Appendix D Noise Data

Appendices

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Noise Background and Modeling Data

NOISE

Noise is most often defined as unwanted sound; whether it is loud, unpleasant, unexpected, or otherwise undesirable. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness."

Noise Descriptors

The following are brief definitions of terminology used in this chapter:

- **Sound.** A disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- **Decibel (dB).** A unitless measure of sound, expressed on a logarithmic scale and with respect to a defined reference sound pressure. The standard reference pressure is 20 micropascals (20 μPa).
- **Vibration Decibel (VdB).** A unitless measure of vibration, expressed on a logarithmic scale and with respect to a defined reference vibration velocity. In the U.S., the standard reference velocity is 1 micro-inch per second ($1x10^{-6}$ in/sec).
- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Equivalent Continuous Noise Level (L_{eq}); also called the Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level which, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.
- **Statistical Sound Level (L_n).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum) and this is often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."
- **Day-Night Sound Level (L_{dn} or DNL).** The energy-average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the sound levels occurring during the period from 10:00 PM to 7:00 AM.
- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added from 7:00 PM to 10:00 PM and 10 dB from 10:00 PM to 7:00 AM. NOTE: For general community/environmental noise, CNEL and L_{dn} values rarely differ by more than 1 dB (with the CNEL being only slightly more restrictive – that is, higher than the L_{dn} value). As a matter of practice, L_{dn} and CNEL values are interchangeable and are treated as equivalent in this assessment.
- **Sensitive Receptor.** Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

AMBIENT NOISE MONITORING DATA

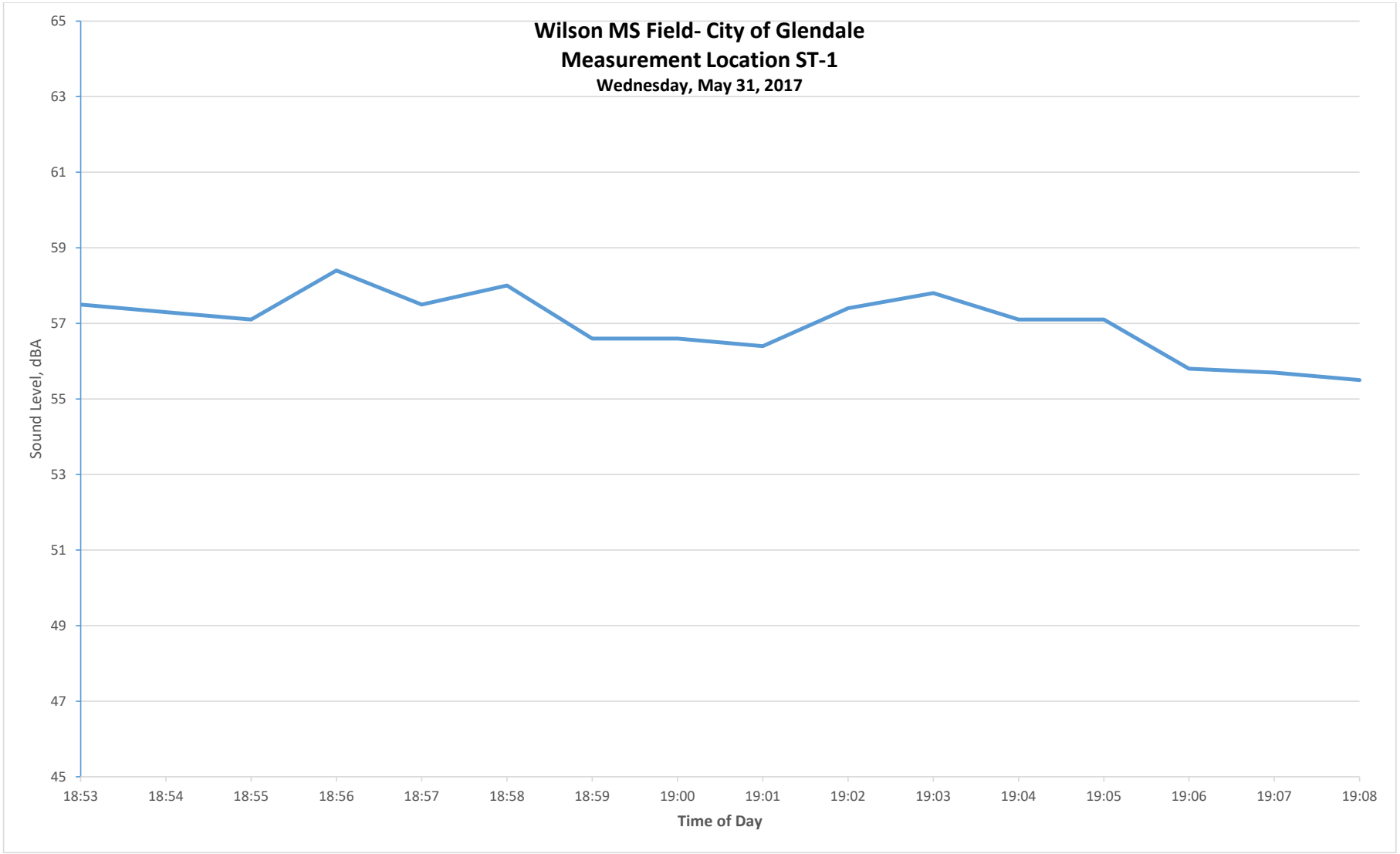
ST-1 Time History

Date	Time	Level	SEL
31-May-17	18:53:11	57.5	75.2
31-May-17	18:54:11	57.3	75
31-May-17	18:55:11	57.1	74.9
31-May-17	18:56:11	58.4	76.2
31-May-17	18:57:11	57.5	75.3
31-May-17	18:58:11	58	75.8
31-May-17	18:59:11	56.6	74.4
31-May-17	19:00:11	56.6	74.4
31-May-17	19:01:11	56.4	74.2
31-May-17	19:02:11	57.4	75.2
31-May-17	19:03:11	57.8	75.5
31-May-17	19:04:11	57.1	74.9
31-May-17	19:05:11	57.1	74.9
31-May-17	19:06:11	55.8	73.6
31-May-17	19:07:11	55.7	73.5
31-May-17	19:08:11	55.5	73.3

15-min Leq	57.1

ST-1 Intervals

Date	Time	Duration	Leq	SEL	Lmax	Lmin	L(2)	L(8)	L(10)	L(25)	L(50)	L(90)
31-May-17	18:53:11	900	57.1	86.7	64.3	54.5	59.9	58.7	58.6	57.7	56.8	55.4


Wilson MS Field- City of Glendale
Measurement Location ST-1
Wednesday, May 31, 2017
Sound Level, dBA
65
63
61
59
57
55
53
51
49
47
45
18:53
18:54
18:55
18:56
18:57
18:58
18:59
19:00
19:01
19:02
19:03
19:04
19:05
19:06
19:07
19:08
Time of Day

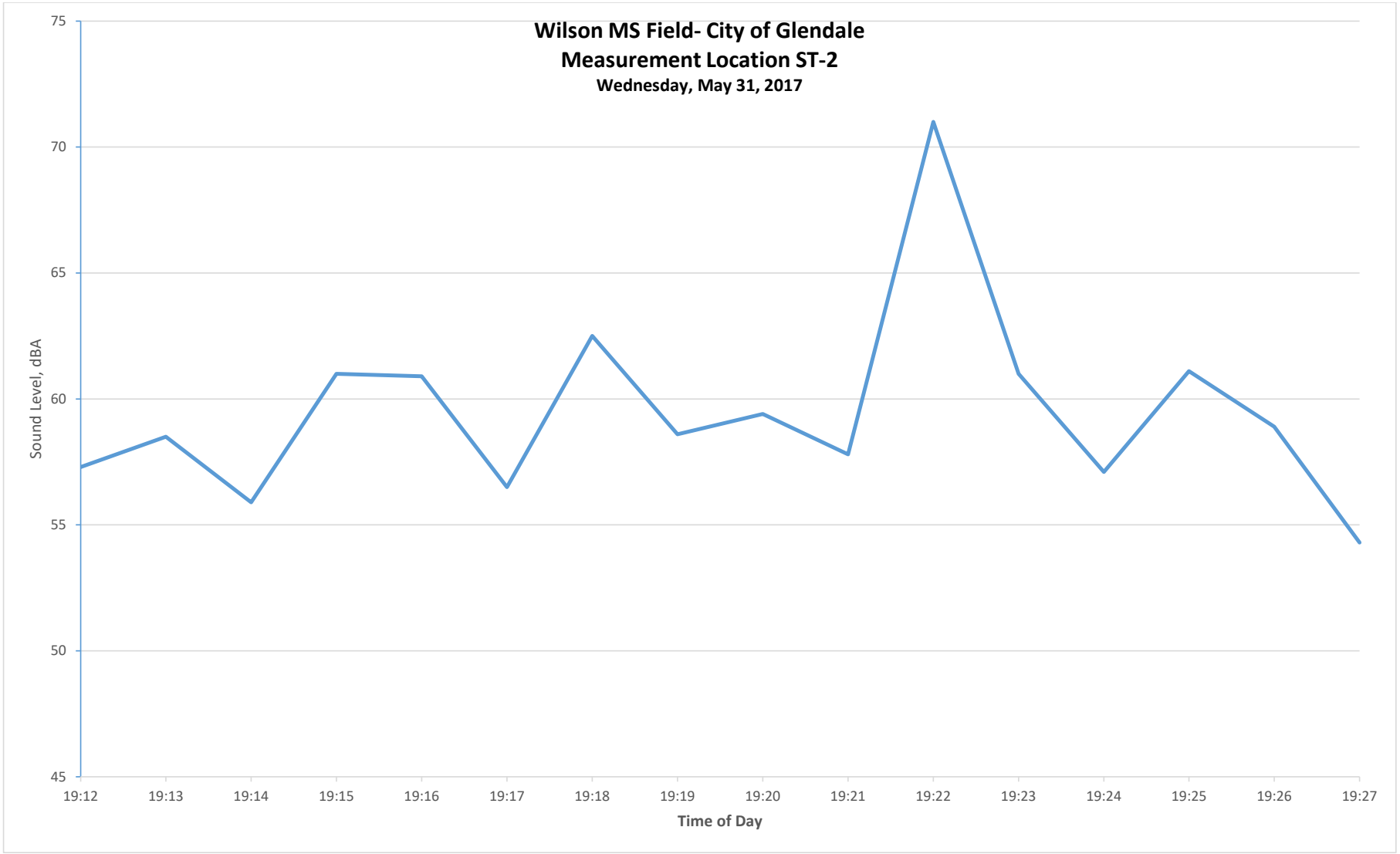
ST-2 Time History

Date	Time	Level	SEL
31-May-17	19:12:23	57.3	75.1
31-May-17	19:13:23	58.5	76.3
31-May-17	19:14:23	55.9	73.7
31-May-17	19:15:23	61	78.8
31-May-17	19:16:23	60.9	78.7
31-May-17	19:17:23	56.5	74.3
31-May-17	19:18:23	62.5	80.3
31-May-17	19:19:23	58.6	76.3
31-May-17	19:20:23	59.4	77.2
31-May-17	19:21:23	57.8	75.5
31-May-17	19:22:23	71	88.7
31-May-17	19:23:23	61	78.8
31-May-17	19:24:23	57.1	74.9
31-May-17	19:25:23	61.1	78.9
31-May-17	19:26:23	58.9	76.6
31-May-17	19:27:23	54.3	72

15-min Leq	62.2

ST-2 Intervals

Date	Time	Duration	Leq	SEL	Lmax	Lmin	L(2)	L(8)	L(10)	L(25)	L(50)	L(90)
31-May-17	19:12:23	900	62.2	91.7	86.4	47.2	67.8	65.1	64.5	60.6	53.8	49.1


Wilson MS Field- City of Glendale
Measurement Location ST-2
Wednesday, May 31, 2017
Sound Level, dBA
75
70
65
60
55
50
45
19:12
19:13
19:14
19:15
19:16
19:17
19:18
19:19
19:20
19:21
19:22
19:23
19:24
19:25
19:26
19:27
Time of Day

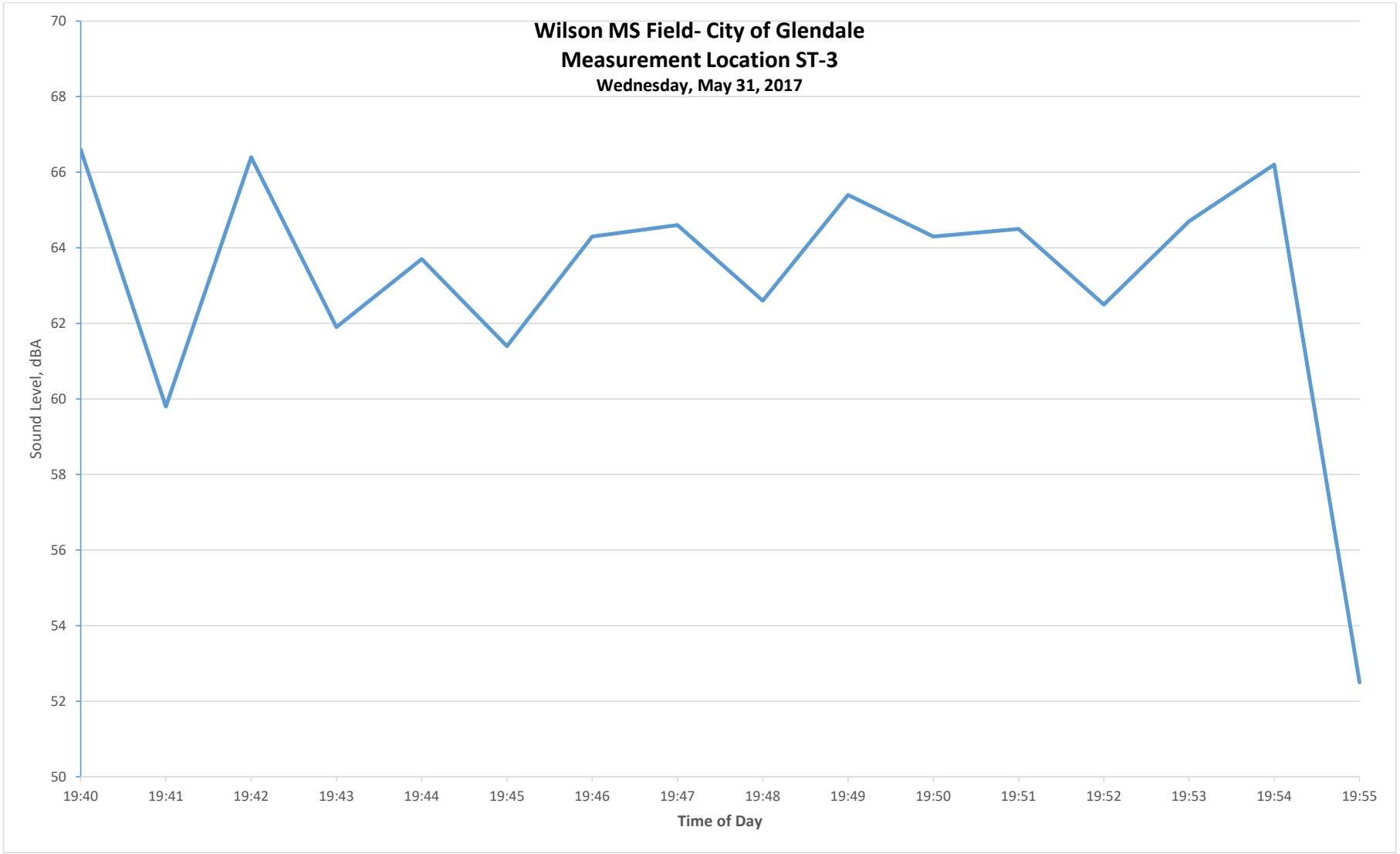
ST-3 Time History

Date	Time	Level	SEL
31-May-17	19:40:28	66.6	84.4
31-May-17	19:41:28	59.8	77.6
31-May-17	19:42:28	66.4	84.2
31-May-17	19:43:28	61.9	79.7
31-May-17	19:44:28	63.7	81.4
31-May-17	19:45:28	61.4	79.2
31-May-17	19:46:28	64.3	82.1
31-May-17	19:47:28	64.6	82.4
31-May-17	19:48:28	62.6	80.4
31-May-17	19:49:28	65.4	83.2
31-May-17	19:50:28	64.3	82.1
31-May-17	19:51:28	64.5	82.3
31-May-17	19:52:28	62.5	80.3
31-May-17	19:53:28	64.7	82.5
31-May-17	19:54:28	66.2	84
31-May-17	19:55:28	52.5	70.3

15-min Leq	64.3

ST-3 Intervals

Date	Time	Duration	Leq	SEL	Lmax	Lmin	L(2)	L(8)	L(10)	L(25)	L(50)	L(90)
31-May-17	19:40:28	900	64.3	93.9	76	50.1	71.4	69.1	68.7	66	60.4	51.9


Wilson MS Field- City of Glendale
Measurement Location ST-3
Wednesday, May 31, 2017
Sound Level, dBA
70
68
66
64
62
60
58
56
54
52
50
19:40
19:41
19:42
19:43
19:44
19:45
19:46
19:47
19:48
19:49
19:50
19:51
19:52
19:53
19:54
19:55
Time of Day

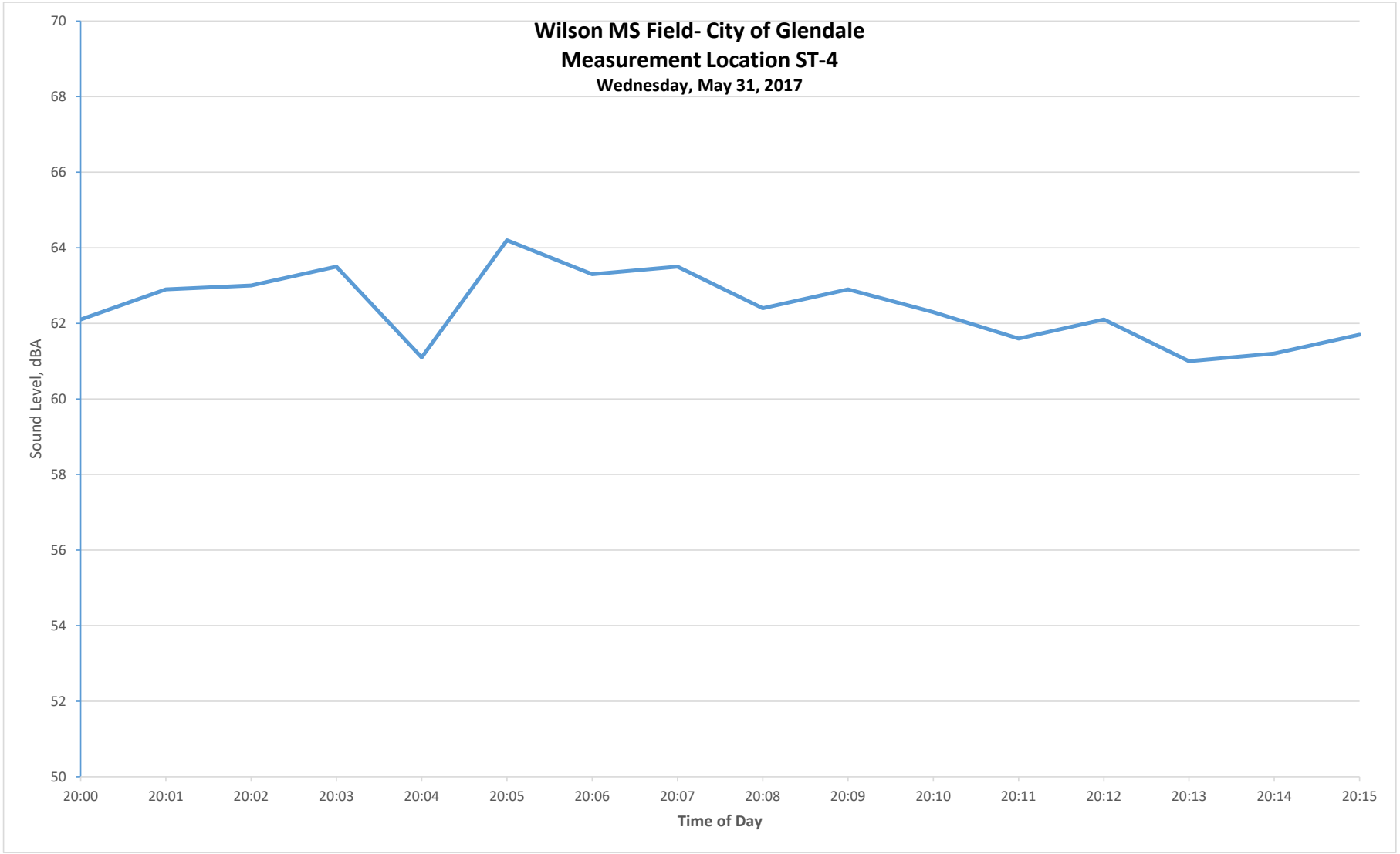
ST-4 Time History

Date	Time	Level	SEL
31-May-17	20:00:08	62.1	79.9
31-May-17	20:01:08	62.9	80.7
31-May-17	20:02:08	63	80.8
31-May-17	20:03:08	63.5	81.3
31-May-17	20:04:08	61.1	78.9
31-May-17	20:05:08	64.2	82
31-May-17	20:06:08	63.3	81.1
31-May-17	20:07:08	63.5	81.3
31-May-17	20:08:08	62.4	80.2
31-May-17	20:09:08	62.9	80.7
31-May-17	20:10:08	62.3	80.1
31-May-17	20:11:08	61.6	79.4
31-May-17	20:12:08	62.1	79.9
31-May-17	20:13:08	61	78.8
31-May-17	20:14:08	61.2	79
31-May-17	20:15:08	61.7	79.5

15-min Leq	62.6

ST-4 Intervals

Date	Time	Duration	Leq	SEL	Lmax	Lmin	L(2)	L(8)	L(10)	L(25)	L(50)	L(90)
31-May-17	20:00:08	900	62.6	92.1	73.5	58	66.7	64.8	64.5	62.9	61.7	60.2


Wilson MS Field- City of Glendale
Measurement Location ST-4
Wednesday, May 31, 2017
Sound Level, dBA
70
68
66
64
62
60
58
56
54
52
50
20:00
20:01
20:02
20:03
20:04
20:05
20:06
20:07
20:08
20:09
20:10
20:11
20:12
20:13
20:14
20:15
Time of Day

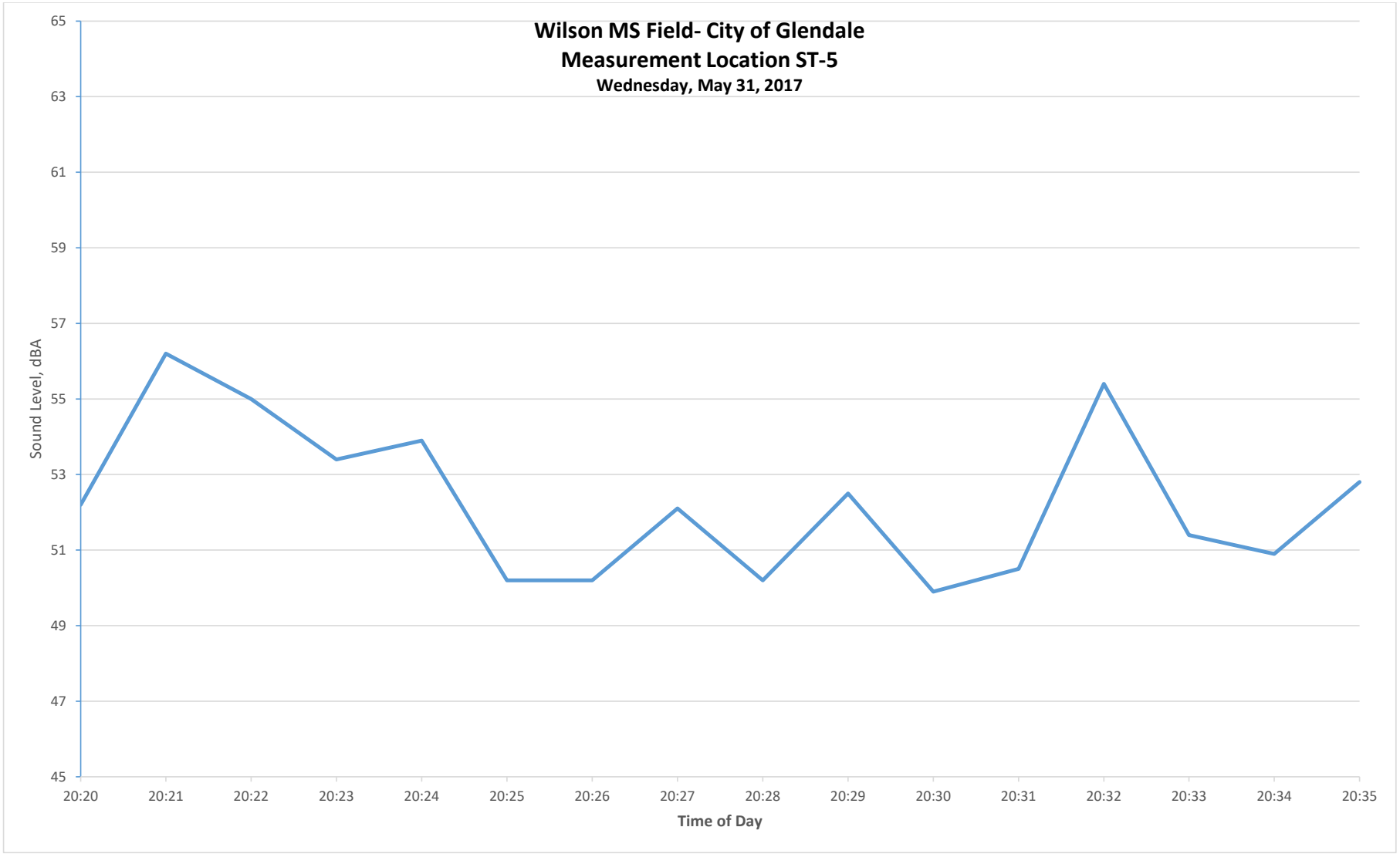
ST-5 Time History

Date	Time	Level	SEL
31-May-17	20:20:03	52.2	70
31-May-17	20:21:03	56.2	74
31-May-17	20:22:03	55	72.8
31-May-17	20:23:03	53.4	71.2
31-May-17	20:24:03	53.9	71.7
31-May-17	20:25:03	50.2	67.9
31-May-17	20:26:03	50.2	68
31-May-17	20:27:03	52.1	69.9
31-May-17	20:28:03	50.2	68
31-May-17	20:29:03	52.5	70.3
31-May-17	20:30:03	49.9	67.6
31-May-17	20:31:03	50.5	68.2
31-May-17	20:32:03	55.4	73.2
31-May-17	20:33:03	51.4	69.2
31-May-17	20:34:03	50.9	68.6
31-May-17	20:35:03	52.8	70.6

15-min Leq	52.8

ST-5 Intervals

Date	Time	Duration	Leq	SEL	Lmax	Lmin	L(2)	L(8)	L(10)	L(25)	L(50)	L(90)
31-May-17	20:20:03	900	52.8	82.3	66.5	48	59.2	55.7	55	52.4	50.8	49.2


Wilson MS Field- City of Glendale
Measurement Location ST-5
Wednesday, May 31, 2017
Sound Level, dBA
65
63
61
59
57
55
53
51
49
47
45
20:20
20:21
20:22
20:23
20:24
20:25
20:26
20:27
20:28
20:29
20:30
20:31
20:32
20:33
20:34
20:35
Time of Day

CONSTRUCTION AND VIBRATION NOISE CALCULATIONS

Wilson MS Multi-Purpose Field	: Construction Noise Calculations		
Receptor	**Spatially AVG Distance(ft)**	**Worst-case Distance (ft)**	**Land Use Type**
1 Residences to North	150	50	Residential
2 Residences to East	250	100	Residential
3 School Buildings to West	-	25	Commercial
4 School Buildings to South	-	25	Commercial

TYPE PHASE NAME >>>			Asphalt Demolitio (per 8 hour day)		Site Prep		Grading		Utility Trenching		Paving		Landscaping	
Equipment Item (Dropdown Menu)	**Leq** @ 50 ft	**Lmax** @ 50 ft	Quantity	Hours of Usage	Quantity	Hours of Usage	Quantity	Hours of Usage	Quantity	Hours of Usage	Quantity	Hours of Usage	Quantity	Hours of Usage
(RCNM) Concrete Saw	82.6	89.6	1	8		8		8		8		8		8
(RCNM) Excavator	76.7	80.7	3	8		8	1	8		8		8		8
(RCNM) Dozer	77.7	81.7	2	8	3	8	1	8		8		8		8
(RCNM) Flat Bed Truck	70.3	74.3	1	4	1	4	1	4	1	4		8		8
(RCNM) Backhoe	73.6	77.6		8	4	8	3	8	2	8	1	8		8
(RCNM) Grader	81	85		8		8	1	8		8		8		8
(RCNM) Concrete Mixer Truck	74.8	78.8		8		8		8		8	2	6		8
(RCNM) Paver	74.2	77.2		8		8		8		8	1	8		8
(RCNM) Pavement Scarafier	82.5	89.5		8		8		8		8	2	6		8
(RCNM) Roller	73	80		8		8		8		8	2	6		8
(RCNM) Front End Loader	75.1	79.1		8		8		8		8		8	1	8
(RCNM) Crane	72.6	80.6		8		8		8		8		8	1	6
(RCNM) Man Lift	67.7	74.7		8		8		8		8		8	1	6
PLACEWORKS	**Totals at 50 feet**		**Asphalt Demolition** Total Leq	Lmax	**Site Prep** Total Leq	Lmax	**Grading** Total Leq	Lmax	**Utility Trenching** Total Leq	Lmax	**Paving** Total Leq	Lmax	**Landscaping** Total Leq	Lmax
			86.5	92.0	84.4	88.4	84.9	88.9	77.1	81.1	85.9	92.3	77.0	82.8

Red cell indicates level exceeds criteria

Total Leq/Lmax (dBA)

	Sensitive Receptor	Attenuation (-) dB	Asphalt Demolition Leq	Asphalt Demolition Lmax	Site Prep Leq	Site Prep Lmax	Grading Leq	Grading Lmax	Utility Trenching Leq	Utility Trenching Lmax	Paving Leq	Paving Lmax	Landscaping Leq	Landscaping Lmax
1	Residences to North	5	65.5	73.0	69.8	83.4	70.3	83.9	62.5	76.1	64.9	73.4	62.5	77.8
2	Residences to East		72.5	85.9	70.4	82.4	70.9	82.8	63.1	75.1	71.9	86.3	63.0	76.8

Phase-Specific Distances (feet)

		Default AVG	Default W-C	Asphalt Demolition AVG	Asphalt Demolition W-C	Site Prep AVG	Site Prep W-C	Grading AVG	Grading W-C	Utility Trenching AVG	Utility Trenching W-C	Paving AVG	Paving W-C	Landscaping AVG	Landscaping W-C
1	Residences to North	150	50	315	250	150	50	150	50	150	50	315	250	150	50
2	Residences to East	250	100	250	100	250	100	250	100	250	100	250	100	250	100

Leq measured from spatially averaged distance

Lmax measured from worst-case distance

RCNM Appendix A: Practices for Calculating Estimated Shielding (fwha.dot.gov)

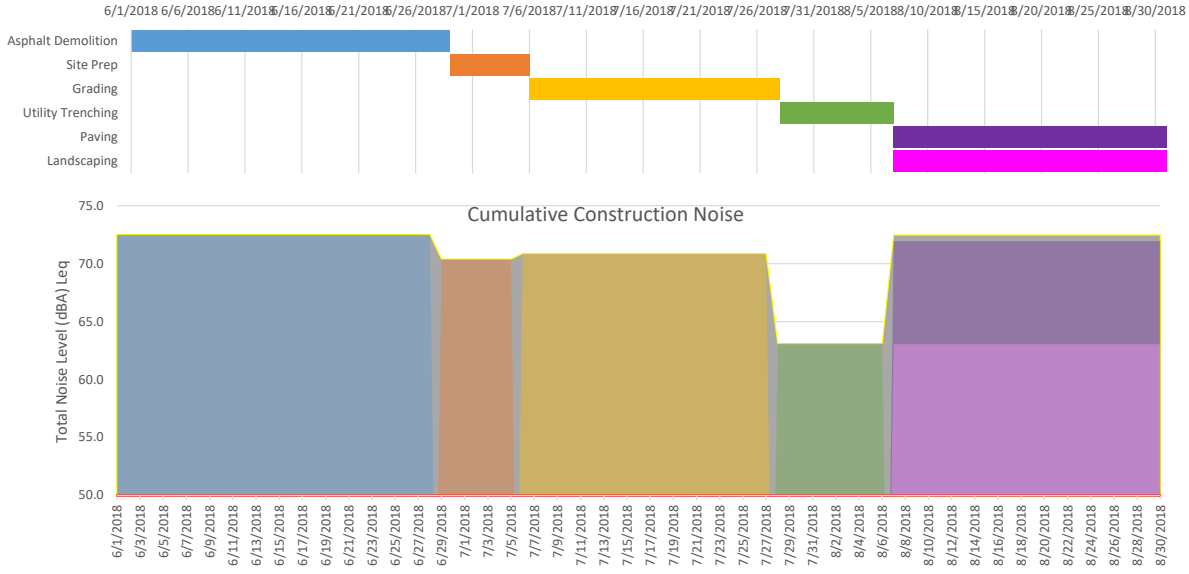
Attenuation (dB)	Instance
3	If a noise barrier or other obstruction (like a dirt mound) just barely breaks the line-of-sight between the noise source and the receptor
5	If the noise source is in a enclosure and/or barrier that has some gaps in it
5	If a noise source is enclosed or shielded with heavy vinyl noise curtain material (e.g., SoundSeal BBC-13-2" or equivalent)
8	If the noise source is completely enclosed OR completely shielded with a solid barrier located close to the source
10	If the noise source is completely enclosed AND completely shielded with a solid barrier located close to the source

Construction Schedule

Construction Phase	Leq @ 50 ft	Start Date	End Date	Total Days
Asphalt Demolition	86.5	6/1/2018	6/28/2018	28
Site Prep	84.4	6/29/2018	7/5/2018	7
Grading	84.9	7/6/2018	7/27/2018	22
Utility Trenching	77.1	7/28/2018	8/6/2018	10
Paving	85.9	8/7/2018	8/30/2018	24
Landscaping	77.0	8/7/2018	8/30/2018	24
Total				91

Receptor shown in graph	Threshold (dBA) Leq
Residences to East	0

Average noise level over entire construction period	Max noise level over construction period
71.5	72.5



Vibration Annoyance Equipment Item	VdB (re. 1 μ-in/sec) at 25 ft	Distance to (feet) 78 VdB	84 VdB	Red Cell indicates level exceeds FTA criteria Residences to North	Residences to East	School Buildings to West	School Buildings to South
Vibratory Roller	94	85.4	53.9	70.7	64.0	#VALUE!	#VALUE!
Hoe Ram	87	49.9	31.5	63.7	57.0	#VALUE!	#VALUE!
Large Bulldozer	87	49.9	31.5	63.7	57.0	#VALUE!	#VALUE!
Caisson Drilling	87	49.9	31.5	63.7	57.0	#VALUE!	#VALUE!
Loaded Trucks	86	46.2	29.1	62.7	56.0	#VALUE!	#VALUE!
Jackhammer	79	27.0	17.0	55.7	49.0	#VALUE!	#VALUE!
Small Bulldozer	58	5.4	3.4	34.7	28.0	#VALUE!	#VALUE!

Vibration Damage Equipment Item	PPV (in/sec) at 25 ft	Distance to (feet) 0.2 PPV	0.3 PPV	Residences to North	Residences to East	School Buildings to West	School Buildings to South
Vibratory Roller	0.21	25.8	19.7	0.074	0.026	0.210	0.210
Hoe Ram	0.089	14.6	11.1	0.031	0.011	0.089	0.089
Large Bulldozer	0.089	14.6	11.1	0.031	0.011	0.089	0.089
Caisson Drilling	0.089	14.6	11.1	0.031	0.011	0.089	0.089
Loaded Trucks	0.076	13.1	10.0	0.027	0.010	0.076	0.076
Jackhammer	0.035	7.8	6.0	0.012	0.004	0.035	0.035
Small Bulldozer	0.003	1.5	1.2	0.001	0.000	0.003	0.003

TRAFFIC DATA

Wilson Middle School Athletic Field
TRAFFIC NOISE CONTOURS RESULT SUMMARY TABLE

#	ROADWAY	SEGMENT	DAILY TRAFFIC VOLUMES	Distance to Reciever	Noise Level (dBA)			DISTANCE TO NOISE CONTOUR (FT.)		
					Leq	Ldn	CNEL	70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Monterey Road between Glendale Ave and Verdugo Rd	Existing	5,260	50	57.6	60.4	**61.1**	13	27	59
2	Verdugo Road between Glenoaks Blvd and Monterey Rd	Existing	10,880	50	62.3	65.2	**65.8**	26	57	122
3	Glendale Avenue between Glenoaks Blvd and Monterey Rd	Existing	21,210	50	65.6	68.5	**69.1**	43	94	201
4	Glenoaks Boulevard between Glendale Ave and Verdugo Rd	Existing	5,120	50	57.5	60.3	**61.0**	13	27	58
5	Adams Street between Glenoaks Blvd and Monterey Rd	Existing	580	50	46.2	49.1	***49.7***	2	5	10
6	Verdugo Circle north of Glenoaks Blvd	Existing	310	50	41.5	44.3	***45.0***	1	2	5
7	Monterey Road between Glendale Ave and Verdugo Rd	Future+P	5,632	50	57.9	60.7	**61.4**	13	29	62
8	Verdugo Road between Glenoaks Blvd and Monterey Rd	Future+P	14,540	50	63.6	66.5	**67.1**	32	69	148
9	Glendale Avenue between Glenoaks Blvd and Monterey Rd	Future+P	21,960	50	65.7	68.6	**69.2**	44	96	206
10	Glenoaks Boulevard between Glendale Ave and Verdugo Rd	Future+P	8,580	50	59.7	62.6	**63.2**	18	38	82
11	Adams Street between Glenoaks Blvd and Monterey Rd	Future+P	618	50	46.5	49.3	***50.0***	2	5	11
12	Verdugo Circle north of Glenoaks Blvd	Future+P	550	50	43.9	46.8	***47.5***	2	3	7

Glendale Athletic Field Traffic Noise Comparison (GLN-02)

Roadway	CNEL			ADT		
	Existing	Future + P	Difference	Existing	Future + P	Difference
Monterey Road between Glendale Ave and Verdugo Rd	61.1	61.4	0.3	5,260	5,632	372
Verdugo Road between Glenoaks Blvd and Monterey Rd	65.8	67.1	1.3	10,880	14,540	3,660
Glendale Avenue between Glenoaks Blvd and Monterey Rd	69.1	69.2	0.2	21,210	21,960	750
Glenoaks Boulevard between Glendale Ave and Verdugo Rd	61.0	63.2	2.2	5,120	8,580	3,460
Adams Street between Glenoaks Blvd and Monterey Rd	*49.7*	*50.0*	0.3	580	618	38
Verdugo Circle north of Glenoaks Blvd	*45.0*	*47.5*	2.5	310	550	240

SOUNDPLAN MODELING INPUT AND OUTPUT DATA

Sound Sources used in noise model: from SoundPLAN 7.4 noise emission library

- Soccer Game: Reference = 62 dBA L_w/m^2
  - Main Field = 4,482 m^2
  - Practice Field = 1,802 m^2
- Spectator (Standing room) = 86 dBA L_w/m^2
  - Main Field = 124 m^2
  - Practice Field = 55 m^2

Wilson Middle School Multi-Purpose Field
Assessed receiver levels
Calculation

2

Receiver	Usage	Fl	Dir	Leq,d dB(A)	Ldn,diff dB(A)	Leq,d,diff dB(A)	Leq,n,diff dB(A)	
MF1	RM	G	SW	51.7				
MF2	RM	G	SW	37.4				
MF3	RM	G F2	SW	45.3 52.3				
MF4	RM	G F2	SW	40.8 46.5				
MF5	RM	G F2	SW	42.4 47.1				
MF6	RM	G F2	SW	47.1 52.9				
MF7	RM	G F2	S	45.2 53.4				
MF8	RM	G F2	SW	46.6 52.5				
MF9	RM	G F2	S	46.9 52.6				
SF1	RS	G F2	S	53.8 54.2				
SF1b	RS	G	S	53.0				
SF2	RS	G F2	S	41.5 49.0				
SF2b	RS	G	S	39.4				
SF3	RS	G F2	W	31.4 45.4				
SF3b	RS	G F2	W	46.3 47.6				
SF4	RS	G F2	W	47.9 48.0				
SF5	RS	G F2	W	48.2 48.2				
SF6	RS	G F2	W	49.2 49.2				
SF7	RS	G F2	W	49.7 49.7				
SF8	RS	G F2	W	33.8 46.9				
SF8b	RS	G F2	W	49.9 50.9				

Wilson Middle School Multi-Purpose Field
Assessed receiver levels
Calculation

2

Receiver	Usage	Fl	Dir	Leq,d dB(A)	Ldn,diff dB(A)	Leq,d,diff dB(A)	Leq,n,diff dB(A)	
SF9	RS	G F2	W	33.4 46.7				
SF9b	RS	G F2	W	49.3 50.5				
SF10	RS	G F2	W	32.6 45.9				
SF10b	RS	G F2	W	48.5 49.5				