ENTECH CONSULTING GROUP
PLANNING • ENVIRONMENTAL • CONSTRUCTION MANAGEMENT

February 7, 2025

Eliza Laws
Senior Environmental Analyst/Planner
Albert A. Webb Associates
3788 McCray Street
Riverside, CA 92506

Subject: Avenue 50 Improvement Project – Noise Review Letter – City of Indio, CA

Dear Eliza:

Entech Consulting Group (Entech) is pleased to submit this letter as part of the noise assessment for the proposed Avenue 50 Improvement Project in the City of Indio, CA. The project proposes to improve a portion of Avenue 50 from Jefferson Street to Botella Place to its ultimate General Plan configuration. Improvements include widening portions of Avenue 50 that provide one travel lane to two travel lanes in each direction, closing gaps in existing sidewalks and trails, and constructing a Class IV protected bicycle lane, curb and gutter, and drainage improvements per the City of Indio's Master Drainage Plan (MDP). The improvements along the northern portion of the Avenue 50 are within the City of Indio city limits whereas the southern portion of Avenue 50 between Jefferson Street and Madison Street are within the City of La Quinta city limits. A glossary of Acoustical Terms is located in Appendix A.

1.0 State and Local Acoustical Requirements

Land Use Compatibility Standards

The Avenue 50 Widening Project is being implemented to support capacity relief, safety improvements, and multimodal infrastructure as part of the City of Indio's General Plan roadway network. The project itself does not generate new vehicle trips but provides the necessary infrastructure to accommodate cumulative traffic increases resulting from citywide development. When evaluating future traffic noise levels under General Plan buildout conditions, CNEL values along Avenue 50 are projected to exceed the 60 dB compatibility threshold for residential land uses. These noise levels reflect cumulative traffic growth citywide. Minor localized noise increases (0.2 to 0.4 dB) may also result from roadway widening, as travel lanes shift closer to adjacent sensitive receptors. As outlined in the General Plan EIR, mitigation measures such as the use of noise-reducing paving materials are recommended to minimize long-term roadway noise exposure for sensitive uses.

Construction Noise Exemptions

Both the City of Indio and the City of La Quinta exempt public works construction from noise control standards.

> City of Indio Municipal Code 95C.09 (I) Exemption- The provisions of this chapter shall not preclude the construction, operation, maintenance and repairs of equipment, apparatus or facilities of park and recreation departments, public work projects or essential public services and facilities, including trash collection and those activities of public utilities subject to the regulatory jurisdiction of the California Public Utilities Commission.
>
> City of La Quinta Municipal Code 9.100.210 E (2) City maintenance, construction, or similar activities.

2.0 Study Method and Procedures

2.1 FHWA Traffic Noise Calculator

Traffic noise from vehicular traffic was projected using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108) standards. The FHWA model arrives at the predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). Roadway volumes and percentages correspond to the City of Indio General Plan EIR traffic counts. The referenced traffic data was applied to the model and is in Appendix B. The following outlines the key adjustments made to the REMEL for the roadway inputs:

- Roadway classification – (e.g., freeway, major arterial, arterial, secondary, collector, etc.),
- Roadway Active Width – (distance between the center of the outermost travel lanes on each side of the roadway)
- Average Daily Traffic Volumes (ADT), Travel Speeds, Percentages of automobiles, medium trucks, and heavy trucks
- Roadway grade and angle of view
- Site Conditions (e.g., soft vs. hard)
- Percentage of total ADT which flows each hour throughout a 24-hour period.

Table 1 provides the traffic noise model assumptions along Avenue 50 for both existing and Future Build conditions.

Table 1: Roadway Parameters and Vehicle Distribution

Roadway	Segment	Existing ADT[1]	Future (2040) ADT[1]	Speed (MPH)	Site Conditions
Avenue 50	Jefferson to Madison	5,387	19,531	50	Hard
Avenue 50	Madison to Monroe	8,003	18,407	50	Hard
Avenue 50	Monroe to Jackson	10,041	21,993	50	Hard
Vehicle Distribution and Mix[1]					
Motor-Vehicle Type		**Daytime % (7AM to 7 PM)**	**Evening % (7 PM to 10 PM)**	**Night % (10 PM to 7 AM)**	**Total % of Traffic Flow**
Automobiles		77.5	12.9	9.6	95.0
Medium Trucks		84.8	4.9	10.3	3.0
Heavy Trucks		86.5	2.7	10.8	2.0

Notes: *The widened roadway varies by segment, with increases of 24 to 44 feet. The near lane/far lane distance in the FHWA 108 model measures from the center of the near lane to the center of the far lane, not the total roadway width. This distance increases by about 12 feet per added lane. Jefferson to Madison and Madison to Monroe gain two lanes (24 feet), while Monroe to Jackson gains one (12 feet) due to existing westbound lanes. Appendix B Traffic Output Worksheets show the adjusted near lane distances under existing and future conditions.*

[1] ADTs and Vehicle Distribution from City of Indio General Plan EIR

2.2 Construction Noise Modeling

Construction activities for the proposed project are exempt from noise standards. However, for disclosure purposes, construction noise associated with the proposed Project was calculated utilizing methodology presented in the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018) and the FHWA Roadway Construction Noise Model (2018), together with several key construction parameters, including distance to each sensitive receiver, equipment usage, percent usage factor, and baseline parameters for the project site.

The Project CalEEMod was utilized to determine the construction equipment. Construction noise levels were calculated for various construction phases based on CalEEMod Air Quality Model assumptions. Three or four of the loudest pieces of equipment were used as a worst-case scenario as all equipment could not be adjacent to a single sensitive receptor at the same time. All equipment was assumed to be situated at the center of the project site. Construction equipment typically moves back and forth across the site, and it is an industry standard to use the acoustical center of the site to model average construction noise levels. Construction worksheets are provided in Appendix C.

3.0 Findings and Recommendations

3.1 Traffic Noise Impact

The potential off-site noise impacts caused by the proposed roadway expansion were calculated at a distance of 50 feet. The Project proposes widening Avenue 50 from one travel lane to two travel lanes in each direction. The noise levels were calculated for the Existing and Future traffic conditions along the study roadway segments with and without the proposed Project. Table 2 compares the traffic noise levels from Existing traffic conditions with the existing lane configuration (Existing without Project) to the noise levels from Existing traffic conditions with the proposed lane configuration (Existing plus Project).

Table 2: Existing/Existing + Project Scenario – Noise Levels Along Roadways (dBA CNEL)

Roadway	Segment	CNEL at 50 ft (dBA)		Change in Noise Level
		Existing (Without Project)	Existing Plus Project	
Avenue 50	Jefferson to Madison	67.2	67.6	0.4
Avenue 50	Madison to Monroe	68.9	69.3	0.4
Avenue 50	Monroe to Jackson	70.1	70.3	0.2

As shown in Table 2, the width increase of Avenue 50 will increase the Existing traffic noise levels by 0.2 to 0.4 db. It takes a change of 3 dB or more to hear an audible difference, which would occur with a doubling of traffic. Therefore, the traffic noise impact is less than significant.

Table 3 compares the traffic noise levels from Future traffic conditions with the existing lane configuration (Future without Project) to the noise levels from Future traffic conditions with the proposed lane configuration (Future plus Project).

Table 3: Future/Future + Project Scenario – Noise Levels Along Roadways (dBA CNEL)

Roadway	Segment	CNEL at 50 ft (dBA)		Change in Noise Level
		Future (Without Project)	Future Plus Project	
Avenue 50	Jefferson to Madison	72.8	73.2	0.4
Avenue 50	Madison to Monroe	72.5	73.0	0.4
Avenue 50	Monroe to Jackson	73.5	73.7	0.2

As shown in Table 3, the width increase of Avenue 50 will increase the Future traffic noise levels by 0.2 to 0.4 db. Therefore, the traffic noise impact is less than significant. Traffic calculations are provided in Appendix B.

3.2 Construction Noise Impact

The degree of construction noise may vary for different areas of the project site and also vary depending on the construction activities. Project construction is anticipated to occur in two phases, including grading and excavation, and paving.

Noise levels at the nearest sensitive receptor (45 feet from the future centerline of Avenue 50 and 10 feet from the edge of construction activities) are shown in Table 2. Many sensitive receptors are further than these distances and have walls that would provide shielding from construction noise. Therefore, construction noise levels would have lower levels than those presented in the table 2. The construction noise calculation output worksheet is located in Appendix C.

<Table 4, next page>

Table 4: Construction Noise Level by Phase (dBA)

Activity	Lmax at Nearest Residences	Leq at Nearest Residences
Grading & Excavation	104.0	87.5
Paving	104.0	87.9

Construction noise is considered a short-term impact and is exempt from the City of Indio and the City of La Quinta noise control standards. Construction is anticipated to occur during the permissible hours according to the Municipal Code. As shown in Table 4, project construction noise will be up to 88 dBA Leq(h) near sensitive receptors. These reflect the worst-case noise levels at La Quinta residences closest to the construction work. Noise levels will be lower at the Indio residents who have a further setback. In addition, residents with block walls will have a reduction in sound level.

3.3 Construction Vibration

Construction activities can produce vibration that may be felt by adjacent land uses. Table 5 gives approximate vibration levels for particular construction activities. This data provides a reasonable estimate for a wide range of soil conditions.

Table 5: Vibration Source Levels for Construction Equipment[1]

Equipment	Peak Particle Velocity (inches/second) at 25 feet	Approximate Vibration Level LV (dVB) at 25 feet
Pile driver (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 upper range	105
	0.170 typical	93
Clam shovel drop (slurry wall)	0.202	94
Hydromill	0.008 in soil	66
(slurry wall)	0.017 in rock	75
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drill	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

[1] Source: Transit Noise and Vibration Impact Assessment, Federal Transit Administration, May 2006.

The construction of the proposed project would not require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. The primary vibration source during construction may be from a vibratory roller. A vibratory roller has a vibration impact of 0.210 inches per second peak particle velocity (PPV) at 25 feet which is perceptible but below any risk to architectural damage. The fundamental equation used to calculate vibration propagation through average soil conditions and distance is as follows:

$$PPV_{equipment} = PPV_{ref} (100/D_{rec})^n$$

Where: PPV_{ref} = reference PPV at 100ft.
D_{rec} = distance from equipment to receiver in ft.
n = 1.1 (the value related to the attenuation rate through ground)

Construction activities are anticipated to occur as close as 30 ft to the nearest buildings. At a distance of 30 feet, a vibratory roller (i.e. heavy compaction machine with a vibrating drum used to densify soil, asphalt, and other materials in paving and road construction) would yield a worst-case 0.172 PPV (in/sec), which is perceptible but below any risk of damage. The impact is less than significant, and no mitigation is required.

4.0 Conclusions

Entech has evaluated the traffic noise and construction noise impacts for the proposed Avenue 50 Improvement Project located in Indio, CA. The study shows that the traffic noise impact will be imperceptible. Construction noise is exempt from noise control standards.

Sincerely,



Michelle A. Jones
Principal Engineer

Appendix A

Glossary of Acoustical Terms

Glossary of Terms

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear. A numerical method of rating human judgment of loudness.

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

Community Noise Equivalent Level (CNEL): The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five (5) decibels to sound levels in the evening from 7:00 to 10:00 PM and after addition of ten (10) decibels to sound levels in the night before 7:00 AM and after 10:00 PM.

Decibel (dB): A unit for measuring the amplitude of a sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micro-pascals.

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

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

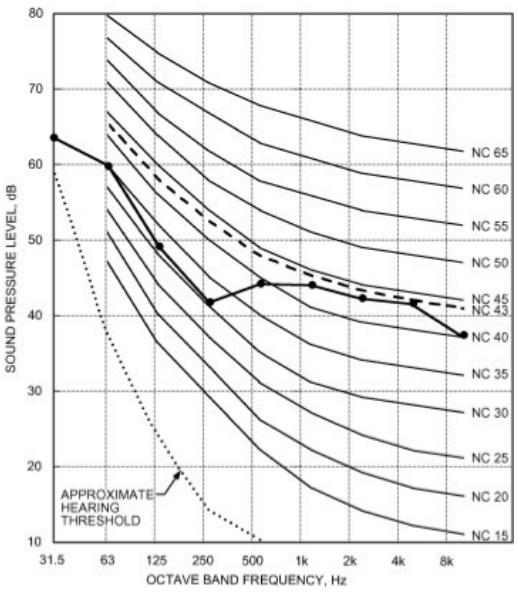
Habitable Room: Any room meeting the requirements of the Uniform Building Code or other applicable regulations which is intended to be used for sleeping, living, cooking or dining purposes, excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors,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

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

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

Noise Criteria (NC) Method: This metric plots octave band sound levels against a family of reference curves, with the number rating equal to the highest tangent line value as demonstrated in Figure 1.

FIGURE 1: Sample NC Curves and Sample Spectrum Levels



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

Percent Noise Levels: See L(n).

Room Criterion (RC) Method: When sound quality in the space is important, the RC metric provides a diagnostic tool to quantify both the speech interference level and spectral imbalance.

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

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

***Sound Transmission Class (STC*)**: To quantify STC, a Transmission Loss (TL) measurement is performed in a laboratory over a range of 16 third-octave bands between 125 – 4,000 Hertz (Hz). The average human voice creates sound within the 125 – 4,000 Hz 1/3rd octave bands.

STC is a single-number rating given to a particular material or assembly. The STC rating measures the ability of a material or an assembly to resist airborne sound transfer over the specified frequencies (see ASTM International Classification E413 and E90). In general, a higher STC rating corresponds with a greater reduction of noise transmitting through a partition.

STC is highly dependent on the construction of the partition. The STC of a partition can be increased by adding mass, increasing, or adding air space, adding absorptive materials within the assembly. The STC rating does not assess low frequency sound transfer (e.g., sounds less than 125 Hz). Special consideration must be given to spaces where the noise transfer concern has lower frequencies than speech, such as mechanical equipment and or/or music. The STC rating is a lab test that does not take into consideration weak points, penetrations, or flanking paths.

Even with a high STC rating, any penetration, airgap, or “flanking path can seriously degrade the isolation quality of a wall. Flanking paths are the means for sound to transfer from one space to another other than through the wall. Sound can flank over, under, or around a wall. Sound can also travel through common ductwork, plumbing or corridors. Noise will travel between spaces at the weakest points. Typically, there is no reason to spend money or effort to improve the walls until all weak points are controlled first.

Appendix B

Traffic Noise Modeling Output

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: AVE 50 IMPROVEMENT
ROADWAY: AVE 50 - EXISTING
LOCATION: JEFFERSON TO MADISON

JOB #: 0899-2024-00
DATE: 2-Apr-24
ENGINEER R. Edelman

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	5,387
SPEED =	50
PK HR % =	10
NEAR LANE/FAR LANE DI	24
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	539

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		50
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		0
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE	90
	DF ANGLE	180

SITE CONDITIONS

AUTOMOBILES =	10
MEDIUM TRUCKS =	10(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9499
MEDIUM TRUCK	0.848	0.049	0.103	0.0301
HEAVY TRUCKS	0.865	0.027	0.108	0.0200

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	48.66	- -
MEDIUM TRUCKS	4.0	48.56	- -
HEAVY TRUCKS	8.0	48.60	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.0	64.1	62.3	56.2	64.9	65.5
MEDIUM TRUCKS	58.7	57.1	50.8	49.2	57.7	57.9
HEAVY TRUCKS	61.1	59.7	50.6	51.9	60.2	60.4
NOISE LEVELS (dBA)	67.8	66.0	62.9	58.2	66.7	67.2

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.0	64.1	62.3	56.2	64.9	65.5
MEDIUM TRUCKS	58.7	57.1	50.8	49.2	57.7	57.9
HEAVY TRUCKS	61.1	59.7	50.6	51.9	60.2	60.4
NOISE LEVELS (dBA)	67.8	66.0	62.9	58.2	66.7	67.2

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	26	83	262	828
LDN	24	75	236	745

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: AVE 50 IMPROVEMENT
ROADWAY: AVE 50 - EXISTING
LOCATION: MADISON TO MONROE

JOB #: 0899-2024-00
DATE: 2-Apr-24
ENGINEER R. Edelman

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	8,003
SPEED =	50
PK HR % =	10
NEAR LANE/FAR LANE DI	24
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	800

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		50
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		0
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE	90
	DF ANGLE	180

SITE CONDITIONS

AUTOMOBILES =	10
MEDIUM TRUCKS =	10(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9500
MEDIUM TRUCK	0.848	0.049	0.103	0.0300
HEAVY TRUCKS	0.865	0.027	0.108	0.0200

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	48.66	- -
MEDIUM TRUCKS	4.0	48.56	- -
HEAVY TRUCKS	8.0	48.60	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	67.7	65.8	64.0	58.0	66.6	67.2
MEDIUM TRUCKS	60.4	58.9	52.5	50.9	59.4	59.6
HEAVY TRUCKS	62.8	61.4	52.4	53.6	62.0	62.1
NOISE LEVELS (dBA)	69.5	67.7	64.6	59.9	68.5	68.9

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	67.7	65.8	64.0	58.0	66.6	67.2
MEDIUM TRUCKS	60.4	58.9	52.5	50.9	59.4	59.6
HEAVY TRUCKS	62.8	61.4	52.4	53.6	62.0	62.1
NOISE LEVELS (dBA)	69.5	67.7	64.6	59.9	68.5	68.9

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	39	123	389	1230
LDN	35	111	350	1107

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: AVE 50 IMPROVEMENT
ROADWAY: AVE 50 - EXISTING
LOCATION: MONROE TO JACKSON

JOB #: 0899-2024-00
DATE: 2-Apr-24
ENGINEER R. Edelman

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	10,041
SPEED =	50
PK HR % =	10
NEAR LANE/FAR LANE DI	36
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	1,004

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		50
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		0
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE	90
	DF ANGLE	180

SITE CONDITIONS

AUTOMOBILES =	10
MEDIUM TRUCKS =	10(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9500
MEDIUM TRUCK	0.848	0.049	0.103	0.0300
HEAVY TRUCKS	0.865	0.027	0.108	0.0200

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	46.78	- -
MEDIUM TRUCKS	4.0	46.67	- -
HEAVY TRUCKS	8.0	46.71	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	68.8	66.9	65.2	59.1	67.7	68.3
MEDIUM TRUCKS	61.5	60.0	53.6	52.1	60.6	60.8
HEAVY TRUCKS	64.0	62.6	53.5	54.8	63.1	63.3
NOISE LEVELS (dBA)	70.6	68.9	65.7	61.1	69.6	70.1

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	68.8	66.9	65.2	59.1	67.7	68.3
MEDIUM TRUCKS	61.5	60.0	53.6	52.1	60.6	60.8
HEAVY TRUCKS	64.0	62.6	53.5	54.8	63.1	63.3
NOISE LEVELS (dBA)	70.6	68.9	65.7	61.1	69.6	70.1

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	51	161	508	1605
LDN	46	145	457	1445

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: AVE 50 IMPROVEMENT — JOB #: 0899-2024-00
ROADWAY: AVE 50 - EXISTING — DATE: 2-Apr-24
LOCATION: JEFFERSON TO MADISON — ENGINEER R. Edelman

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	5,387
SPEED =	50
PK HR % =	10
NEAR LANE/FAR LANE DI	48
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	539

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		50
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		0
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE	90
	DF ANGLE	180

SITE CONDITIONS

AUTOMOBILES =	10
MEDIUM TRUCKS =	10 (10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9499
MEDIUM TRUCK	0.848	0.049	0.103	0.0301
HEAVY TRUCKS	0.865	0.027	0.108	0.0200

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	44.00	- -
MEDIUM TRUCKS	4.0	43.89	- -
HEAVY TRUCKS	8.0	43.93	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.4	64.5	62.7	56.7	65.3	65.9
MEDIUM TRUCKS	59.1	57.6	51.2	49.7	58.1	58.4
HEAVY TRUCKS	61.5	60.1	51.1	52.3	60.7	60.8
NOISE LEVELS (dBA)	68.2	66.5	63.3	58.6	67.2	67.6

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	66.4	64.5	62.7	56.7	65.3	65.9
MEDIUM TRUCKS	59.1	57.6	51.2	49.7	58.1	58.4
HEAVY TRUCKS	61.5	60.1	51.1	52.3	60.7	60.8
NOISE LEVELS (dBA)	68.2	66.5	63.3	58.6	67.2	67.6

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	29	92	290	916
LDN	26	82	261	825

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: AVE 50 IMPROVEMENT
ROADWAY: AVE 50 - EXISTING
LOCATION: MADISON TO MONROE

JOB #: 0899-2024-00
DATE: 2-Apr-24
ENGINEER R. Edelman

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	8,003
SPEED =	50
PK HR % =	10
NEAR LANE/FAR LANE DI	48
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	800

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		50
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		0
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE	90
	DF ANGLE	180

SITE CONDITIONS

AUTOMOBILES =	10
MEDIUM TRUCKS =	10(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9500
MEDIUM TRUCK	0.848	0.049	0.103	0.0300
HEAVY TRUCKS	0.865	0.027	0.108	0.0200

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	44.00	- -
MEDIUM TRUCKS	4.0	43.89	- -
HEAVY TRUCKS	8.0	43.93	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	68.1	66.2	64.5	58.4	67.0	67.6
MEDIUM TRUCKS	60.8	59.3	52.9	51.4	59.8	60.1
HEAVY TRUCKS	63.3	61.8	52.8	54.1	62.4	62.5
NOISE LEVELS (dBA)	69.9	68.2	65.0	60.3	68.9	69.3

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	68.1	66.2	64.5	58.4	67.0	67.6
MEDIUM TRUCKS	60.8	59.3	52.9	51.4	59.8	60.1
HEAVY TRUCKS	63.3	61.8	52.8	54.1	62.4	62.5
NOISE LEVELS (dBA)	69.9	68.2	65.0	60.3	68.9	69.3

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	43	136	430	1360
LDN	39	122	387	1225

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT: AVE 50 IMPROVEMENT
ROADWAY: AVE 50 - EXISTING
LOCATION: MONROE TO JACKSON

JOB #: 0899-2024-00
DATE: 2-Apr-24
ENGINEER R. Edelman

NOISE INPUT DATA

ROADWAY CONDITIONS

ADT =	10,041
SPEED =	50
PK HR % =	10
NEAR LANE/FAR LANE DI	48
ROAD ELEVATION =	0.0
GRADE =	1.0 %
PK HR VOL =	1,004

RECEIVER INPUT DATA

RECEIVER DISTANCE =		50
DIST C/L TO WALL =		50
RECEIVER HEIGHT =		5.0
WALL DISTANCE FROM RECEIVER		0
PAD ELEVATION =		0.5
ROADWAY VIEW:	LF ANGLE=	-90
	RT ANGLE	90
	DF ANGLE	180

SITE CONDITIONS

AUTOMOBILES =	10
MEDIUM TRUCKS =	10(10 = HARD SITE, 15 = SOFT SITE)
HEAVY TRUCKS =	10

WALL INFORMATION

HTH WALL	0.0
AMBIENT=	0.0
BARRIER =	0 (0 = WALL, 1 = BERM)

VEHICLE MIX DATA

VEHICLE TYPE	DAY	EVENING	NIGHT	DAILY
AUTOMOBILES	0.775	0.129	0.096	0.9500
MEDIUM TRUCK	0.848	0.049	0.103	0.0300
HEAVY TRUCKS	0.865	0.027	0.108	0.0200

MISC. VEHICLE INFO

VEHICLE TYPE	HEIGHT	SLE DISTANCE	GRADE ADJUSTMENT
AUTOMOBILES	2.0	44.00	- -
MEDIUM TRUCKS	4.0	43.89	- -
HEAVY TRUCKS	8.0	43.93	0.00

NOISE OUTPUT DATA

NOISE IMPACTS (WITHOUT TOPO OR BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	69.1	67.2	65.4	59.4	68.0	68.6
MEDIUM TRUCKS	61.8	60.3	53.9	52.4	60.8	61.1
HEAVY TRUCKS	64.2	62.8	53.8	55.0	63.4	63.5
NOISE LEVELS (dBA)	70.9	69.2	66.0	61.3	69.9	70.3

NOISE IMPACTS (WITH TOPO AND BARRIER SHIELDING)

VEHICLE TYPE	PK HR LEQ	DAY LEQ	EVEN LEQ	NIGHT LEQ	LDN	CNEL
AUTOMOBILES	69.1	67.2	65.4	59.4	68.0	68.6
MEDIUM TRUCKS	61.8	60.3	53.9	52.4	60.8	61.1
HEAVY TRUCKS	64.2	62.8	53.8	55.0	63.4	63.5
NOISE LEVELS (dBA)	70.9	69.2	66.0	61.3	69.9	70.3

NOISE CONTOUR (FT)				
NOISE LEVELS	70 dBA	65 dBA	60 dBA	55 dBA
CNEL	54	171	540	1707
LDN	49	154	486	1536

Appendix C

Construction Noise Modeling Output

Receptor - Residences to the East

Construction Phase Equipment Item	# of Items	Item Lmax at 50 feet, dBA[1]	Edge of Site to Receptor, feet	Center of Site to Receptor, feet	Item Usage Percent[1]	Ground Factor[2]	Usage Factor	Receptor Item Lmax, dBA	Recptor. Item Leq, dBA
Linear, Grading & Excavation									
Grader	2	85	10	45	40	0	0.40	99.0	81.9
Concrete Saw	1	90	10	45	20	0	0.20	104.0	83.9
								104.0	87.5
Linear, Paving									
Pavement Scarifier	1	90	10	45	20	0	0.20	104.0	83.9
Tractor	3	84	10	45	40	0	0.40	98.0	80.9
								104.0	87.9

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

VIBRATION LEVEL IMPACT

Project:	Ave 50	Date: 4/2/24
Source:	Vibratory Loader	
Scenario:	Unmitigated	
Location:	Adjacent residences	
Address:	La Quinta/Indio	

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

DATA INPUT

Equipment = Type	1	Vibratory Roller	INPUT SECTION IN BLUE
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	30.00	Distance from Equipment to Receiver (ft)	
n =	1.10	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2006, pgs 38-43.

DATA OUT RESULTS

PPV =	**0.172**	IN/SEC	OUTPUT IN RED