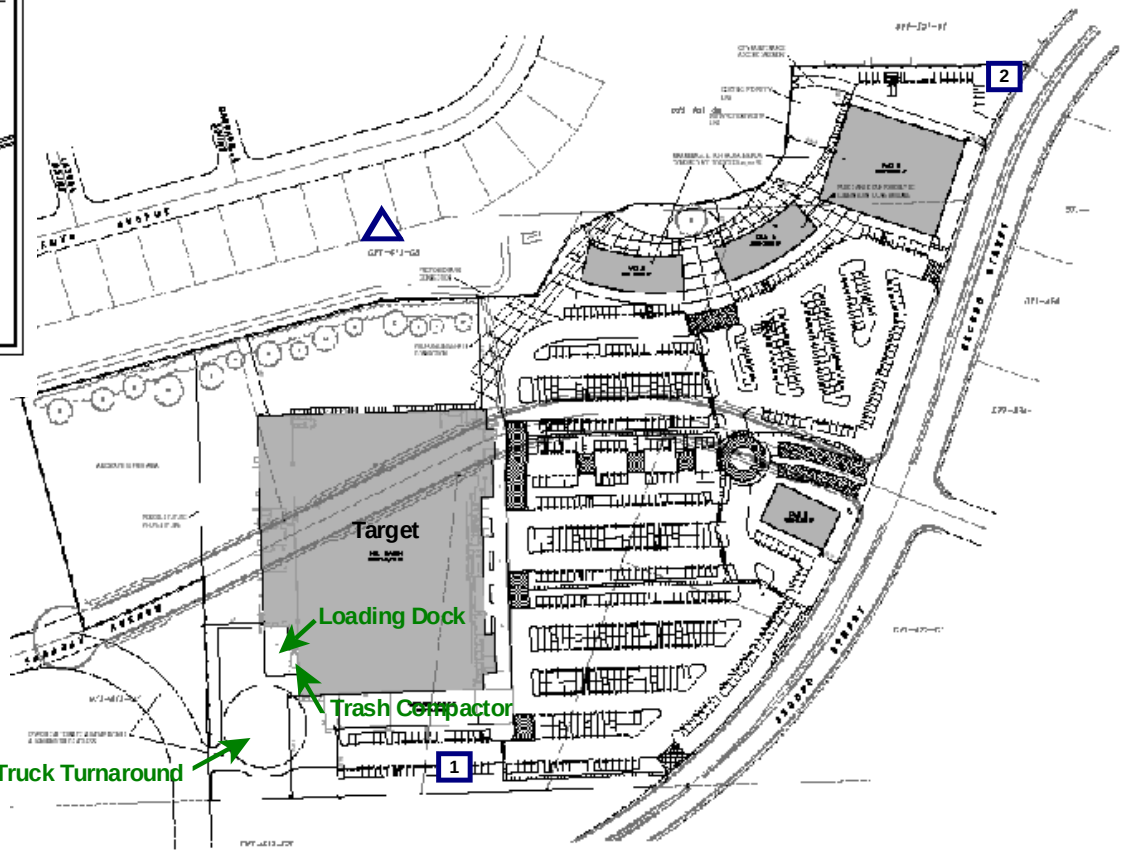


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Table 1 provides definitions of acoustical terminology relevant to this study.

TABLE 1

ACOUSTICAL TERMINOLOGY

Acoustics	The science (or physics) of sound.
Ambient Noise	The distinctive acoustical characteristics of a given environment consisting of all noise sources audible at a given location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of noise.
A-Weighting	A frequency-response filter that conditions a given sound signal to approximate human response.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours (10 p.m. - 7 a.m.) weighted by a factor of 10 prior to averaging.
Decibel or dB	A Bel is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bel.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
L_{dn}	Day/Night Average Level. Similar to CNEL but with no evening weighting. The hours of 7 – 10 p.m. are considered daytime.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
L_n	The measured sound pressure level exceeded (n) percent of the time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB at 1,000 Hz for persons with good hearing.
SEL	A single-number rating indicating the total energy of a discrete noise event compressed into a 1-second time duration.

Existing Land Uses in the Project Vicinity:

The project site is currently vacant and undeveloped. It is bordered to the north by residential uses (single- and multi-family), to the east by commercial/industrial uses, to the west by vacant land, and to the south by commercial/industrial uses.

Noise-sensitive land uses in the immediate project vicinity include the existing single-family and multi-family residences to the north. These uses may be affected by increased project-related traffic noise on local area roadways and on-site project-related noise sources.

Existing Ambient Noise Environment in the Project Vicinity:

The existing ambient noise environment in the immediate project vicinity is defined primarily by operations on I-80 and the UPRR. Noise from the existing commercial/industrial operations to the south and east are insignificant when compared to noise from the transportation noise sources.

To quantify the existing ambient noise environment in the project vicinity, ambient noise level measurement surveys were conducted at three locations in the project area on July 18-19, 2005. The noise measurement locations are shown in Figure 1. Long-term (24-hour) measurements were completed at 4210 Arroyo Avenue, north of the project site, while short-term (15-minute) samples were collected at Sites 1 and 2 to the south and east, respectively.

A Larson-Davis Laboratories (LDL) Model 820 precision integrating sound level meter was used for the noise level measurement surveys. The meter was calibrated before use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute (ANSI) for Type 1 (precision) sound level meters (ANSI S1.4).

Ambient noise level survey results are presented in Figure 2 and Table 2. The ambient noise measurement surveys revealed that existing noise levels in the immediate project vicinity were consistent with typical commercial/residential land uses in urban/suburban settings.

TABLE 2

SUMMARY OF AMBIENT NOISE LEVEL MEASUREMENTS
SHORT-TERM SAMPLES – JULY 18, 2005 (11 a.m. – 12 p.m.)
SECOND STREET CROSSING – DAVIS, CALIFORNIA

Site	Location	L_{eq}	L_{max}	Noise Sources
1	South Side	54	62	Traffic on I-80. PA system at auto dealership.
2	Northeast Corner	63	77	Traffic on Alhambra Drive and I-80.

Source: Bollard Acoustical Consultants, Inc.

Roadway Traffic Noise:

To predict existing noise levels due to traffic, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The Model is based on the Calveno

reference noise factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the project site. The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions. A day/night traffic distribution of 83%/17% was factored into the calculations to determine L_{dn}. Additionally, a medium/heavy truck split of 2%/1% was assumed, along with traffic speeds of 30-45 MPH.

Traffic volumes for existing conditions were obtained from the Traffic Impact Study prepared for the project by Fehr & Peers Transportation Consultants (September 2005). The data within that report is in the form of AM/PM peak-hour intersection turning movements, which was converted to ADT by Bollard Acoustical Consultants, Inc.

TABLE 3

EXISTING TRAFFIC NOISE LEVELS AND CONTOUR DISTANCES
SECOND STREET CROSSING – DAVIS, CALIFORNIA

			Distance to Contours (feet)		
Roadway	**Segment**	**L_{dn} @ 75 Feet**	**70 dB L_{dn}**	**65 dB L_{dn}**	**60 dB L_{dn}**
2nd Street	West of Cantril	59	15	31	67
2nd Street	Cantril – Pena	60	16	36	77
2nd Street	Pena – Cousteau	61	18	39	84
2nd Street	Cousteau – Faraday	61	18	39	84
2nd Street	Faraday – Mace	61	19	41	89
2nd Street	East of Mace	54	7	15	32
Mace Boulevard	2nd – Alhambra	67	48	104	225
Mace Boulevard	2nd – I-80	69	63	137	294
Mace Boulevard	1-80 – Chiles	69	60	128	277
Mace Boulevard	South of Chiles	66	38	83	178
Chiles Road	East of Mace	60	17	36	78
Chiles Road	Mace – I-80	62	21	44	96
Chiles Road	West of I-80	61	18	38	81
5th Street	North of Alhambra	50	4	8	17
5th Street	Alhambra – Pole Line	62	21	44	96
5th Street	Pole Line – L	62	21	45	97
5th Street	West of L	62	21	45	98
Alhambra Drive	North of Loyola	55	8	17	37
Alhambra Drive	Loyola – 5th	58	12	25	54
32A (Webster)	West of I-80	53	6	12	26
32A (Webster)	I-80 WB – I-80 EB	53	5	11	25
32A (Webster)	West of I-80	54	7	14	31

Source: FHWA-RD-77-108 with inputs from Fehr & Peers and Bollard Acoustical Consultants, Inc.

Figure 2
Measured Ambient Noise Levels
Second Street Crossing - Davis, California
4210 Arroyo Avenue - Davis California
July 18-19, 2005

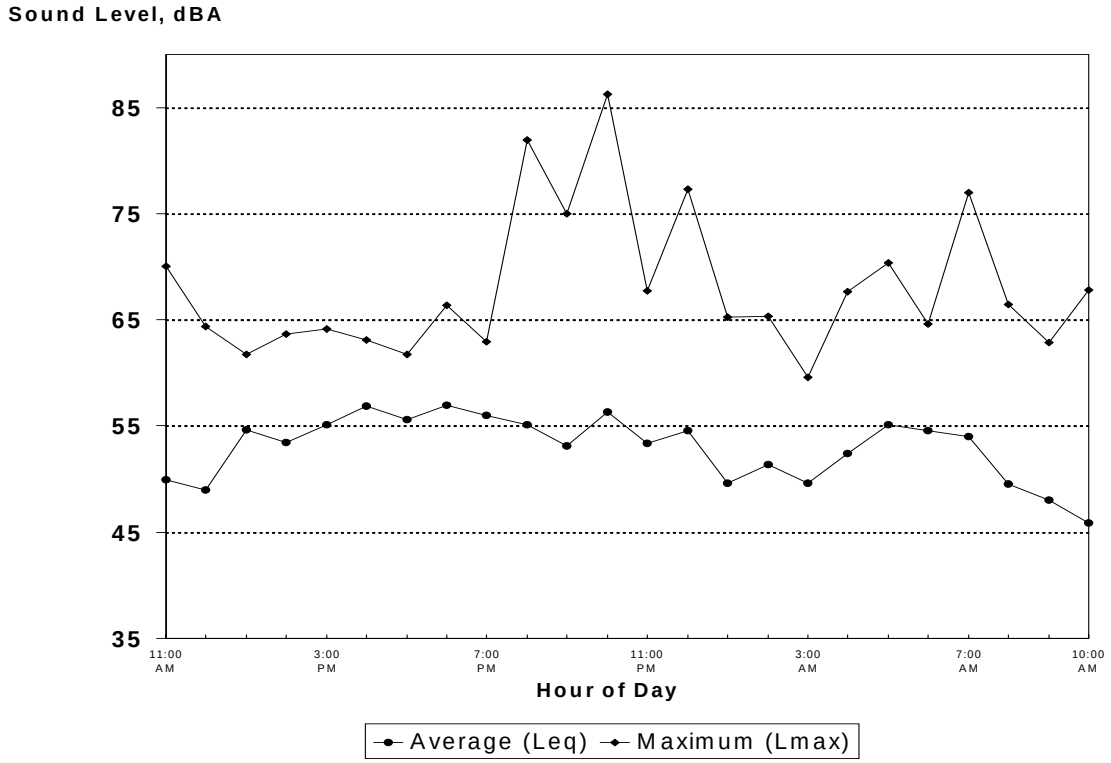

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Table 3 shows the existing traffic noise levels in terms of L_{dn} at a reference distance of 75 feet from the centerlines of existing project-area roadways. These are considered to be the "baseline" conditions. The table also includes the distances to existing traffic noise contours.

The project uses (i.e., Target store, other commercial/retail) are not considered to be noise-sensitive, and are not expected to be impacted by perimeter roadway traffic noise exposure. Therefore, the impact of traffic noise exposure on the proposed project uses is not discussed in the following.

Railroad Noise:

As described above, the project site is directly adjacent to a branch of the UPRR along the south property boundary. The proposed project is not expected to alter the activity on the Railroad, and will therefore not alter the noise exposure produced by the Railroad. Additionally, the project uses are not considered to be noise-sensitive, and are not expected to be impacted by UPRR noise exposure.

REGULATORY SETTING

In order to limit population exposure to physically and/or psychologically damaging noise levels, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. The City of Davis General Plan Noise Element, Noise Ordinance, and CEQA provide regulations regarding noise levels relevant to the proposed project. The following provides a general overview of the existing regulations established by the City and CEQA.

City of Davis Noise Element:

The City of Davis General Plan Noise Element requires that interior noise exposure from exterior transportation noise sources (i.e., traffic, trains) within residential dwellings not exceed 45 dB L_{dn} (or CNEL) regardless of exterior noise exposure.

The City of Davis has established an exterior noise level criterion of 60 dB L_{dn} (or CNEL) or less within outdoor activity areas of residential land uses. This is considered to be the "Normally Acceptable" criterion, and may be adjusted upward (60-70 dB L_{dn}) based on compliance with the interior noise criterion and the City's discretion.

City of Davis Noise Ordinance:

The City of Davis Noise Ordinance establishes a maximum noise level standard of 55 dB during the hours of 7:00 a.m. - 9:00 p.m. and 50 dB during the hours of 9:00 p.m. - 7:00 a.m. These "maximum" criteria are interpreted by Bollard Acoustical Consultants, Inc. to be average hourly levels (Hourly L_{eq}).

NOISE IMPACTS ANALYSIS

Standards of Significance:

Generally, a project may have a significant impact on the environment if it will substantially increase the ambient noise levels at adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed, as discussed previously in the Regulatory Setting section above. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local planning criteria. The local planning standards applicable to this project are repeated below.

City of Davis Noise Element Criteria:

The City of Davis General Plan Noise Element requires that interior noise exposure from exterior transportation noise sources (i.e., traffic, trains) within residential dwellings not exceed 45 dB L_{dn} (or CNEL) regardless of exterior noise exposure.

The City of Davis has established an exterior noise level criterion of 60 dB L_{dn} (or CNEL) or less within outdoor activity areas of residential land uses. This is considered to be the "Normally Acceptable" criterion, and may be adjusted upward (60-70 dB L_{dn}) based on compliance with the interior noise criterion and the City's discretion.

City of Davis Noise Ordinance Criteria:

The City of Davis Noise Ordinance establishes a maximum noise level standard of 55 dB during the hours of 7:00 a.m. - 9:00 p.m. and 50 dB during the hours of 9:00 p.m. - 7:00 a.m. These "maximum" criteria are interpreted by Bollard Acoustical Consultants, Inc. to be average hourly levels (Hourly L_{eq}).

Additionally, noise impacts associated with the proposed project would be considered significant if they expose existing noise-sensitive land uses to a traffic noise level increase of 3 dB or more.

Analysis:

The identified primary noise-producing elements associated with this project are increased traffic on the local roadway network, on-site heavy truck movements (Target), loading dock activities (Target), rooftop mechanical equipment, trash compactor (Target), and project-related construction. The following focuses on these noise sources.

Traffic:

To assess noise impacts due to project-related traffic increases on the local roadway network, traffic noise levels were predicted at a representative distance (75 feet from the roadway

centerlines) for the Existing + Project, Cumulative (2015), and Cumulative (2015) + Project conditions. The traffic noise levels were predicted using the same modeling methodology described in the Environmental Setting section above. Results of this analysis are summarized in Table 4.

TABLE 4

PREDICTED TRAFFIC NOISE LEVELS AT 75 FEET FROM ROADWAY CENTERLINES
SECOND STREET CROSSING – DAVIS, CALIFORNIA

		L_{dn}, dB (change, dB)	
Roadway	**Segment**	**Existing + Project**	**Cumulative (2015) + Project**
2nd Street	West of Cantril	60 (+1)	63 (+1)
2nd Street	Cantril – Pena	***62*** (+2)	63 (+1)
2nd Street	Pena – Cousteau	62 (+1)	63 (0)
2nd Street	Cousteau – Faraday	62 (+1)	63 (+1)
2nd Street	Faraday – Mace	63 (+2)	64 (+1)
2nd Street	East of Mace	55 (+1)	56 (0)
Mace Boulevard	2nd – Alhambra	68 (+1)	69 (0)
Mace Boulevard	2nd – I-80	70 (+1)	71 (+1)
Mace Boulevard	1-80 – Chiles	69 (0)	70 (0)
Mace Boulevard	South of Chiles	66 (0)	68 (0)
Chiles Road	East of Mace	60 (0)	61 (0)
Chiles Road	Mace – I-80	62 (0)	63 (0)
Chiles Road	West of I-80	61 (0)	62 (0)
5th Street	North of Alhambra	50 (0)	54 (0)
5th Street	Alhambra – Pole Line	62 (0)	63 (+1)
5th Street	Pole Line – L	62 (0)	62 (0)
5th Street	West of L	62 (0)	63 (+1)
Alhambra Drive	North of Loyola	56 (+1)	57 (+1)
Alhambra Drive	Loyola – 5th	57 (+1)	59 (+1)
32A (Webster)	West of I-80	54 (+1)	55 (+1)
32A (Webster)	I-80 WB – I-80 EB	53 (0)	54 (0)
32A (Webster)	West of I-80	54 (0)	56 (0)

Note: ***Bold/Italic*** represents possible significant impact.

Source: FHWA-RD-77-108 with inputs from Fehr & Peers and Bollard Acoustical Consultants, Inc.

Target Heavy Truck Circulation:

Daily operations of the proposed Target store will include deliveries of goods to the store via tractor-trailer trucks. Based on information provided by Target, a maximum of 12 heavy trucks per week (approximately 1.7 deliveries or 3.4 trips per day on average) will operate on the project site. These operations could be expected to occur during a single hour after 9 p.m. The expected delivery

route will be from I-80/Mace Boulevard Exit, to Mace Boulevard, to Second Street, entering the site at the southern-most entrance, to the loading dock area on the south side of the store. The distance between the truck turn-around area on the south side of the store and the closest noise-sensitive residential receivers to the north of the project site is approximately 650 feet. This is the distance used in our analysis of this noise source.

Trucks en route to the loading dock are estimated to produce an average Sound Exposure Level (SEL) of approximately 87 dB at a distance of 50 feet. The typical maximum level (L_{max}) due to a truck event has been measured to be approximately 75 dB at 50 feet. At the nearest residential properties to the north (approximately 650 feet away), unmitigated SEL and L_{max} values associated with truck events on the project site were predicted to be approximately 65 dB and 53 dB, respectively, based on a standard spreading loss factor of -6 dB per doubling of distance from the noise source.

Assuming that the day's truck deliveries (i.e., 1.7 truck deliveries or 3.4 total truck trips) could occur during a continuous one-hour period, the calculated Target truck circulation noise exposure (unmitigated) at the closest residential receivers was calculated to be approximately 35 dB L_{eq} (53 dB L_{max}).

Target Loading Dock:

The primary noise sources associated with the Target store loading dock include heavy trucks stopping (air brakes), backing into the loading dock (back-up alarm), and pulling out of the loading dock (revving engine). Once a truck has backed into the dock, it is unloaded from the inside of the store using a fork lift or hand cart, and most of the unloading noise is contained within the building and truck trailer.

The proposed loading dock for the Target store is located on the southwest corner of the building, approximately 540 feet from the nearest noise-sensitive residential receivers to the north. Measured loading dock noise exposure for similar projects was approximately 63 dB L_{eq} and 85 dB L_{max} at a distance of 50 feet from the center of the loading docks. These levels represent continuous activity at the measured loading docks, including activity from all of the above-mentioned noise sources. Assuming a noise attenuation of -6 dB per doubling of distance from the loading dock, unmitigated hourly L_{eq} and L_{max} loading dock noise exposure at the closest residences to the north is expected to be approximately 42 dB and 64 dB, respectively. Again, this represents a conservative Target loading dock noise exposure at the closest affected residences to the north of the site.

Rooftop Heating, Ventilation, and Air Conditioning (HVAC) Equipment:

The HVAC systems for maintaining comfortable shopping environments within the proposed Target store and other commercial/retail buildings (Pads A-D) will consist of packaged rooftop units. Each unit for the Target store is expected to produce a noise level of approximately 58 dB at 15 feet, as specified by Target Corporation. This reference noise level, an HVAC roof plan for the Target

building, and estimates of required HVAC equipment for Pads A-D were used to calculate project-related HVAC noise exposure at the closest residential properties to the north.
Using the above-described information, Bollard Acoustical Consultants, Inc. calculated a conservative, unmitigated HVAC noise exposure (all units running and no acoustical shielding by project buildings) of approximately 40-42 dB at the closest residential properties. Acoustical shielding provided by the project buildings was calculated to be approximately 7-9 dB, reducing the expected HVAC noise exposure to approximately 31-35 dB at the closest existing residences to the north, with a majority of the noise exposure produced by proposed HVAC units on the north side of the Target building roof.

Trash Compactor:

The proposed Target store will utilize a trash compactor located on the southwest corner of the building near the loading dock (see Figure 1). It is our understanding that the proposed compactor produces an unmitigated noise exposure level of approximately 50 dB at a distance of 100 feet. Accounting for the distance between the trash compactor and the closest residences to the north, we estimate an unmitigated noise exposure of approximately 35 dB.

Cumulative Noise Exposure from On-Site Noise Sources:

Cumulative noise exposure from the expected dominant on-site noise sources (i.e., Target truck movements, Target loading dock, Target trash compactor, and rooftop HVAC) is expected to be approximately 44 dB Hourly L_{eq} and 64 dB L_{max} at the closest existing residences immediately north of the project site. The noise exposure is expected to be dominated by Target loading dock activities and rooftop HVAC equipment on the north side of the Target building.

Project Construction:

During the construction phases of the project, noise from building equipment would be expected to add to the noise environment in the immediate project vicinity. Activities involved in construction would likely generate maximum noise levels, as indicated in Table 5, ranging from 85-88 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours (7 a.m.-5 p.m.). Still, existing residences located along the north side of the project site will likely be affected by this noise.

TABLE 5

CONSTRUCTION EQUIPMENT NOISE LEVELS

Type of Equipment	L_{max}, dB at 50 feet
Bulldozers	87
Heavy Trucks	88

Backhoe	85
Pneumatic Tools	85

Source: Environmental Noise Pollution, Patrick R. Cunniff, 1977.

Noise would also be generated during the construction phase by increased truck traffic on local area roadways. A significant project-generated noise source would be truck traffic associated with the transport of heavy materials and equipment to and from the construction site.

SPECIFIC IMPACTS AND MITIGATION STATEMENTS

Impact 1: **Increase in Existing Traffic Noise Levels:** The project will generate increased traffic on existing local area roadways. As shown in Table 4, project-related traffic relative to existing volumes on 2nd Street between Cantrill Drive and Pena Drive may elevate traffic noise above the City's 60 dB L_{dn} criterion. However, land uses on this section of roadway are not considered noise-sensitive. **Therefore, this impact is considered to be less than significant.**

Mitigation 1: None required.

Impact 2: **Cumulative Increase in Traffic Noise Levels:** The project will contribute to cumulative traffic on the local roadway network. Project-related traffic noise increases in the project vicinity, relative to Cumulative (2015) No Project noise levels, are not expected to exceed the 3 dB criterion as shown in Table 4. **Therefore, this impact is considered to be less than significant.**

Mitigation 2: None required.

Impact 3: **On-Site Noise Sources at Existing Residences:** The primary on-site noise-producing elements of the project include heavy truck movements (Target), loading dock activities (Target), rooftop mechanical equipment (HVAC), and the trash compactor (Target). These sources are predicted to generate noise levels as-high-as 44 dB Hourly L_{eq} and 64 dB L_{max} at the closest existing residential property to the north of the project site. These levels are within the City's noise exposure limits, and are generally below the existing ambient noise levels recorded in the project vicinity (see Figure 2). **Therefore, this impact is considered to be less than significant.**

Mitigation 3: None required.

Impact 4: **Construction Noise:** Activities associated with the project construction will result in elevated noise levels, with maximum noise levels ranging from 85-88 dB at 50 feet as shown in Table 5. Although these levels would be audible at the nearest existing residences, they would be temporary in nature and would likely occur during normal daytime working hours. Nonetheless, because construction activities would result in periods of elevated noise levels, **this impact is considered to be potentially significant.**

Mitigation 4: Implementation of the following noise mitigation measures would reduce this impact to a less than significant level.

All construction activities should adhere to the construction practices established by the City of Davis, including limiting construction activities to the daytime hours and requiring all internal combustion engines to be fitted with factory specified mufflers.

This concludes our Environmental Noise Assessment for the Second Street Crossing project. Please contact me at (530) 745-0550 or jasonm@bacnoise.com if you have any questions or require additional information.