

Appendix G

Noise Modeling Data

FIELD NOISE MEASUREMENT DATA

PROJECT CDWR SRR ENERGY SITES PROJECT # 12206.028
 SITE ID ST2
 SITE ADDRESS TURLOCK OBSERVER(S) JVL
 START DATE 11/11/22 END DATE 11/11/22
 START TIME 5:13 END TIME 5:19

METEOROLOGICAL CONDITIONS
 TEMP 59 F HUMIDITY 34 % R.H. WIND CALM LIGHT MODERATE
 WINDSPD 0 MPH DIR. N NE S SE S SW W NW VARIABLE STEADY GUSTY
 SKY SUNNY CLEAR OVRCAST PRTLY CLDY FOG RAIN

ACOUSTIC MEASUREMENTS
 MEAS. INSTRUMENT Piccolo II TYPE 1 2 SERIAL # 0060
 CALIBRATOR KEED R8070 SERIAL # 6321
 CALIBRATION CHECK PRE-MEASUREMENT 94.0 dBA SPL POST-MEASUREMENT 94.0 dBA SPL WINDSCRN X

SETTINGS A-WTD SLOW FAST FRONTAL RANDOM ANSI OTHER: _____

REC. #	BEGIN	END	Leq	Lmax	Lmin	L90	L50	L10	OTHER (SPECIFY METRIC)
<u>67</u>	<u>5:13</u>								
<u>73</u>		<u>5:19</u>							

COMMENTS _____

SOURCE INFO AND TRAFFIC COUNTS MARSHALL ROAD

PRIMARY NOISE SOURCE TRAFFIC AIRCRAFT RAIL INDUSTRIAL OTHER: _____
 ROADWAY TYPE: ARTERIAL/HIGHWAY DIST. TO RDWY C/L OR EOP: 0'

TRAFFIC COUNT DURATION: _____ MIN SPEED 100 MIN SPEED _____

COUNT 1 (OR RDWY 1)	DIRECTION	MIN		SPEED		IF COUNTING BOTH DIRECTIONS AS ONE, CHECK HERE	COUNT 2 (OR RDWY 2)	
		NB/EB	SB/WB	NB/EB	SB/WB		NB/EB	SB/WB
	AUTOS	<u>0</u>				<u>X</u>		
	MED TRKS	<u>0</u>						
	HVY TRKS	<u>0</u>						
	BUSES	<u>0</u>						
	MOTRCLS	<u>0</u>						

SPEEDS ESTIMATED BY: RADAR / DRIVING THE PACE
 POSTED SPEED LIMIT SIGNS SAY: _____

OTHER NOISE SOURCES (BACKGROUND): DIST. AIRCRAFT RUSTLING LEAVES DIST. BARKING DOGS BIRDS DIST. INDUSTRIAL
 DIST. KIDS PLAYING DIST. CONVRSTNS / YELLING DIST. TRAFFIC (LIST RDWYS BELOW) DISTD GARDENERS/LANDSCAPING NOISE
 OTHER: _____

DESCRIPTION / SKETCH
 TERRAIN HARD SOFT MIXED FLAT OTHER: _____
 PHOTOS _____
 OTHER COMMENTS / SKETCH _____

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

noise level limit for construction phase, per Cal/OSHA guidance "action level" = **85**
 allowable hours over which Leq is to be averaged = **1**

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

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Temporary Barrier Insertion Loss (dB)	Additional Noise Reduction	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq	Source	Receiver	Barrier	Source to	Rcvr. to Barr.	Source to	"A" (ft)	"B" (ft)	"C" (ft)	Path Length	Abarr (dB)	Heff (with barrier)	Heff (w/out barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)
													Elevation (ft)	Elevation (ft)	Height (ft)	Barr. ("A") Horiz. (ft)	("B") Horiz. (ft)	Revr. ("C") Horiz. (ft)	Diff. "P" (ft)	Diff. "P" (ft)	Diff. "P" (ft)	Diff. "P" (ft)	Diff. "P" (ft)	Diff. "P" (ft)	Diff. "P" (ft)	Diff. "P" (ft)	Diff. "P" (ft)	Diff. "P" (ft)
Site Preparation	grader	1	40	85	Graders	2440	0.1		44.0	1	60	40	5	5	0	2435	5	2440	2435.0	7.1	2440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	scraper	0	40	84	Scrapers	2490	0.1		42.8	1	60	0	5	5	0	2485	5	2490	2485.0	7.1	2490.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	tractor	0	40	84	Tractors/Loaders/Backhoes	2540	0.1		42.5	1	60	0	5	5	0	2535	5	2540	2535.0	7.1	2540.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Site Preparation Phase:												40.0																
Grading	grader	1	40	85	Graders	2440	0.1		44.0	1	60	40	5	5	0	2435	5	2440	2435.0	7.1	2440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	dozer	0	40	82	Rubber Tired Dozers	2540	0.1		40.5	1	60	0	5	5	0	2535	5	2540	2535.0	7.1	2540.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	tractor	0	40	84	Tractors/Loaders/Backhoes	2490	0.1		42.8	1	60	0	5	5	0	2485	5	2490	2485.0	7.1	2490.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Grading Phase:												40.0																
Trenching	all other equipment > 5 hp	1	50	85	Default Equipment	2490	0.1		43.8	1	60	41	5	5	0	2485	5	2490	2485.0	7.1	2490.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	flat bed truck	0	40	74	Flatbed Truck	2540	0.1		32.5	1	60	0	5	5	0	2535	5	2540	2535.0	7.1	2540.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Trenching Phase:												40.8																
Civil Construction / Generator Installation	crane	0	16	81	Cranes	2590	0.1		39.3	1	60	0	5	5	0	2585	5	2590	2585.0	7.1	2590.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	tractor	0	40	84	Forklifts	2640	0.1		42.1	1	60	0	5	5	0	2635	5	2640	2635.0	7.1	2640.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	generator	0	50	72	Generator Sets	2440	0.1		31.0	1	60	0	5	5	0	2435	5	2440	2435.0	7.1	2440.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	tractor	1	40	84	Tractors/Loaders/Backhoes	2540	0.1		42.5	1	60	39	5	5	0	2535	5	2540	2535.0	7.1	2540.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
	welder / torch	0	40	73	Welders	2490	0.1		31.8	1	60	0	5	5	0	2485	5	2490	2485.0	7.1	2490.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
Total for Civil Construction / Generator Installation Phase:												38.6																

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

noise level limit for construction phase, per Cal/OSHA guidance "action level" = 85
 allowable hours over which Leq is to be averaged = 1

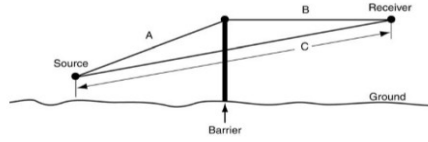
5 = temporary barrier (TB) of input height inserted between source and receptor

Construction Activity	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Temporary Barrier Insertion Loss (dB)	Additional Noise Reduction	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 1-hour Leq	Source Elevation (ft)	Receiver Elevation (ft)	Barrier Height (ft)	Source to Barr. ("A") Horiz. (ft)	Rcvr. to Barr. ("B") Horiz. (ft)	Source to Rcvr. ("C") Horiz. (ft)	"A" (ft)	"B" (ft)	"C" (ft)	Path Length Diff. "P" (ft)	Abarr (dB)	Heff (with barrier)	Heff (w/out barrier)	G (with barrier)	G (without barrier)	ILbarr (dB)													
Site Preparation	grader	1	40	85	Graders	2645	0.1		43.1	1	60	39	5	5	0	2640	5	2645	2640.0	7.1	2645.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
	scraper	1	40	84	Scrapers	2695	0.1		41.9	1	60	38	5	5	0	2690	5	2695	2690.0	7.1	2695.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
	tractor	1	40	84	Tractors/Loaders/Backhoes	2745	0.1		41.7	1	60	38	5	5	0	2740	5	2745	2740.0	7.1	2745.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
Total for Site Preparation Phase:												43.0																													
Grading	grader	1	40	85	Graders	2645	0.1		43.1	1	60	39	5	5	0	2640	5	2645	2640.0	7.1	2645.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
	dozer	1	40	82	Rubber Tired Dozers	2745	0.1		39.7	1	60	36	5	5	0	2740	5	2745	2740.0	7.1	2745.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
	tractor	2	40	84	Tractors/Loaders/Backhoes	2695	0.1		41.9	1	60	41	5	5	0	2690	5	2695	2690.0	7.1	2695.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
Total for Grading Phase:												43.8																													
Trenching	all other equipment > 5 hp	1	50	85	Default Equipment	2695	0.1		42.9	1	60	40	5	5	0	2690	5	2695	2690.0	7.1	2695.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
	flat bed truck	1	40	74	Flatbed Truck	2745	0.1		31.7	1	60	28	5	5	0	2740	5	2745	2740.0	7.1	2745.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
Total for Trenching Phase:												40.1																													
Civil Construction / Generator Installation	crane	1	16	81	Cranes	2795	0.1		38.5	1	60	30	5	5	0	2790	5	2795	2790.0	7.1	2795.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
	tractor	2	40	84	Forklifts	2845	0.1		41.2	1	60	40	5	5	0	2840	5	2845	2840.0	7.1	2845.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
	generator	1	50	72	Generator Sets	2645	0.1		30.1	1	60	27	5	5	0	2640	5	2645	2640.0	7.1	2645.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
	tractor	1	40	84	Tractors/Loaders/Backhoes	2745	0.1		41.7	1	60	38	5	5	0	2740	5	2745	2740.0	7.1	2745.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
	welder / torch	3	40	73	Welders	2695	0.1		30.9	1	60	32	5	5	0	2690	5	2695	2690.0	7.1	2695.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1													
Total for Civil Construction / Generator Installation Phase:												42.9																													

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

Source _{elev}	5.0	A _{horiz}	24.0	A	25.0
Receiver _{elev}	10.0	B _{horiz}	38.0	B	38.1
C	62.2	C _{horiz}	62.0		
P	0.85				
Barrier _{elev}	12				
Abarr	12.3				

Barrier Parameter P
P = A+B-C



The above calculations, referring to inputs from the figure at right, helps a user estimate what barrier attenuation (Abarr) to expect (i.e., up to 15 per formula to right) based upon source height (above grade), barrier height, and receiver height, and the horizontal distances between the source and receiver to the barrier. The FTA-based formula in the worksheets use these path length (P) and Abarr values to determine the barrier's insertion loss.

11/26/21, MCS:
the calculations herein assume the "In General" calculation of Heff per Figure 6-5, which then allows a calculation of "G" with and without barrier.

For all other barriers, and for protrusion of terrain above the line of sight:	$A_{barrier} = \min \left\{ 15 \text{ or } \left[20 \times \log \left(\frac{2.51\sqrt{P}}{\tanh(4.46\sqrt{P})} \right) + 5 \right] \right\}$
Barrier Insertion Loss	$IL_{barrier} = \max \left\{ 0 \text{ or } \left[A_{barrier} - 10(G_{NB} - G_B) \log \left(\frac{D}{50} \right) \right] \right\}$
<p>D = closest distance between the receiver and the source, in feet P = path length difference, in feet (see figure below) G_{NB} = Ground factor G computed <i>without barrier</i> (see Figure 6-5) G_B = Ground factor G computed <i>with barrier</i> (see Figure 6-5)</p> <p>† The term "tanh(variable)" stands for hyperbolic tangent, available on many scientific calculators. If "tanh" is not available, then compute E = exp(variable), and set tanh(variable) = (E - 1/E) / (E + 1/E), where exp(variable) is the "exponential" function, also written as e^x on calculator keypads.</p>	

Sources: Transit Noise & Vibration Impact Assessment (FTA 2006)

Table 3.6.3 Octave Band Center Frequency Unweighted Sound Power Levels

Unweighted Sound Power Level (PWL)								
<i>Equipment Type</i>	31.5 (Hz)	63 (Hz)	125 (Hz)	250 (Hz)	500 (Hz)	1000 (Hz)	2000 (Hz)	4000 (Hz)
Generator Unit	84.1	85.5	85.2	86.7	86.3	86.6	90.0	92.8
Transformer	67.9	73.9	75.9	70.9	70.9	64.9	59.9	54.9

8000 (Hz)	Overall
92.5	98.3
47.9	79.9

from *Electric Power Plant Environmental Noise Guide* (Edison Electric Institute 1984), p. 4-17

5 = number of E-Rock machines in a string or row served by the transformer

0.45 = MVA per E-Rock machine (from specs)

74 = ref dBA PWL

Medium Voltage Transformer 1/1 OBCF PWL (dB)											
	Hz	31	63	125	250	500	1000	2000	4000	8000	Overall
PWL (unweighted)		71.1	77.1	79.1	74.1	74.1	68.1	63.1	58.1	51.1	83.1
A-wtd PWL		32	51	63	65	71	68	64	59	50	74.5

PWL

Table 3.6.3 Octave Band Center Frequency Unweighted Sound Power Levels	
One Minute Averaging	Unweighted Sound Power Level (PWL)
Equipment Type	Average Noise Level ($L_{eq\ minute}$) dBA
Generator Unit	

1.44928 960 1391.3
720 1043.48

0.17559 7680 1348.55
5760 1011.41

2:00:02 PM	68	68
3:00:02 PM	70	70
4:00:02 PM	69	69
5:00:02 PM	68	68
6:00:02 PM	67	67
7:00:02 PM	65	70
8:00:02 PM	65	70
9:00:02 PM	63	68
10:00:02 PM	60	70
11:00:02 PM	57	67
12:00:02 AM	54	64
1:00:02 AM	55	65
2:00:02 AM	53	63
3:00:02 AM	62	72
4:00:02 AM	63	73
5:00:02 AM	64	74
6:00:02 AM	65	75
7:00:02 AM	67	67
8:00:02 AM	68	68
9:00:02 AM	67	67
10:00:02 AM	67	67
11:00:02 AM	65	65
12:00:02 PM	67	67
1:00:02 PM	68	68
2:00:02 PM	67	67
3:00:02 PM	68	68
4:00:02 PM	68	68

69.31456

65
70

