

# 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
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Construction Phase Equipment Type	No. of Equip.	Reference Noise Level at 50ft, Lmax	Acoustical Usage Factor	R1					R3					R4					
				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	
<b>Demolition</b>																			
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	
<b>Site Grading</b>																			
Grader	2	85	40%	255	74	70	73	0	215	75	71	74	0	180	77	73	76	0	
<b>Concrete and Asphalt Paving</b>																			
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	
<b>Maximum Combined Noise Levels</b>																			
<b>Ambient Noise Level</b>																			
<b>Threshold (80 dBA)</b>																			
<b>Significant Impact?</b>																			

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: <a href="https://www.fhwa.dot.gov/Environment/noise/construction_noise/rcnm/rcnm01.cfm#table1">https://www.fhwa.dot.gov/Environment/noise/construction_noise/rcnm/rcnm01.cfm#table1</a>					
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 Scarafier	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**

Construction Equipment	Project Equipment	Equipment Velocity Decibels @ 25 Feet* (VdB)	Equipment Peak Particle Velocity @ 25 Feet* (inches/second)	Receptor		
				Distance to Structure (Feet)	Estimated Velocity Decibels @ Distance** (VdB)	Estimated Peak Particle Velocity @ Distance*** (inches/second)
Loaded Trucks	<input type="checkbox"/> 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  $VdB(D) = VdB(25ft) - 30 \times \text{LOG}_{10}(D/25)$ , where D is equal to the distance (see page 185).  
 \*\*\* Based on the formula  $PPV(D) = PPV(25 ft) \times (25/D)^N$ , 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			
LAlaq	52.6 dB			
LAeq	49.0 dB			
LAlaq - LAeq	3.6 dB			

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	49.0					
LS(max)	58.6	2023/12/17 18:32:07				
LS(min)	44.8	2023/12/17 18:39:23				
LPeak(max)	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<sup>®</sup>  
 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

Instrument Identification

	First	Second	Third

**Results**

LASeq 54.6  
 LASE 84.1  
 EAS 28.889  $\mu\text{Pa}^2\text{h}$   
 EAS8 924.445  $\mu\text{Pa}^2\text{h}$   
 EAS40 4.622  $\text{mPa}^2\text{h}$   
 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
Leq	54.6					
LS(max)	62.5	2023/12/17 16:00:00				
LS(min)	51.2	2023/12/17 16:12:46				
LPeak(max)	90.6	2023/12/17 16:02:25				

Overload Count 0  
 Overload Duration 0.0 s

**Dose Settings**

	OSHA-1	OSHA-2
Dose Name	5	5 dB
Exchange Rate	90	80 dB
Threshold	90	90 dB
Criterion Level	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  
**Under Range Peak** **A** **C** **Z**  
**Under Range Limit** **101.2** **98.2** **103.2** dB  
**Noise Floor** **38.4** **38.0** **45.1** 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  
  
**Under Range Peak** **A** **C** **Z**  
**Under Range Limit** **101.2** **98.2** **103.2** dB  
**Noise Floor** **38.4** **38.0** **45.1** dB  
**29.2** **28.9** **36.0** dB  
  
**Instrument Identification** **First** **Second** **Third**

**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  $\text{mPa}^2\text{h}$   
**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

	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