

Appendix G

Noise Calculations and Output Files

G1. Noise Calculations and Modeling

Project: IBC Multi-Use Trail: Creekwalk
Construction Noise Impact on Sensitive Receptors

Parameters	
Leq to L10 factor	3

				R1					R3					R4				
Construction Phase Equipment Type	No. of Equip.	Reference Noise Level at 50ft, Lmax	Acoustical Usage Factor	Distance (ft)	Lmax	Leq	L10	Estimated Noise Shielding, dBA	Distance (ft)	Lmax	Leq	L12	Estimated Noise Shielding, dBA	Distance (ft)	Lmax	Leq	L11	Estimated Noise Shielding, dBA
Demolition					76	73				77	74				79	75		
Other Equipment	2	85	50%	255	74	71	74	0	215	75	72	75	0	180	77	74	77	0
Excavator	2	85	40%	310	72	68	71	0	280	73	69	72	0	240	74	70	73	0
Site Grading					74	70				75	71				77	73		
Grader	2	85	40%	255	74	70	73	0	215	75	71	74	0	180	77	73	76	0
Concrete and Asphalt Paving					79	75				81	76				82	77		
Paver	2	85	50%	255	74	71	74	0	215	75	72	75	0	180	77	74	77	0
Concrete Mixer Truck	2	85	40%	269	73	69	72	0	231	75	71	74	0	195	76	72	75	0
Pavement Scarifier	2	85	20%	283	73	66	69	0	248	74	67	70	0	210	76	69	72	0
Roller	2	85	20%	296	73	66	69	0	264	74	67	70	0	225	75	68	71	0
Pumps	2	77	50%	310	64	61	64	0	280	65	62	65	0	240	66	63	66	0
Maximum Combined Noise Levels						74.5					75.9					77.4		
Ambient Noise Level						49.0					50.9					53.1		
Threshold (80 dBA)						80					80					80		
Significant Impact?						No					No					No		

Source for Ref. Noise Levels: LA CEQA Guides, 2006 & FHWA RCNM, 2005



Table 1. CA/T equipment noise emissions and acoustical usage factors database.

CA/T Noise Emission Reference Levels and Usage Factors					
Source: https://www.fhwa.dot.gov/Environment/noise/construction_noise/rcnm/rcnm01.cfm#table1					
Updated: 6/28/2017					
Equipment Description	Impact Device ?	Acoustical Use Factor (%)	Spec 721.560 Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50ft (dBA, slow) (samples averaged)	No. of Actual Data Samples (Count)
Other Equipment	No	50%	85	-- N/A --	0
Auger Drill Rig	No	20%	85	84	36
Tractor/Loader/Backhoe	No	40%	80	78	372
Bar Bender	No	20%	80	-- N/A --	0
Blasting	Yes	-- N/A --	94	-- N/A --	0
Boring Jack Power Unit	No	50%	80	83	1
Chain Saw	No	20%	85	84	46
Clam Shovel (dropping)	Yes	20%	93	87	4
Compactor (ground)	No	20%	80	83	57
Compressor (air)	No	40%	80	78	18
Concrete Batch Plant	No	15%	83	-- N/A --	0
Concrete Mixer Truck	No	40%	85	79	40
Concrete Pump Truck	No	20%	82	81	30
Concrete Saw	No	20%	90	90	55
Crane	No	16%	85	81	405
Dozer	No	40%	85	82	55
Drill Rig Truck	No	20%	84	79	22
Drum Mixer	No	50%	80	80	1
Dump Truck	No	40%	84	76	31
Excavator	No	40%	85	81	170
Flat Bed Truck	No	40%	84	74	4
Forklift	No	10%	75		
Front End Loader	No	40%	80	79	96
Generator	No	50%	82	81	19
Generator (<25KVA, VMS signs)	No	50%	70	73	74
Gradall	No	40%	85	83	70
Grader	No	40%	85	-- N/A --	0
Grapple (on backhoe)	No	40%	85	87	1
Horizontal Boring Hydr. Jack	No	25%	80	82	6
Hydra Break Ram	Yes	10%	90	-- N/A --	0
Impact Pile Driver	Yes	20%	95	101	11
Jackhammer	Yes	20%	85	89	133
Man Lift	No	20%	85	75	23
Mounted Impact Hammer (hoe ram)	Yes	20%	90	90	212
Pavement Scarifier	No	20%	85	90	2
Paver	No	50%	85	77	9
Pickup Truck	No	40%	55	75	1
Pneumatic Tools	No	50%	85	85	90
Pumps	No	50%	77	81	17
Refrigerator Unit	No	100%	82	73	3
Rivit Buster/chipping gun	Yes	20%	85	79	19
Rock Drill	No	20%	85	81	3
Roller	No	20%	85	80	16
Sand Blasting (Single Nozzle)	No	20%	85	96	9
Scraper	No	40%	85	84	12
Shears (on backhoe)	No	40%	85	96	5
Slurry Plant	No	100%	78	78	1
Slurry Trenching Machine	No	50%	82	80	75
Soil Mix Drill Rig	No	50%	80	-- N/A --	0
Tractor	No	40%	84	-- N/A --	0
Vacuum Excavator (Vac-truck)	No	40%	85	85	149
Vacuum Street Sweeper	No	10%	80	82	19
Ventilation Fan	No	100%	85	79	13
Vibrating Hopper	No	50%	85	87	1
Vibratory Concrete Mixer	No	20%	80	80	1
Vibratory Pile Driver	No	20%	95	101	44
Warning Horn	No	5%	85	83	12
Welder	No	40%	73	74	5

IBC Multi-Use Trail Creekwalk
Vibration Level Calculations

				Receptor		
				N =		1.5
Construction Equipment	Project Equipment	Equipment Velocity Decibels @ 25 Feet* (VdB)	Equipment Peak Particle Velocity @ 25 Feet* (inches/second)	Distance to Structure (Feet)	Estimated Velocity Decibels @ Distance** (VdB)	Estimated Peak Particle Velocity @ Distance*** (inches/second)
Loaded Trucks	☐ Yes	86	0.076	180	60.3	0.004

Source:
Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, 2018.

Notes:
* Values taken from Table 7-4.
** Based on the formula $VdB(D) = VdB(25ft) - 30 \times \log_{10}(D/25)$, where D is equal to the distance (see page 185).
*** Based on the formula $PPV(D) = PPV(25\text{ ft}) \times (25/D)^N$, where D is equal to the distance (see page 185).
N = soil type classification factor (typically ranges from 1 to 1.5)

G2. Noise Monitoring Data

Summary			
File Name on Meter	LxT_Data.020.s		
File Name on PC	LxT_0007058-20231217 182616-LxT_Data.020.ldbin		
Serial Number	0007058		
Model	SoundTrack LxT®		
Firmware Version	2.404		
User			
Location			
Job Description			
Note			

Measurement			
Description			
Start	2023-12-17 18:26:16		
Stop	2023-12-17 18:41:16		
Duration	00:15:00.0		
Run Time	00:15:00.0		
Pause	00:00:00.0		
Pre-Calibration	2023-12-17 15:45:30		
Post-Calibration	None		
Calibration Deviation	---		

Overall Settings			
RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamplifier	PRMLxT1		
Microphone Correction	Off		
Integration Method	Exponential		
Overload	143.8 dB		
	A	C	Z
Under Range Peak	99.7	96.7	101.7 dB
Under Range Limit	37.0	36.6	43.7 dB
Noise Floor	27.8	27.5	34.5 dB

	First	Second	Third
Instrument Identification			

Results				
LASeq			49.0	
LASE			78.6	
EAS			8.028 μPa²h	
EAS8			256.890 μPa²h	
EAS40			1.284 mPa²h	
LApeak (max)	2023-12-17	18:40:47		81.3 dB
LASmax	2023-12-17	18:32:07		58.6 dB
LASmin	2023-12-17	18:39:23		44.8 dB
SEA			-99.9 dB	

	Exceedance Counts	Duration	
LAS > 85.0 dB	0	0.0 s	
LAS > 115.0 dB	0	0.0 s	
LApeak > 135.0 dB	0	0.0 s	
LApeak > 137.0 dB	0	0.0 s	
LApeak > 140.0 dB	0	0.0 s	
LCseq	60.4 dB		
LASeq	49.0 dB		
LCseq - LASEq	11.4 dB		
LALeq	52.6 dB		
LAeq	49.0 dB		
LALeq - LAeq	3.6 dB		

A		C		Z	
dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
49.0					
58.6	2023/12/17 18:32:07				
44.8	2023/12/17 18:39:23				
81.3	2023/12/17 18:40:47				

Overload Count	0
Overload Duration	0.0 s

Dose Settings			
Dose Name	OSHA-1	OSHA-2	
Exchange Rate	5	5 dB	
Threshold	90	80 dB	
Criterion Level	90	90 dB	
Criterion Duration	8	8 h	

Results			
Dose	-99.94	-99.94 %	
Projected Dose	-99.94	-99.94 %	
TWA (Projected)	-99.9	-99.9 dB	
TWA (t)	-99.9	-99.9 dB	
Lep (t)	34.0	34.0 dB	

Statistics	
LAS 5.00	53.3 dB
LAS 10.00	52.0 dB
LAS 33.30	48.4 dB
LAS 50.00	47.5 dB
LAS 66.60	47.0 dB
LAS 90.00	46.2 dB

Summary			
File Name on Meter	LxT_Data.017.s		
File Name on PC	LxT_0007058-20231217 160000-LxT_Data.017.ldbin		
Serial Number	0007058		
Model	SoundTrack LxT®		
Firmware Version	2.404		
User			
Location			
Job Description			
Note			

Measurement			
Description			
Start	2023-12-17 16:00:00		
Stop	2023-12-17 16:15:00		
Duration	00:15:00.0		
Run Time	00:15:00.0		
Pause	00:00:00.0		
Pre-Calibration	2023-12-17 15:45:32		
Post-Calibration	None		
Calibration Deviation	---		

Overall Settings			
RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamplifier	PRMLxT1		
Microphone Correction	Off		
Integration Method	Exponential		
Overload	143.8 dB		
	A	C	Z
Under Range Peak	99.7	96.7	101.7 dB
Under Range Limit	37.0	36.6	43.7 dB
Noise Floor	27.8	27.5	34.5 dB

	First	Second	Third
Instrument Identification			

Results				
LASeq			54.6	
LASE			84.1	
EAS			28.889	µPa²h
EAS8			924.445	µPa²h
EAS40			4.622	mPa²h
LApeak (max)	2023-12-17	16:02:25		90.6 dB
LASmax	2023-12-17	16:00:00		62.5 dB
LASmin	2023-12-17	16:12:46		51.2 dB
SEA			-99.9	dB

	Exceedance Counts	Duration	
LAS > 85.0 dB	0	0.0 s	
LAS > 115.0 dB	0	0.0 s	
LApeak > 135.0 dB	0	0.0 s	
LApeak > 137.0 dB	0	0.0 s	
LApeak > 140.0 dB	0	0.0 s	
LCSeq	64.8 dB		
LASeq	54.6 dB		
LCSeq - LASEq	10.2 dB		
LALeq	55.7 dB		
LAeq	54.6 dB		
LALeq - LAeq	1.1 dB		

A		C		Z	
dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
54.6					
62.5	2023/12/17 16:00:00				
51.2	2023/12/17 16:12:46				
90.6	2023/12/17 16:02:25				

Overload Count	0
Overload Duration	0.0 s

Dose Settings			
Dose Name	OSHA-1	OSHA-2	
Exchange Rate	5	5 dB	
Threshold	90	80 dB	
Criterion Level	90	90 dB	
Criterion Duration	8	8 h	

Results			
Dose	-99.94	-99.94 %	
Projected Dose	-99.94	-99.94 %	
TWA (Projected)	-99.9	-99.9 dB	
TWA (t)	-99.9	-99.9 dB	
Lep (t)	39.6	39.6 dB	

Statistics	
LAS 5.00	56.8 dB
LAS 10.00	56.2 dB
LAS 33.30	54.8 dB
LAS 50.00	54.2 dB
LAS 66.60	53.7 dB
LAS 90.00	52.6 dB

Summary	
File Name on Meter	LxT_Data.288.s
File Name on PC	LxT_0004983-20240331 065010-LxT_Data.288.ldbir
Serial Number	0004983
Model	SoundTrack LxT®
Firmware Version	2.404
User	
Location	
Job Description	
Note	

Measurement	
Description	
Start	2024-03-31 06:50:10
Stop	2024-03-31 07:05:10
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2024-03-30 01:09:29
Post-Calibration	None
Calibration Deviation	---

Overall Settings			
RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamplifier	PRMLxT1		
Microphone Correction	Off		
Integration Method	Exponential		
Overload	145.2 dB		
	A	C	Z
Under Range Peak	101.2	98.2	103.2 dB
Under Range Limit	38.4	38.0	45.1 dB
Noise Floor	29.2	28.9	36.0 dB
	First	Second	Third
Instrument Identification			

Results	
LASeq	50.9 dB
LASE	80.4 dB
EAS	12.303 µPa²h
EAS8	393.686 µPa²h
EAS40	1.968 mPa²h
LApk (max)	2024-03-31 07:01:54 85.8 dB
LASmax	2024-03-31 06:52:23 68.4 dB
LASmin	2024-03-31 06:58:40 47.1 dB
SEA	-99.9 dB

Exceedance Counts		Duration			
LAS > 85.0 dB	0	0.0 s			
LAS > 115.0 dB	0	0.0 s			
LApk > 135.0 dB	0	0.0 s			
LApk > 137.0 dB	0	0.0 s			
LApk > 140.0 dB	0	0.0 s			
LCseq	65.7 dB				
LAseq	50.9 dB				
LCseq - LAseq	14.8 dB				
LALeq	52.9 dB				
LAeq	50.9 dB				
LALeq - LAeq	2.0 dB				
A		C		Z	
dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	50.9				
Ls(max)	68.4 2024/03/31 6:52:23				
Ls(min)	47.1 2024/03/31 6:58:40				
Lpk(max)	85.8 2024/03/31 7:01:54				

Overload Count	0
Overload Duration	0.0 s

Dose Settings		
Dose Name	OSHA-1	OSHA-2
Exchange Rate	5	5 dB
Threshold	90	80 dB
Criterion Level	90	90 dB
Criterion Duration	8	8 h

Results		
Dose	-99.94	-99.94 %
Projected Dose	-99.94	-99.94 %
TWA (Projected)	-99.9	-99.9 dB
TWA (t)	-99.9	-99.9 dB
Lep (t)	35.8	35.8 dB

Ln Percentiles	
LAS 5.00	53.6 dB
LAS 10.00	51.5 dB
LAS 33.30	49.3 dB
LAS 50.00	48.8 dB
LAS 66.60	48.4 dB
LAS 90.00	47.9 dB

Summary	
File Name on Meter	LxT_Data.289.s
File Name on PC	LxT_0004983-20240331 072115-LxT_Data.289.ldbin
Serial Number	0004983
Model	SoundTrack LxT®
Firmware Version	2.404
User	
Location	
Job Description	
Note	

Measurement	
Description	
Start	2024-03-31 07:21:15
Stop	2024-03-31 07:36:15
Duration	00:15:00.0
Run Time	00:15:00.0
Pause	00:00:00.0
Pre-Calibration	2024-03-30 01:09:29
Post-Calibration	None
Calibration Deviation	---

Overall Settings			
RMS Weight	A Weighting		
Peak Weight	A Weighting		
Detector	Slow		
Preamplifier	PRMLxT1		
Microphone Correction	Off		
Integration Method	Exponential		
Overload	145.2 dB		
	A	C	Z
Under Range Peak	101.2	98.2	103.2 dB
Under Range Limit	38.4	38.0	45.1 dB
Noise Floor	29.2	28.9	36.0 dB
	First	Second	Third
Instrument Identification			

Results	
LASeq	53.1 dB
LASE	82.6 dB
EAS	20.417 $\mu\text{Pa}^2\text{h}$
EAS8	653.356 $\mu\text{Pa}^2\text{h}$
EAS40	3.267 mPa^2h
LApk (max)	2024-03-31 07:27:29 81.9 dB
LASmax	2024-03-31 07:32:22 61.0 dB
LASmin	2024-03-31 07:31:49 50.7 dB
SEA	-99.9 dB

	Exceedance Counts	Duration																																							
LAS > 85.0 dB	0	0.0 s																																							
LAS > 115.0 dB	0	0.0 s																																							
LApk > 135.0 dB	0	0.0 s																																							
LApk > 137.0 dB	0	0.0 s																																							
LApk > 140.0 dB	0	0.0 s																																							
LCSeq	66.4 dB																																								
LASeq	53.1 dB																																								
LCSeq - LASeq	13.3 dB																																								
LALeq	54.8 dB																																								
LAeq	53.1 dB																																								
LALeq - LAeq	1.7 dB																																								
	<table><tr><th colspan="2">A</th><th colspan="2">C</th><th colspan="2">Z</th></tr><tr><th>dB</th><th>Time Stamp</th><th>dB</th><th>Time Stamp</th><th>dB</th><th>Time Stamp</th></tr><tr><td>Leq</td><td>53.1</td><td></td><td></td><td></td><td></td></tr><tr><td>Ls(max)</td><td>61.0 2024/03/31 7:32:22</td><td></td><td></td><td></td><td></td></tr><tr><td>Ls(min)</td><td>50.7 2024/03/31 7:31:49</td><td></td><td></td><td></td><td></td></tr><tr><td>Lpk(max)</td><td>81.9 2024/03/31 7:27:29</td><td></td><td></td><td></td><td></td></tr></table>					A		C		Z		dB	Time Stamp	dB	Time Stamp	dB	Time Stamp	Leq	53.1					Ls(max)	61.0 2024/03/31 7:32:22					Ls(min)	50.7 2024/03/31 7:31:49					Lpk(max)	81.9 2024/03/31 7:27:29				
A		C		Z																																					
dB	Time Stamp	dB	Time Stamp	dB	Time Stamp																																				
Leq	53.1																																								
Ls(max)	61.0 2024/03/31 7:32:22																																								
Ls(min)	50.7 2024/03/31 7:31:49																																								
Lpk(max)	81.9 2024/03/31 7:27:29																																								
Overload Count	0																																								
Overload Duration	0.0 s																																								

Dose Settings		
Dose Name	OSHA-1	OSHA-2
Exchange Rate	5	5 dB
Threshold	90	80 dB
Criterion Level	90	90 dB
Criterion Duration	8	8 h

Results		
Dose	-99.94	-99.94 %
Projected Dose	-99.94	-99.94 %
TWA (Projected)	-99.9	-99.9 dB
TWA (t)	-99.9	-99.9 dB
Lep (t)	38.0	38.0 dB

Ln Percentiles	
LAS 5.00	54.8 dB
LAS 10.00	54.0 dB
LAS 33.30	53.1 dB
LAS 50.00	52.8 dB
LAS 66.60	52.5 dB
LAS 90.00	51.9 dB