

# **APPENDIX F**

## **Noise Data**

## Appendix F-A: Acoustical Terminology

<b>Acoustics</b>	The science of sound.
<b>Ambient Noise</b>	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
<b>ASTC</b>	Apparent Sound Transmission Class. Similar to STC but includes sound from flanking paths and correct for room reverberation. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
<b>Attenuation</b>	The reduction of an acoustic signal.
<b>A-Weighting</b>	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
<b>Decibel or dB</b>	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
<b>CNEL</b>	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by +5 dBA and nighttime hours weighted by +10 dBA.
<b>DNL</b>	See definition of Ldn.
<b>IIC</b>	Impact Insulation Class. An integer-number rating of how well a building floor attenuates impact sounds, such as footsteps. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
<b>Frequency</b>	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
<b>Ldn</b>	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
<b>Leq</b>	Equivalent or energy-averaged sound level.
<b>Lmax</b>	The highest root-mean-square (RMS) sound level measured over a given period of time.
<b>L(n)</b>	The sound level exceeded a described percentile over a measurement period. For instance, an hourly L50 is the sound level exceeded 50% of the time during the one-hour period.
<b>Loudness</b>	A subjective term for the sensation of the magnitude of sound.
<b>NIC</b>	Noise Isolation Class. A rating of the noise reduction between two spaces. Similar to STC but includes sound from flanking paths and no correction for room reverberation.
<b>NNIC</b>	Normalized Noise Isolation Class. Similar to NIC but includes a correction for room reverberation.
<b>Noise</b>	Unwanted sound.
<b>NRC</b>	Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.
<b>RT60</b>	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
<b>Sabin</b>	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 Sabin.
<b>SEL</b>	Sound Exposure Level. SEL is a rating, in decibels, of a discrete event, such as an aircraft flyover or train pass by, that compresses the total sound energy into a one-second event.
<b>SPC</b>	Speech Privacy Class. SPC is a method of rating speech privacy in buildings. It is designed to measure the degree of speech privacy provided by a closed room, indicating the degree to which conversations occurring within are kept private from listeners outside the room.
<b>STC</b>	Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations. The STC rating is typically used to rate the sound transmission of a specific building element when tested in laboratory conditions where flanking paths around the assembly don't exist. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
<b>Threshold of Hearing</b>	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
<b>Threshold of Pain</b>	Approximately 120 dB above the threshold of hearing.
<b>Impulsive</b>	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
<b>Simple Tone</b>	Any sound which can be judged as audible as a single pitch or set of single pitches.

## Appendix F-B: Continuous and Short-Term Ambient Noise Measurement Results



**Appendix F-B1a: Continuous Noise Monitoring Results**

Site: LT-1

Project: The Campus Development

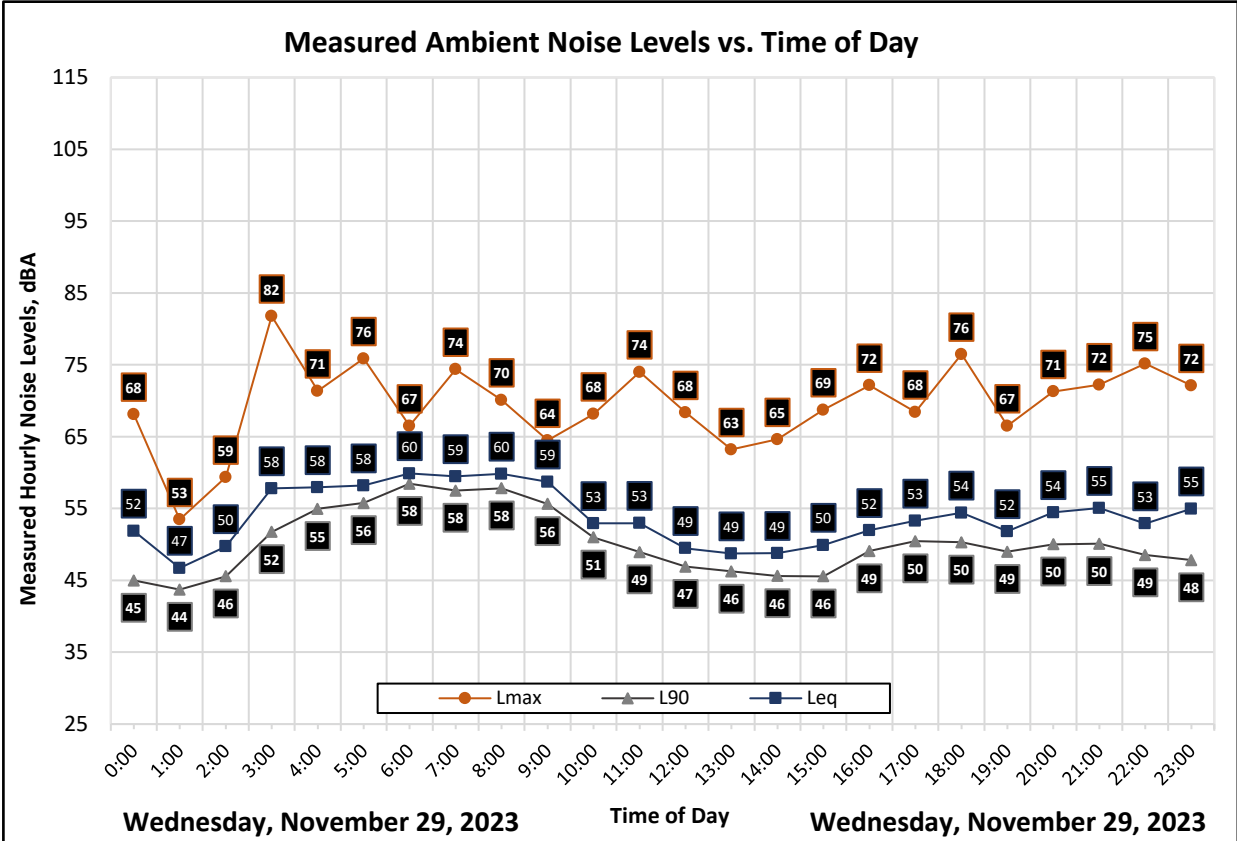
Meter: LDL 820-3

Location: Southwestern Project Boundary

Calibrator: CAL200

Coordinates: 38.4707313, -121.8130828

Date	Time	Measured Level, dBA			
		L <sub>eq</sub>	L <sub>max</sub>	L <sub>50</sub>	L <sub>90</sub>
Wednesday, November 29, 2023	0:00	52	68	51	45
Wednesday, November 29, 2023	1:00	47	53	46	44
Wednesday, November 29, 2023	2:00	50	59	48	46
Wednesday, November 29, 2023	3:00	58	82	55	52
Wednesday, November 29, 2023	4:00	58	71	58	55
Wednesday, November 29, 2023	5:00	58	76	58	56
Wednesday, November 29, 2023	6:00	60	67	60	58
Wednesday, November 29, 2023	7:00	59	74	59	58
Wednesday, November 29, 2023	8:00	60	70	59	58
Wednesday, November 29, 2023	9:00	59	64	59	56
Wednesday, November 29, 2023	10:00	53	68	52	51
Wednesday, November 29, 2023	11:00	53	74	51	49
Wednesday, November 29, 2023	12:00	49	68	49	47
Wednesday, November 29, 2023	13:00	49	63	48	46
Wednesday, November 29, 2023	14:00	49	65	48	46
Wednesday, November 29, 2023	15:00	50	69	47	46
Wednesday, November 29, 2023	16:00	52	72	51	49
Wednesday, November 29, 2023	17:00	53	68	52	50
Wednesday, November 29, 2023	18:00	54	76	52	50
Wednesday, November 29, 2023	19:00	52	67	51	49
Wednesday, November 29, 2023	20:00	54	71	52	50
Wednesday, November 29, 2023	21:00	55	72	53	50
Wednesday, November 29, 2023	22:00	53	75	51	49
Wednesday, November 29, 2023	23:00	55	72	52	48



Statistics	Leq	Lmax	L50	L90
Day Average	55	70	52	50
Night Average	56	69	53	50
Day Low	49	63	47	46
Day High	60	76	59	58
Night Low	47	53	46	44
Night High	60	82	60	58
Ldn	62	Day %		58
CNEL	62	Night %		42



**Appendix F-B1b: Continuous Noise Monitoring Results**

Site: LT-1

Project: The Campus Development

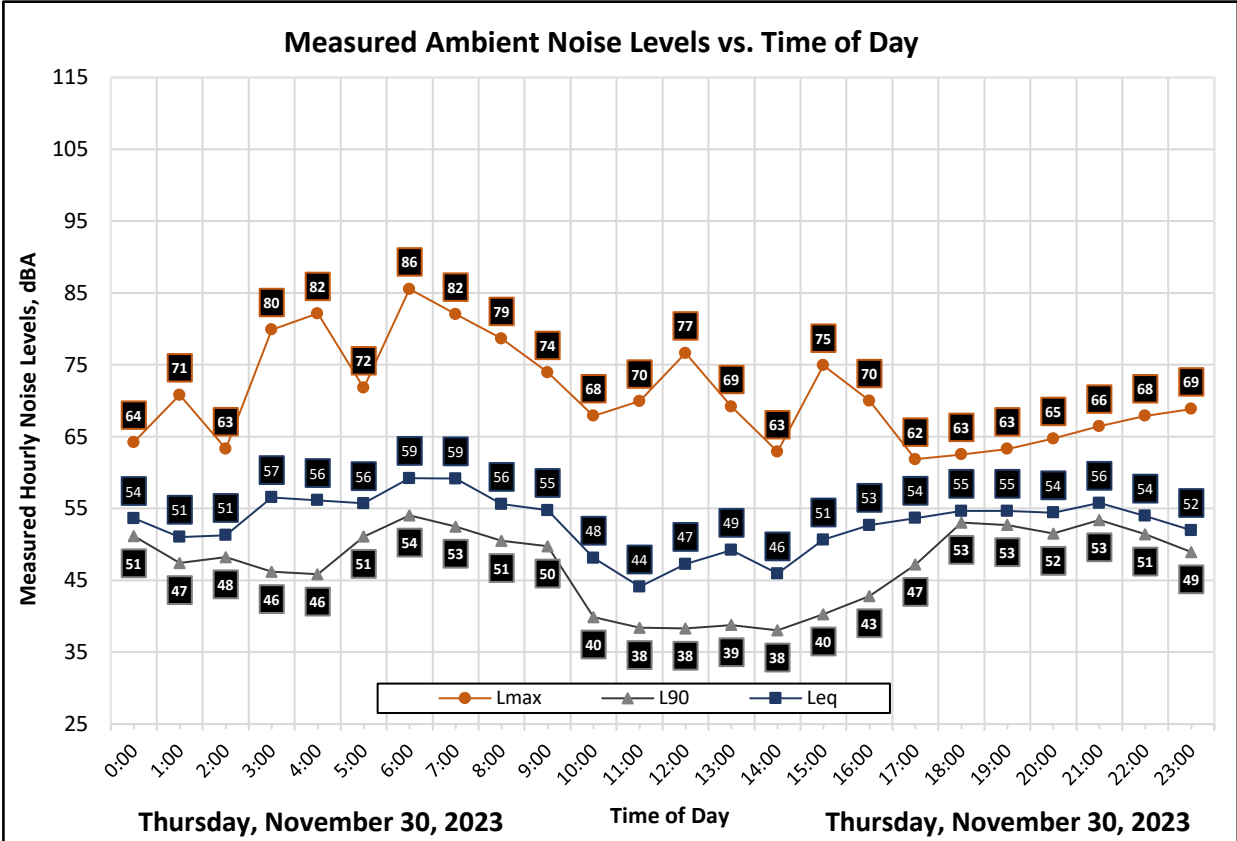
Meter: LDL 820-3

Location: Southwestern Project Boundary

Calibrator: CAL200

Coordinates: 38.4707313, -121.8130828

Date	Time	Measured Level, dBA			
		L <sub>eq</sub>	L <sub>max</sub>	L <sub>50</sub>	L <sub>90</sub>
Thursday, November 30, 2023	0:00	54	64	53	51
Thursday, November 30, 2023	1:00	51	71	50	47
Thursday, November 30, 2023	2:00	51	63	51	48
Thursday, November 30, 2023	3:00	57	80	49	46
Thursday, November 30, 2023	4:00	56	82	48	46
Thursday, November 30, 2023	5:00	56	72	55	51
Thursday, November 30, 2023	6:00	59	86	56	54
Thursday, November 30, 2023	7:00	59	82	54	53
Thursday, November 30, 2023	8:00	56	79	52	51
Thursday, November 30, 2023	9:00	55	74	52	50
Thursday, November 30, 2023	10:00	48	68	44	40
Thursday, November 30, 2023	11:00	44	70	40	38
Thursday, November 30, 2023	12:00	47	77	40	38
Thursday, November 30, 2023	13:00	49	69	41	39
Thursday, November 30, 2023	14:00	46	63	40	38
Thursday, November 30, 2023	15:00	51	75	43	40
Thursday, November 30, 2023	16:00	53	70	48	43
Thursday, November 30, 2023	17:00	54	62	53	47
Thursday, November 30, 2023	18:00	55	63	55	53
Thursday, November 30, 2023	19:00	55	63	54	53
Thursday, November 30, 2023	20:00	56	65	54	52
Thursday, November 30, 2023	21:00	56	66	55	53
Thursday, November 30, 2023	22:00	54	68	53	51
Thursday, November 30, 2023	23:00	52	69	51	49



Statistics	Leq	Lmax	L50	L90
Day Average	54	70	48	46
Night Average	55	73	52	49
Day Low	44	62	40	38
Day High	59	82	55	53
Night Low	51	63	48	46
Night High	59	86	56	54
Ldn	61	Day %		56
CNEL	61	Night %		44



**Appendix F-B2a: Continuous Noise Monitoring Results**

Site: LT-2

Project: The Campus Development

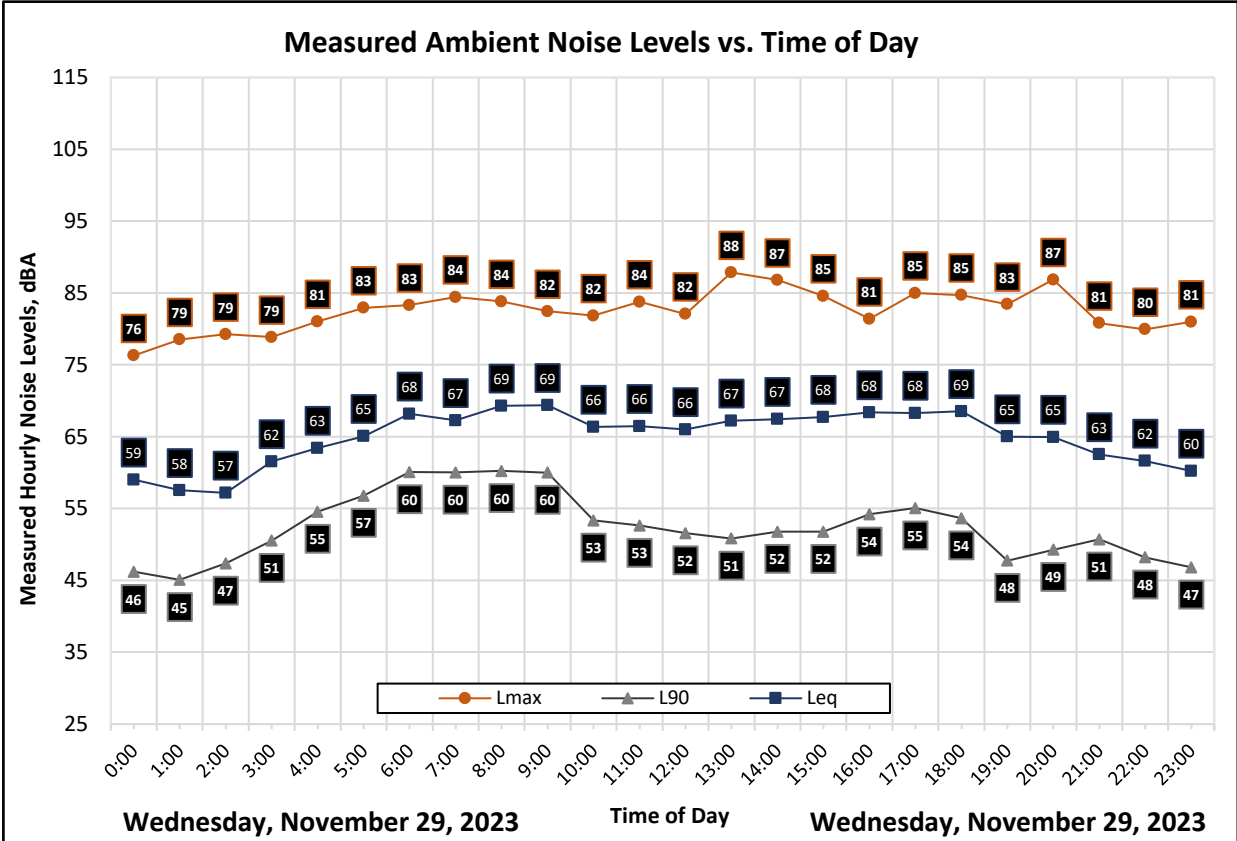
Meter: LDL 820-7

Location: Eastern Project Boundary

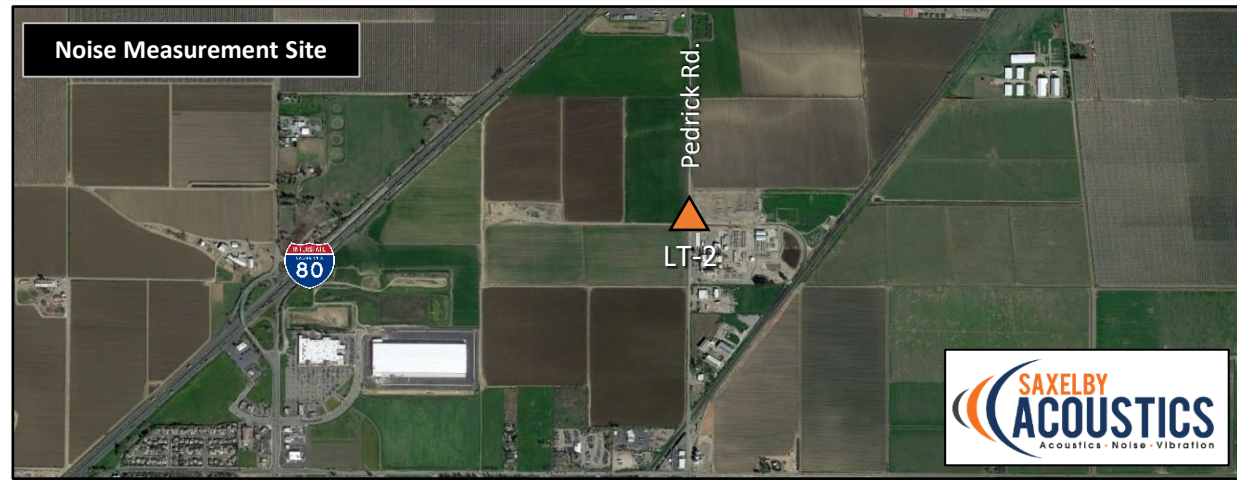
Calibrator: CAL200

Coordinates: 38.4767935, -121.8041006

Date	Time	Measured Level, dBA			
		L <sub>eq</sub>	L <sub>max</sub>	L <sub>50</sub>	L <sub>90</sub>
Wednesday, November 29, 2023	0:00	59	76	50	46
Wednesday, November 29, 2023	1:00	58	79	48	45
Wednesday, November 29, 2023	2:00	57	79	50	47
Wednesday, November 29, 2023	3:00	62	79	55	51
Wednesday, November 29, 2023	4:00	63	81	57	55
Wednesday, November 29, 2023	5:00	65	83	60	57
Wednesday, November 29, 2023	6:00	68	83	63	60
Wednesday, November 29, 2023	7:00	67	84	62	60
Wednesday, November 29, 2023	8:00	69	84	64	60
Wednesday, November 29, 2023	9:00	69	82	64	60
Wednesday, November 29, 2023	10:00	66	82	57	53
Wednesday, November 29, 2023	11:00	66	84	58	53
Wednesday, November 29, 2023	12:00	66	82	57	52
Wednesday, November 29, 2023	13:00	67	88	57	51
Wednesday, November 29, 2023	14:00	67	87	59	52
Wednesday, November 29, 2023	15:00	68	85	60	52
Wednesday, November 29, 2023	16:00	68	81	63	54
Wednesday, November 29, 2023	17:00	68	85	64	55
Wednesday, November 29, 2023	18:00	69	85	64	54
Wednesday, November 29, 2023	19:00	65	83	56	48
Wednesday, November 29, 2023	20:00	65	87	55	49
Wednesday, November 29, 2023	21:00	63	81	55	51
Wednesday, November 29, 2023	22:00	62	80	51	48
Wednesday, November 29, 2023	23:00	60	81	54	47



Statistics	L <sub>eq</sub>	L <sub>max</sub>	L <sub>50</sub>	L <sub>90</sub>
Day Average	67	84	60	54
Night Average	63	80	54	51
Day Low	63	81	55	48
Day High	69	88	64	60
Night Low	57	76	48	45
Night High	68	83	63	60
Ldn	70	Day %		83
CNEL	70	Night %		17



**Appendix F-B2b: Continuous Noise Monitoring Results**

Site: LT-2

Project: The Campus Development

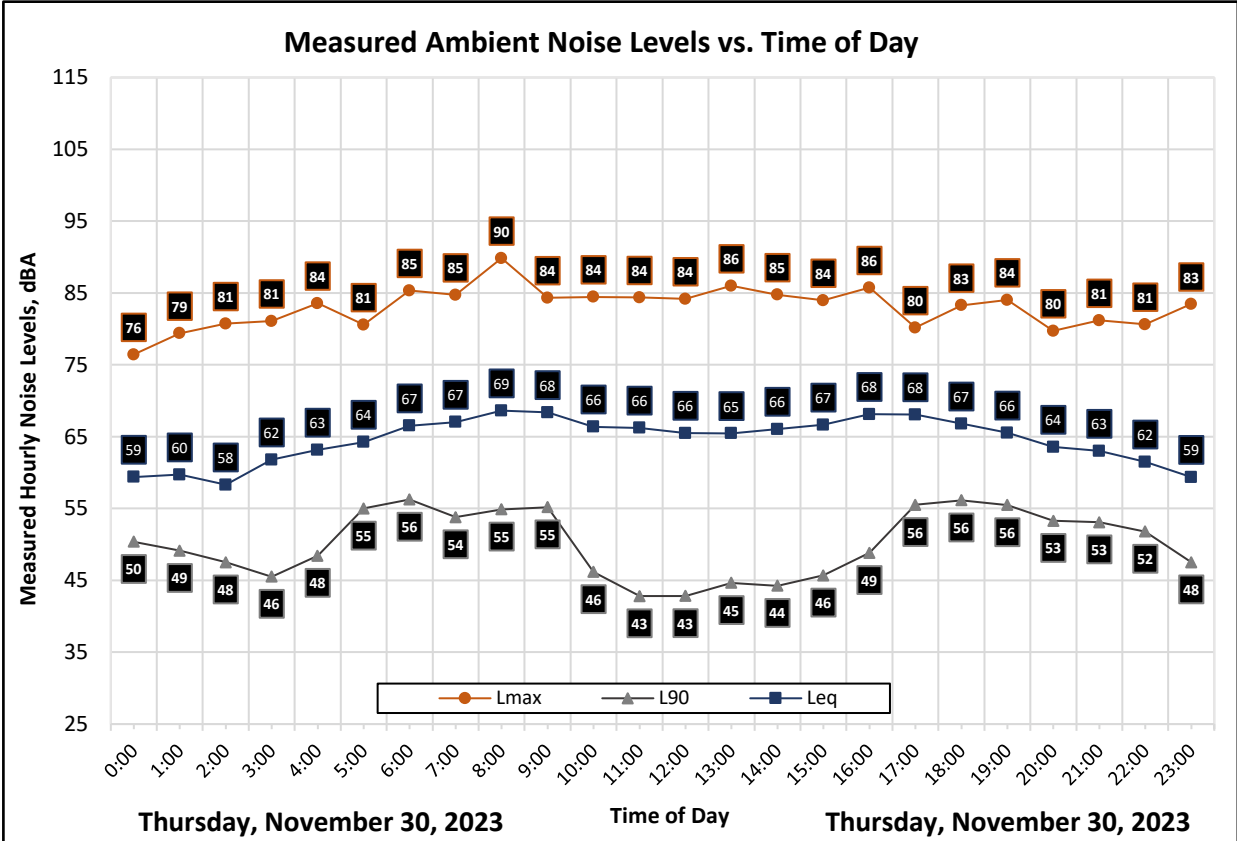
Meter: LDL 820-7

Location: Eastern Project Boundary

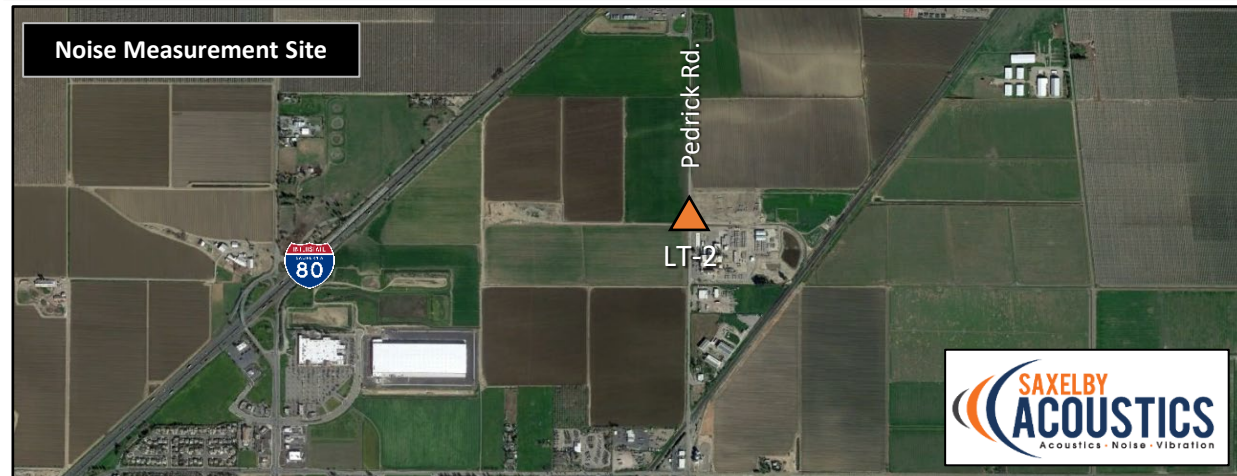
Calibrator: CAL200

Coordinates: 38.4767935, -121.8041006

Date	Time	Measured Level, dBA			
		L <sub>eq</sub>	L <sub>max</sub>	L <sub>50</sub>	L <sub>90</sub>
Thursday, November 30, 2023	0:00	59	76	54	50
Thursday, November 30, 2023	1:00	60	79	52	49
Thursday, November 30, 2023	2:00	58	81	51	48
Thursday, November 30, 2023	3:00	62	81	50	46
Thursday, November 30, 2023	4:00	63	84	52	48
Thursday, November 30, 2023	5:00	64	81	60	55
Thursday, November 30, 2023	6:00	67	85	60	56
Thursday, November 30, 2023	7:00	67	85	61	54
Thursday, November 30, 2023	8:00	69	90	63	55
Thursday, November 30, 2023	9:00	68	84	62	55
Thursday, November 30, 2023	10:00	66	84	56	46
Thursday, November 30, 2023	11:00	66	84	55	43
Thursday, November 30, 2023	12:00	66	84	53	43
Thursday, November 30, 2023	13:00	65	86	53	45
Thursday, November 30, 2023	14:00	66	85	56	44
Thursday, November 30, 2023	15:00	67	84	59	46
Thursday, November 30, 2023	16:00	68	86	63	49
Thursday, November 30, 2023	17:00	68	80	64	56
Thursday, November 30, 2023	18:00	67	83	61	56
Thursday, November 30, 2023	19:00	66	84	60	56
Thursday, November 30, 2023	20:00	64	80	57	53
Thursday, November 30, 2023	21:00	63	81	55	53
Thursday, November 30, 2023	22:00	62	81	54	52
Thursday, November 30, 2023	23:00	59	83	51	48



Statistics	Leq	Lmax	L50	L90
Day Average	67	84	58	50
Night Average	62	81	54	50
Day Low	63	80	53	43
Day High	69	90	64	56
Night Low	58	76	50	46
Night High	67	85	60	56
Ldn	69	Day %		83
CNEL	70	Night %		17



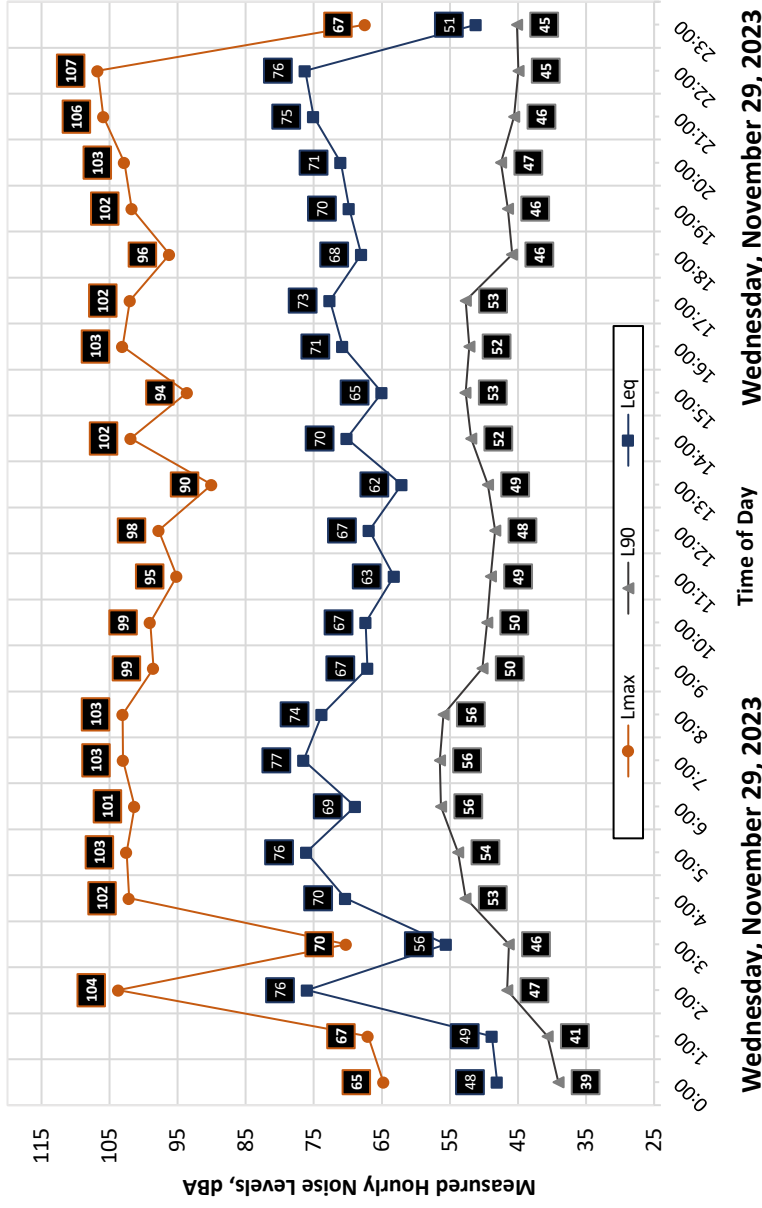
**Appendix F-B3a: Continuous Noise Monitoring Results**

Date	Time	Measured Level, dBA		
		L <sub>eq</sub>	L <sub>max</sub>	L <sub>50</sub>
Wednesday, November 29, 2023	0:00	48	65	42
Wednesday, November 29, 2023	1:00	49	67	45
Wednesday, November 29, 2023	2:00	76	104	52
Wednesday, November 29, 2023	3:00	56	70	51
Wednesday, November 29, 2023	4:00	70	102	56
Wednesday, November 29, 2023	5:00	76	103	59
Wednesday, November 29, 2023	6:00	69	101	59
Wednesday, November 29, 2023	7:00	77	103	60
Wednesday, November 29, 2023	8:00	74	103	60
Wednesday, November 29, 2023	9:00	67	99	55
Wednesday, November 29, 2023	10:00	67	99	55
Wednesday, November 29, 2023	11:00	63	95	55
Wednesday, November 29, 2023	12:00	67	98	55
Wednesday, November 29, 2023	13:00	62	90	55
Wednesday, November 29, 2023	14:00	70	102	58
Wednesday, November 29, 2023	15:00	65	94	59
Wednesday, November 29, 2023	16:00	71	103	58
Wednesday, November 29, 2023	17:00	73	102	58
Wednesday, November 29, 2023	18:00	68	96	54
Wednesday, November 29, 2023	19:00	70	102	52
Wednesday, November 29, 2023	20:00	71	103	51
Wednesday, November 29, 2023	21:00	75	106	49
Wednesday, November 29, 2023	22:00	76	107	48
Wednesday, November 29, 2023	23:00	51	67	48

Statistics	Leq	Lmax	L50	L90
Day Average	71	100	56	50
Night Average	71	87	51	47
Day Low	62	90	49	46
Day High	77	106	60	56
Night Low	48	65	42	39
Night High	76	107	59	56
Ldn	77	Day %		66
CNEL	77	Night %		34

Site: LT-3  
 Project: The Campus Development  
 Location: Eastern Project Boundary  
 Coordinates: (38.4689861, -121.8045479)  
 Meter: LDL 820-1  
 Calibrator: CAL200

**Measured Ambient Noise Levels vs. Time of Day**





**Appendix F-B3b: Continuous Noise Monitoring Results**

Site: LT-3

Project: The Campus Development

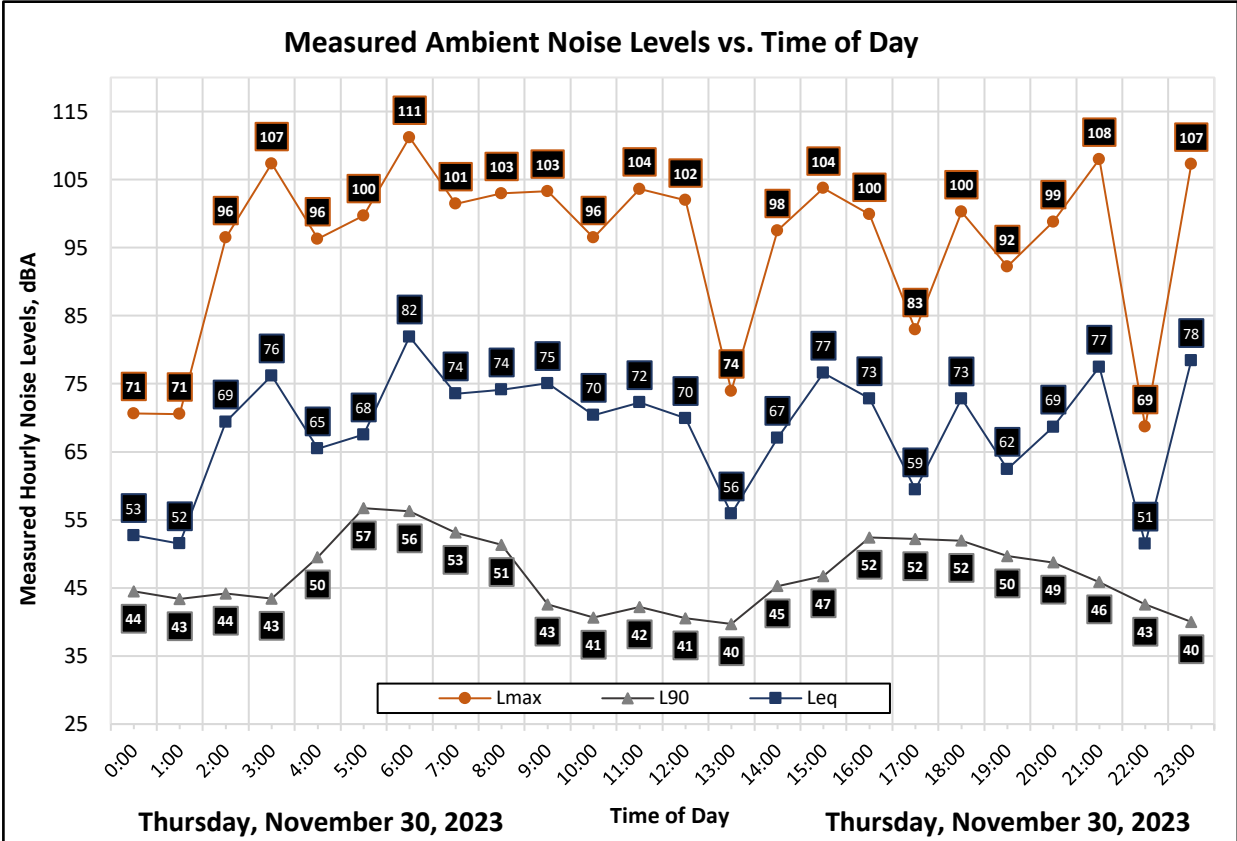
Meter: LDL 820-1

Location: Eastern Project Boundary

Calibrator: CAL200

Coordinates: (38.4689861, -121.8045479)

Date	Time	Measured Level, dBA			
		L <sub>eq</sub>	L <sub>max</sub>	L <sub>50</sub>	L <sub>90</sub>
Thursday, November 30, 2023	0:00	53	71	48	44
Thursday, November 30, 2023	1:00	52	71	47	43
Thursday, November 30, 2023	2:00	69	96	48	44
Thursday, November 30, 2023	3:00	76	107	49	43
Thursday, November 30, 2023	4:00	65	96	54	50
Thursday, November 30, 2023	5:00	68	100	59	57
Thursday, November 30, 2023	6:00	82	111	59	56
Thursday, November 30, 2023	7:00	74	101	58	53
Thursday, November 30, 2023	8:00	74	103	56	51
Thursday, November 30, 2023	9:00	75	103	51	43
Thursday, November 30, 2023	10:00	70	96	49	41
Thursday, November 30, 2023	11:00	72	104	51	42
Thursday, November 30, 2023	12:00	70	102	48	41
Thursday, November 30, 2023	13:00	56	74	48	40
Thursday, November 30, 2023	14:00	67	98	55	45
Thursday, November 30, 2023	15:00	77	104	56	47
Thursday, November 30, 2023	16:00	73	100	58	52
Thursday, November 30, 2023	17:00	59	83	57	52
Thursday, November 30, 2023	18:00	73	100	56	52
Thursday, November 30, 2023	19:00	62	92	53	50
Thursday, November 30, 2023	20:00	69	99	52	49
Thursday, November 30, 2023	21:00	77	108	50	46
Thursday, November 30, 2023	22:00	51	69	45	43
Thursday, November 30, 2023	23:00	78	107	44	40



Statistics	Leq	Lmax	L50	L90
Day Average	73	98	53	47
Night Average	76	92	50	47
Day Low	56	74	48	40
Day High	77	108	58	53
Night Low	52	69	44	40
Night High	82	111	59	57
Ldn	81	Day %		49
CNEL	81	Night %		51



**Appendix F-B4: Short Term Noise Monitoring Results**

Site: ST-1

Project: The Campus Development

Meter: LDL 831-5

Location: Southeast Boundary of Project Site

Calibrator: CAL200

Coordinates: (39.1200676, -121.6150012)

Start: 2023-11-28 12:50:54

Stop: 2023-11-28 13:00:54

SLM: SoundAdvisor™ Model 831C

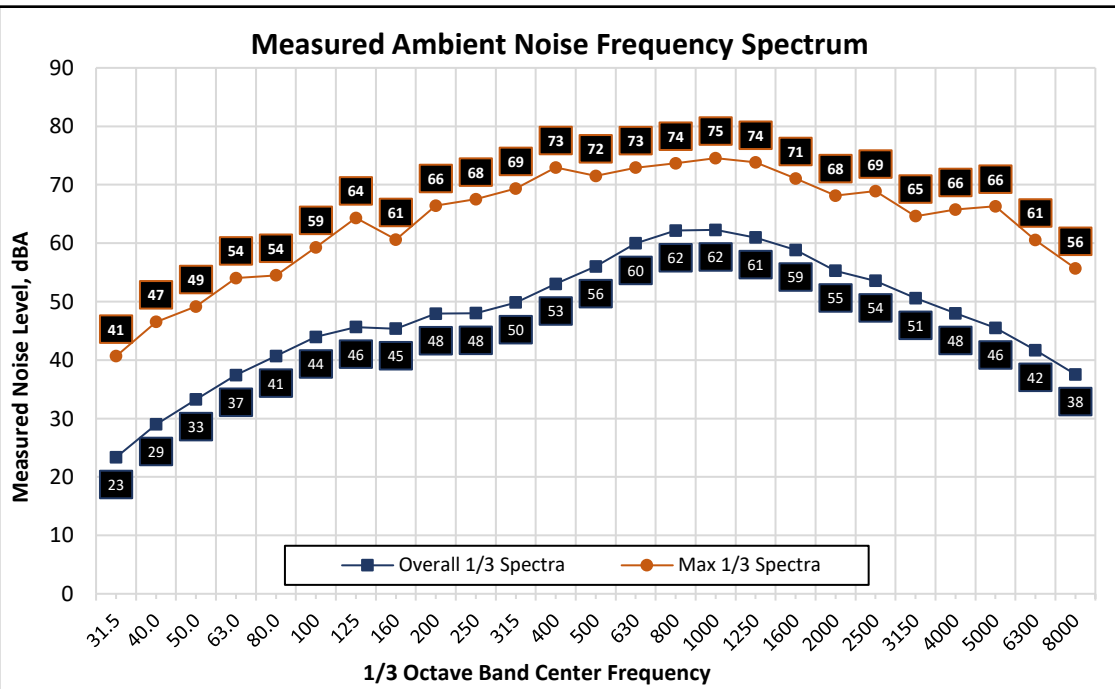
Serial: 11709

**Measurement Results, dBA**

Duration: 0:10  
 L<sub>eq</sub>: 69  
 L<sub>max</sub>: 82  
 L<sub>min</sub>: 43  
 L<sub>50</sub>: 60  
 L<sub>90</sub>: 46

**Notes**

Primary noise source is adjacent road, Pedrick Road. Secondary noise source was industrial land use adjacent to the project site. Lmax was driven by heavy truck passbys.



## Appendix F-C: Traffic Noise Calculation Inputs and Results



**Appendix F-C-1**  
**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Project #:** 230514  
**Description:** The Campus Development - Existing  
**Ldn/CNEL:** Ldn  
**Hard/Soft:** Soft

Segment	Roadway	Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset			Level, dBA
												60 dBA	65 dBA	70 dBA	
1	Sievers Road	West of Pedrick Road	1,850	83	0	17	1.0%	1.0%	25	100	0	22	10	5	50.2
2	Dorset Drive	West of N. 1st St	3,790	83	0	17	1.0%	1.0%	25	160	-5	36	17	8	45.2
3	N. 1st Street	Between Dorset Dr. and Vaughn Rd.	16,740	83	0	17	1.0%	1.0%	55	380	-5	308	143	66	53.6
4	Vaughn Road	West of N. 1st St	6,160	83	0	17	1.0%	1.0%	25	80	-5	49	23	11	51.9
5	N. 1st Street	South of Vaughn Road	14,140	83	0	17	1.0%	1.0%	55	530	0	275	128	59	55.7
6	Vaughn Road	Between N. 1st St. and Pedrick Rd.	4,950	83	0	17	1.0%	1.0%	25	240	-5	43	20	9	43.8

**Appendix F-C-2**

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Project #:** 230514

**Description:** The Campus Development - Existing Plus Project

**Ldn/CNEL:** Ldn

**Hard/Soft:** Soft

Segment	Roadway	Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset			Level, dBA
												60 dBA	65 dBA	70 dBA	
1	Sievers Road	West of Pedrick Road	1,600	83	0	17	1.0%	1.0%	25	100	0	20	9	4	49.6
2	Dorset Drive	West of N. 1st St	3,920	83	0	17	1.0%	1.0%	25	160	-5	37	17	8	45.4
3	N. 1st Street	Between Dorset Dr. and Vaughn Rd.	17,520	83	0	17	1.0%	1.0%	55	380	-5	317	147	68	53.8
4	Vaughn Road	West of N. 1st St	5,410	83	0	17	1.0%	1.0%	25	80	-5	45	21	10	51.3
5	N. 1st Street	South of Vaughn Road	14,490	83	0	17	1.0%	1.0%	55	530	0	279	130	60	55.8
6	Vaughn Road	Between N. 1st St. and Pedrick Rd.	5,760	83	0	17	1.0%	1.0%	25	240	-5	47	22	10	44.4

**Appendix F-C-3**

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Project #:** 230514

**Description:** The Campus Development - Cumulative

**Ldn/CNEL:** Ldn

**Hard/Soft:** Soft

Segment	Roadway	Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset			Level, dBA
												60 dBA	65 dBA	70 dBA	
1	Sievers Road	West of Pedrick Road	2,100	83	0	17	1.0%	1.0%	25	100	0	24	11	5	50.7
2	Dorset Drive	West of N. 1st St	3,950	83	0	17	1.0%	1.0%	25	160	-5	37	17	8	45.4
3	N. 1st Street	Between Dorset Dr. and Vaughn Rd.	19,130	83	0	17	1.0%	1.0%	55	380	-5	336	156	72	54.2
4	Vaughn Road	West of N. 1st St	5,820	83	0	17	1.0%	1.0%	25	80	-5	48	22	10	51.6
5	N. 1st Street	South of Vaughn Road	16,420	83	0	17	1.0%	1.0%	55	530	0	304	141	65	56.4
6	Vaughn Road	Between N. 1st St. and Pedrick Rd.	2,800	83	0	17	1.0%	1.0%	25	240	-5	29	14	6	41.3

**Appendix F-C-4**

**FHWA-RD-77-108 Highway Traffic Noise Prediction Model**

**Project #:** 230514

**Description:** The Campus Development - Cumulative Plus Project

**Ldn/CNEL:** Ldn

**Hard/Soft:** Soft

Segment	Roadway	Segment	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)	Contours (ft.) - No Offset			Level, dBA
												60 dBA	65 dBA	70 dBA	
1	Sievers Road	West of Pedrick Road	2,250	83	0	17	1.0%	1.0%	25	100	0	25	12	5	51.0
2	Dorset Drive	West of N. 1st St	3,960	83	0	17	1.0%	1.0%	25	160	-5	37	17	8	45.4
3	N. 1st Street	Between Dorset Dr. and Vaughn Rd.	19,440	83	0	17	1.0%	1.0%	55	380	-5	340	158	73	54.3
4	Vaughn Road	West of N. 1st St	6,390	83	0	17	1.0%	1.0%	25	80	-5	51	24	11	52.0
5	N. 1st Street	South of Vaughn Road	17,550	83	0	17	1.0%	1.0%	55	530	0	317	147	68	56.7
6	Vaughn Road	Between N. 1st St. and Pedrick Rd.	4,350	83	0	17	1.0%	1.0%	25	240	-5	39	18	8	43.2