
Appendix F

Noise Modeling (July 2024)

City of San Diego
Utilities Undergrounding Program EIR

Appendix F -- Construction Noise and Vibration Prediction Worksheets

To User: bordered cells are inputs, unbordered cells have formulae
enter "0" to turn off air or grnd absorption terms, "1" to turn on

air abs? 1
grnd abs? 1

magnitude of threshold (dBA) = 75
allowable hours over which Leq is to be averaged = 12

Source, receptor, and barrier all share same reference grade elevation; unless otherwise noted)
= Barrier of input height inserted between source and receptor

Project Phase No.	Project Phase Description	Comparable FHWA RCNM Construction Equipment Type	Quantity	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft from FHWA RCNM	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 12-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)	Absn (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILBarr (dB)
1	Trenching/Boring/Conduit	compressor (air)	2	40	78	90	0		71.0	4	240	65	5	5	0	5	85	90	7.1	85.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		auger drill rig	1	20	84	90	0		77.0	6	360	67	5	5	0	5	85	90	7.1	85.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		concrete saw	1	20	90	90	0		83.0	11	60	65	5	5	0	5	85	90	7.1	85.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		excavator	1	40	80	90	0		74.0	6	360	67	5	5	0	5	85	90	7.1	85.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		skidsteer*	1	40	80	90	0		73.0	6	360	66	5	5	0	5	85	90	7.1	85.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		excavator	1	40	81	90	0		74.0	6	360	67	5	5	0	5	85	90	7.1	85.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		backhoe	1	40	78	90	0		71.0	4	240	62	5	5	0	5	85	90	7.1	85.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		roller	1	20	80	90	0		73.0	3	180	60	5	5	0	5	85	90	7.1	85.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		compactor (ground)	1	20	80	90	0		73.0	3	180	60	5	5	0	5	85	90	7.1	85.1	90.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Trenching/Boring/Conduit Phase			74.7																
2	Cabling & Connection	generator	3	50	72	35	0		75.0	8	480	75	5	5	0	5	30	35	7.1	30.4	35.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Cabling & Connection Phase			75.0																
3	Cut-Over	man lift	3	20	75	35	0		78.0	8	480	74	5	5	0	5	30	35	7.1	30.4	35.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Cut-Overs Phase			74.0																
4	Removal of Overhead Utilities	compressor (air)	2	40	78	65	0		75.6	6	360	72	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		man lift	2	20	75	65	0		72.6	8	480	67	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		crane	2	16	81	65	0		78.6	5	300	70	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Removal of Overhead Utilities Phase			74.6																
5	Post-Undergrounding Improvements	skidsteer*	1	40	80	160	0		66.3	8	480	61	5	5	0	5	155	160	7.1	155.1	160.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		concrete saw	1	20	90	160	0		76.3	2	120	62	5	5	0	5	155	160	7.1	155.1	160.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	2	50	85	160	0		71.3	8	480	70	5	5	0	5	155	160	7.1	155.1	160.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		compressor (air)	1	40	78	160	0		64.3	8	480	59	5	5	0	5	155	160	7.1	155.1	160.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		crane	1	16	81	160	0		67.3	2	120	52	5	5	0	5	155	160	7.1	155.1	160.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		concrete saw	2	20	90	160	0		76.3	8	480	71	5	5	0	5	155	160	7.1	155.1	160.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	1	50	85	160	0		71.3	8	480	67	5	5	0	5	155	160	7.1	155.1	160.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		compressor (air)	2	40	78	160	0		64.3	8	480	62	5	5	0	5	155	160	7.1	155.1	160.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Post-Undergrounding Improvements Phase			74.8																
6	Street Restoration	skidsteer*	1	40	80	120	0		69.5	8	480	64	5	5	0	5	115	120	7.1	115.1	120.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		front end loader	1	40	79	120	0		68.5	8	480	63	5	5	0	5	115	120	7.1	115.1	120.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		paver	1	50	77	120	0		66.5	8	480	62	5	5	0	5	115	120	7.1	115.1	120.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		vacuum street sweeper	1	10	80	120	0		69.5	8	480	58	5	5	0	5	115	120	7.1	115.1	120.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		roller	1	20	80	120	0		69.5	8	480	61	5	5	0	5	115	120	7.1	115.1	120.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	1	50	85	120	0		74.5	8	480	70	5	5	0	5	115	120	7.1	115.1	120.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		backhoe	1	40	78	120	0		67.5	8	480	62	5	5	0	5	115	120	7.1	115.1	120.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		front end loader	1	40	79	120	0		68.5	8	480	63	5	5	0	5	115	120	7.1	115.1	120.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		vacuum street sweeper	1	10	80	120	0		69.5	8	480	58	5	5	0	5	115	120	7.1	115.1	120.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	1	50	85	120	0		74.5	8	480	70	5	5	0	5	115	120	7.1	115.1	120.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Street Restoration Phase			74.8																

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enter "0" to turn off air or grnd absorption terms, "1" to turn on

air abs? 1
grnd abs? 1

magnitude of threshold (dBA) = 85
allowable hours over which Leq is to be averaged = 8

Source, receptor, and barrier all share same reference grade elevation; unless otherwise noted)
= Barrier of input height inserted between source and receptor

Project Phase No.	Project Phase Description	Comparable FHWA RCNM Construction Equipment Type	Quantity	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft from FHWA RCNM	Source to NSR Distance (ft)	Temporary Barrier Insertion Loss (dB)	Additional Noise Reduction	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq	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)	Absorb (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILBarr (dB)
1	Trenching/Boring/Conduit	compressor (air)	2	40	78	45	0		78.8	4	240	75	5	5	0	5	40	45	7.1	40.3	45.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		auger drill rig	1	20	84	45	0		84.8	6	360	77	5	5	0	5	40	45	7.1	40.3	45.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		concrete saw	1	20	90	45	0		90.8	11	60	75	5	5	0	5	40	45	7.1	40.3	45.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		excavator	1	40	80	45	0		81.8	6	360	77	5	5	0	5	40	45	7.1	40.3	45.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		skidsteer*	1	40	80	45	0		80.8	6	360	76	5	5	0	5	40	45	7.1	40.3	45.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		excavator	1	40	81	45	0		81.8	6	360	77	5	5	0	5	40	45	7.1	40.3	45.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		backhoe	1	40	78	45	0		78.8	4	240	72	5	5	0	5	40	45	7.1	40.3	45.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		roller	1	20	80	45	0		80.8	3	180	70	5	5	0	5	40	45	7.1	40.3	45.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		compactor (ground)	1	20	80	45	0		80.8	3	180	70	5	5	0	5	40	45	7.1	40.3	45.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Trenching/Boring/Conduit Phase			84.3																
2	Cabling & Connection	generator	3	50	72	15	0		82.4	8	480	84	5	5	0	5	10	15	7.1	11.2	15.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Cabling & Connection Phase			84.1																
3	Cut-Over	man lift	3	20	75	15	0		85.4	8	480	83	5	5	0	5	10	15	7.1	11.2	15.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Cut-Overs Phase			83.2																
4	Removal of Overhead Utilities	compressor (air)	2	40	78	25	0		83.9	6	360	82	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		man lift	2	20	75	25	0		80.9	8	480	77	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		crane	2	16	81	25	0		86.9	5	300	80	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Removal of Overhead Utilities Phase			84.7																
5	Post-Undergrounding Improvements	skidsteer*	1	40	80	80	0		74.6	8	480	71	5	5	0	5	75	80	7.1	75.2	80.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		concrete saw	1	20	90	80	0		84.6	2	120	72	5	5	0	5	75	80	7.1	75.2	80.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	2	50	85	80	0		79.6	8	480	80	5	5	0	5	75	80	7.1	75.2	80.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		compressor (air)	1	40	78	80	0		72.6	8	480	69	5	5	0	5	75	80	7.1	75.2	80.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		crane	1	16	81	80	0		75.6	2	120	62	5	5	0	5	75	80	7.1	75.2	80.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		concrete saw	2	20	90	80	0		84.6	8	480	81	5	5	0	5	75	80	7.1	75.2	80.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	1	50	85	80	0		79.6	8	480	77	5	5	0	5	75	80	7.1	75.2	80.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		compressor (air)	2	40	78	80	0		72.6	8	480	72	5	5	0	5	75	80	7.1	75.2	80.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Post-Undergrounding Improvements Phase			84.8																
6	Street Restoration	skidsteer*	1	40	80	65	0		77.6	8	480	74	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		front end loader	1	40	79	65	0		76.6	8	480	73	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		paver	1	50	77	65	0		74.6	8	480	72	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		vacuum street sweeper	1	10	80	65	0		77.6	8	480	68	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		roller	1	20	80	65	0		77.6	8	480	71	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	1	50	85	65	0		82.6	8	480	80	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		backhoe	1	40	78	65	0		75.6	8	480	72	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		front end loader	1	40	79	65	0		76.6	8	480	73	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		vacuum street sweeper	1	10	80	65	0		77.6	8	480	68	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	1	50	85	65	0		82.6	8	480	80	5	5	0	5	60	65	7.1	60.2	65.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
									Total Aggregate Noise Exposure from Street Restoration Phase			84.7																

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Appendix F -- Construction Noise and Vibration Prediction Worksheets

To User: bordered cells are inputs, unbordered cells have formulae
enter "0" to turn off air or grnd absorption terms, "1" to turn on

air abs? 1
grnd abs? 1

magnitude of threshold (dBA) = 90
allowable hours over which Leq is to be averaged = 8

Source, receptor, and barrier all share same reference grade elevation; unless otherwise noted)
= Barrier of input height inserted between source and receptor

Project Phase No.	Project Phase Description	Comparable FHWA RCNM Construction Equipment Type	Quantity	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft from FHWA RCNM	Source to NSR Distance (ft)	Temporary Barrier Insertion Loss (dB)	Additional Noise Reduction	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq	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)	Abserr (dB)	Heff (with barrier)	Heff (wout barrier)	G (with barrier)	G (without barrier)	ILBarr (dB)
1	Trenching/Boring/Conduit	compressor (air)	2	40	78	25	0		83.9	4	240	80	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		auger drill rig	1	20	84	25	0		89.9	6	360	82	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		concrete saw	1	40	90	25	0		85.9	11	60	80	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		excavator	1	40	80	25	0		86.9	6	360	82	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		skidsteer*	1	40	80	25	0		85.9	6	360	81	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		excavator	1	40	81	25	0		86.9	6	360	82	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		backhoe	1	40	78	25	0		83.9	4	240	77	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		roller	1	20	80	25	0		85.9	3	180	75	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		compactor (ground)	1	20	80	25	0		85.9	3	180	75	5	5	0	5	20	25	7.1	20.6	25.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
												89.4																
2	Cabling & Connection	generator	3	50	72	10	0		85.9	8	480	88	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
												87.7																
3	Cut-Over	man lift	3	20	75	10	0		88.9	8	480	87	5	5	0	5	5	10	7.1	7.1	10.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
												86.7																
4	Removal of Overhead Utilities	compressor (air)	2	40	78	15	0		88.4	6	360	86	5	5	0	5	10	15	7.1	11.2	15.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		man lift	2	20	75	0	0		85.4	8	480	81	5	5	0	5	10	15	7.1	11.2	15.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		crane	2	16	81	15	0		91.4	5	300	84	5	5	0	5	10	15	7.1	11.2	15.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
												89.2																
5	Post-Undergrounding Improvements	skidsteer*	1	40	80	55	0		79.1	8	480	75	5	5	0	5	50	55	7.1	50.2	55.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		concrete saw	1	20	90	55	0		89.1	2	120	76	5	5	0	5	50	55	7.1	50.2	55.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	2	50	85	55	0		84.1	8	480	84	5	5	0	5	50	55	7.1	50.2	55.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		compressor (air)	1	40	78	55	0		77.1	8	480	73	5	5	0	5	50	55	7.1	50.2	55.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		crane	1	16	81	55	0		80.1	2	120	66	5	5	0	5	50	55	7.1	50.2	55.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		concrete saw	2	20	90	55	0		89.1	8	480	85	5	5	0	5	50	55	7.1	50.2	55.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	1	50	85	55	0		84.1	8	480	81	5	5	0	5	50	55	7.1	50.2	55.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		compressor (air)	2	40	78	55	0		77.1	8	480	76	5	5	0	5	50	55	7.1	50.2	55.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
												89.2																
6	Street Restoration	skidsteer*	1	40	80	40	0		81.8	8	480	78	5	5	0	5	35	40	7.1	35.4	40.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		front end loader	1	40	79	40	0		80.8	8	480	77	5	5	0	5	35	40	7.1	35.4	40.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		paver	1	50	77	40	0		78.8	8	480	76	5	5	0	5	35	40	7.1	35.4	40.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		vacuum street sweeper	1	10	80	40	0		81.8	8	480	72	5	5	0	5	35	40	7.1	35.4	40.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		roller	1	20	80	40	0		81.8	8	480	75	5	5	0	5	35	40	7.1	35.4	40.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	1	50	85	40	0		86.8	8	480	84	5	5	0	5	35	40	7.1	35.4	40.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		backhoe	1	40	78	40	0		79.8	8	480	76	5	5	0	5	35	40	7.1	35.4	40.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		front end loader	1	40	79	40	0		80.8	8	480	77	5	5	0	5	35	40	7.1	35.4	40.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		vacuum street sweeper	1	10	80	40	0		81.8	8	480	72	5	5	0	5	35	40	7.1	35.4	40.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
		all other equipment > 5 HP	1	50	85	40	0		86.8	8	480	84	5	5	0	5	35	40	7.1	35.4	40.0	0.00	0.1	5.0	5.0	0.7	0.7	0.1
												88.9																

To User: boxed cells are user inputs. Leave others alone.

Non-transient groundborne vibration at exterior façade of following FTA Building/Structural Category

I. R-concrete, steel, or timber

exponent
threshold ips PPV

II. E-concrete and masonry

exponent
threshold ips PPV

III. N-E timber and masonry

exponent
threshold ips PPV

IV. Extremely susceptible

exponent
threshold ips PPV

Groundborne Vibration Source (equipment or process)	PPV (at 25 feet)
vibratory roller	0.21
large bulldozer	0.089
caisson drilling	0.089
small bulldozer	0.003
jackhammer	0.035

Rcvr dist.				Rcvr dist.				Rcvr dist.				Rcvr dist.			
VdB	(feet)	PPV rcvr	VdB*	VdB	(feet)	PPV rcvr	VdB*	VdB	(feet)	PPV rcvr	VdB*	VdB	(feet)	PPV rcvr	VdB*
94	15	0.452	101	94	20	0.293	97	94	26	0.198	94	94	37	0.117	89
87	10	0.352	99	94	15	0.191	94	94	15	0.191	94	94	21	0.116	89
87	10	0.352	99	94	15	0.191	94	94	15	0.191	94	94	21	0.116	89
58	5	0.034	78	94	5	0.034	78	94	1.6	0.185	93	94	2.25	0.111	89
79	25	0.035	79	94	25	0.035	79	94	8	0.193	94	94	11	0.120	90

*root mean square of the PPV, and presumes crest factor of 4 per FTA calculation technique

Tables below are from FTA's 2018 *Transit Noise and Vibration Impact Assessment Manual*:

Table 7-4 Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 ft, in/sec	Approximate L _v * at 25 ft
Pile Driver (impact)	upper range	1.518
	typical	0.644
Pile Driver (sonic)	upper range	0.734
	typical	0.17
Clam shovel drop (slurry wall)	0.202	94
Hydromill (slurry wall)	in soil	0.008
	in rock	0.017
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drilling	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

* RMS velocity in decibels, VdB re 1 micro-in/sec

Table 7-5 Construction Vibration Damage Criteria

Building/ Structural Category	PPV, in/sec	Approximate L _v *
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

*RMS velocity in decibels, VdB re 1 micro-in/sec