
Noise Monitoring Program Report

Operations Noise Monitoring

Merrimack Premium Outlets

Merrimack,
New Hampshire

Prepared for **Premium Outlets | SIMON**
Roseland, New Jersey

Prepared by **Vanasse Hangen Brustlin, Inc.**
Bedford, New Hampshire

December, 2012

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Noise Monitoring Program

Introduction

The purpose of this noise monitoring program is to evaluate the sound levels associated with peak operation activities (such as peak holiday shopping) at the Merrimack Premium Outlets (MPO) site in Merrimack, New Hampshire. This program adheres to the operational noise impact criteria as identified in the September 16, 2008 *Operations and Maintenance Plan*.

The following sections describe noise terminology, the operational noise criteria, the noise monitoring equipment, noise monitoring methodology, noise monitoring locations, schedule, results, and conclusions of the noise monitoring program.

Noise Terminology

Sound is described in terms of loudness, frequency, and duration. Loudness is the sound pressure level measured on a logarithmic scale in units of decibels (dB). For community noise impact assessments, sound level frequency characteristics are based upon human hearing, using an A-weighted (dBA) frequency filter. The A-weighted filter is used because it approximates the way humans hear sound.

The most common way to account for the time-varying nature of sound (duration) is through the equivalent sound level measurement, referred to as Leq. The Leq averages the background sound levels with short-term transient sound levels and provides a uniform method for comparing sound levels that vary over time. The Leq is the primary noise descriptor that has been evaluated in this operational noise monitoring report.

Merrimack Premium Outlets Operations Noise Criteria

The project operation noise impact criteria established in the September 16, 2008 *Operations and Maintenance Plan* for the Merrimack Premium Outlet site is presented in Table 1:

Table 1
Project Operation Noise Impact Criteria

Monitoring Location	A-Weighted Sound Level in Decibels (dBA)	
	Leq Daytime	Leq Nighttime
Areas Within 750 feet of F.E. Everett Turnpike	65	55
All Other Areas	60	50

Noise Monitoring Equipment

The noise monitoring program was conducted with a Larson Davis 824 and a Larson Davis 831 Type I noise monitor. Noise monitoring was conducted following standard engineering practices and in conformance with the Federal Highway Administration (FHWA) noise monitoring guidelines¹.

Noise Monitoring Methodology

The noise monitoring program was conducted to measure the sound levels associated with the peak operations at the Merrimack Premium Outlets site. Each monitoring location was evaluated to ensure that the maximum sound levels from operations activities at the Merrimack Premium Outlets site were measured. The noise monitoring was conducted:

- for a daytime period consistent with peak operations activities,
- for an evening nighttime period (10:00 PM to 7:00AM),
- at a height of 6 feet above ground level,



¹ *Measurement of Highway-Related Noise*, US Department of Transportation, Federal Highway Administration, FHWA-PD-96-046, May 1996



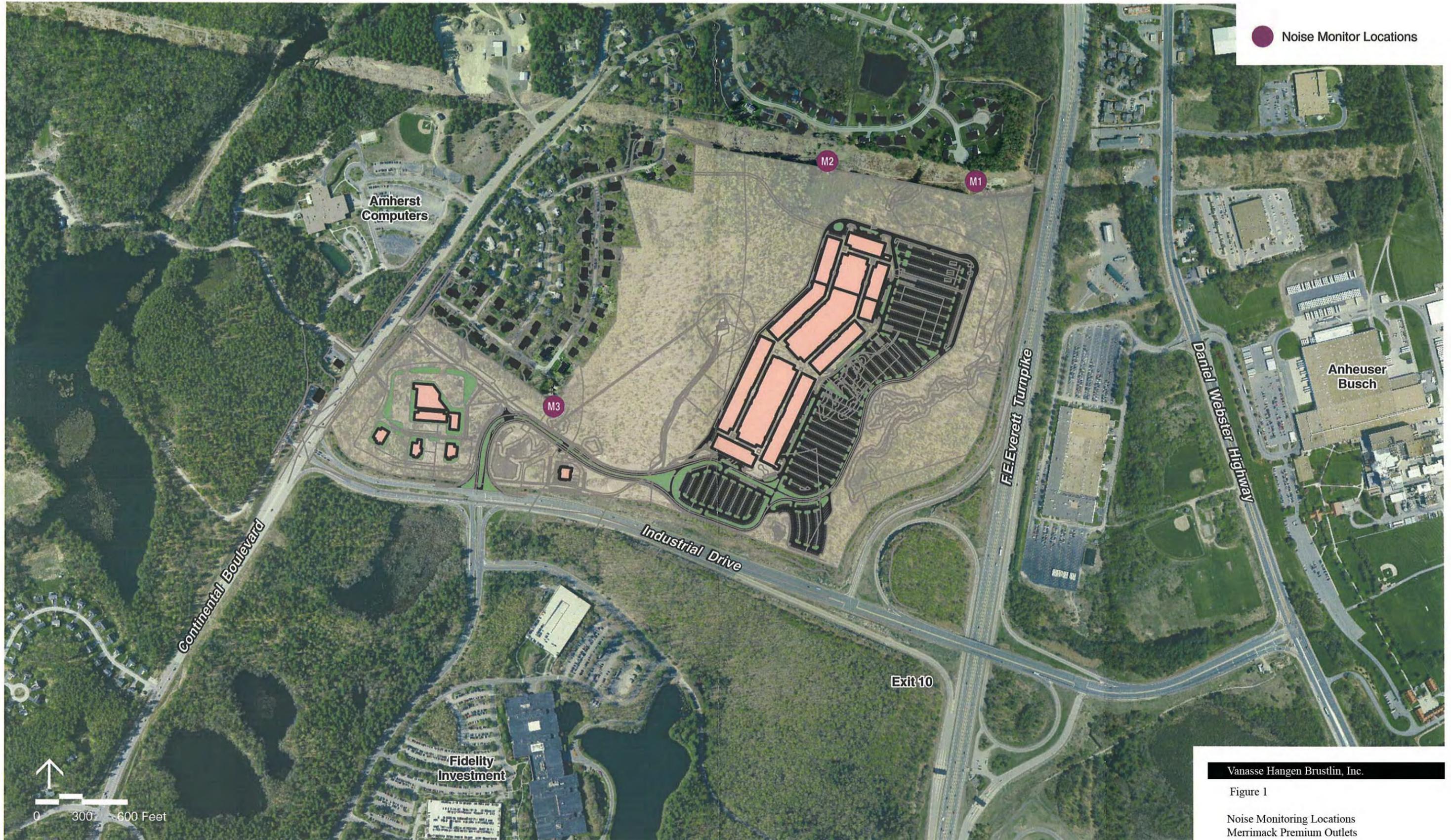
- with the A-weighted filter,
- with the noise monitors calibrated at the site, and
- at the three residential locations (M1, M2, and M3) identified in the *Operations and Maintenance Plan*.

Noise Monitoring Locations

The *Operations and Maintenance Plan* identified the three (3) closest locations (residential areas) to the MPO site that have outdoor activities that maybe sensitive to the sound levels associated with the site's operational activities. These monitoring locations are representative of the closest residences to the site's operational activities. The noise monitoring was conducted as close to the property line between the site and the following locations (without going onto private property) as follows:

- M 1 – the end of the Englewood Drive cul-de-sac (at the utility line):
 - Recorded (Day) Sunday November 25th from 2:10 PM – 3:00 PM.
 - Recorded (Night) Saturday November 24th from 11:30 PM – 12:20 AM.
- M 2 – just south of Whittier Road (at the utility line):
 - Recorded (Day) Sunday November 25th from 1:15 PM – 2:05 PM.
 - Recorded (Night) Sunday November 25th from 12:30 AM – 1:20 AM.
- M 3 – the property located at the corner of Douglas Street and Spruce Street:
 - Recorded continuously from Wednesday November 21st at 4:00 PM through Sunday November 25th at 3:00 PM.

These monitoring locations were originally selected as noise monitoring sites as part of the noise evaluation documented in the Noise Chapter of the 2007 Environmental Report that was part of the Conditional Use Permit documentation. The monitoring locations are presented in Figure 1.



● Noise Monitor Locations

Vanasse Hangen Brustlin, Inc.

Figure 1

Noise Monitoring Locations
 Merrimack Premium Outlets
 Merrimack, New Hampshire



Schedule

Noise monitoring data was collected at the three monitoring locations over the course of the Thanksgiving weekend 2012 (Thursday November 22nd through Saturday the 25th). The noise monitoring was conducted in conformance with the standard noise monitoring guidelines and the operational noise monitoring program procedures described in the *Operations and Maintenance Plan*, which stated that the noise monitoring should be conducted within six months of the project opening during the daytime and nighttime (10:00 PM to 7:00AM) periods.

Results

The noise measurements were conducted during daytime and nighttime periods that included peak operational activities at the MPO site. The noise measurements were conducted adjacent to the property lines at the three closest residential locations (M1, M2 and M3).

Monitoring location M1, adjacent to Englewood Drive, is located within 750 feet of the F.E Everett Turnpike and therefore experiences higher background sound levels than M2, which is further west. The hourly Leq sound levels at M1 ranged from 55.3 dB(A) during the daytime period to 51.6 dB(A) during the nighttime period. These measured sound levels are below the daytime (Leq - 65 dB(A)) and the nighttime (Leq - 55 dB(A)) criteria for locations within 750 feet of the F.E. Everett Turnpike. Table 2 summarizes the range of hourly Leq sound levels recorded at the three monitoring locations.

Sound levels at M2 adjacent to Whittier Road are lower than M1 because of the natural topography, which provides additional shielding from operational noise and significantly greater separation from the FE Everett Turnpike (a typical non-operational background noise source). Specifically, the hourly Leq sound levels at M2 ranged from 42.6 dB(A) during the daytime period to 40.6 dB(A) during the nighttime period. These measured sound levels are below both the daytime (Leq - 60 dB(A)) and the nighttime (Leq - 50 dB(A)) criteria.

Monitoring location M3, which is located near Spruce Street and Douglas Street, revealed higher sound levels than reported at M2 because of its proximity to the MPO site driveway. As described previously in the report, this location (M3) was monitored continuously from Wednesday November 21st at 4:00 PM through Sunday November 25th at 3:00 PM on the MPO property approximately 40 feet south of the residential property line. It should be noted that the sound level results reported at this location (M3) were calculated from the monitored results (on the MPO property) using the principals of noise propagation to represent a location at the residential



property line (40 feet further north). Daytime Leq sound levels calculated at M3 ranged from 40.6 to 53.0 dB(A), which falls below the daytime (Leq - 60 dB(A)) criteria.

A review of the nighttime sound levels results calculated at M3 revealed that all of the Leq sound levels fall below the nighttime (Leq - 50 dB(A)) criteria. More specifically during a typical nighttime period when the MPO is not open for business (as monitored on Wednesday night/Thursday morning, Friday night/Saturday morning, and Saturday night/Sunday morning), the results revealed typical nighttime Leq values ranging from 31.0 to 46.6 dB(A). Only on Thursday night/Friday morning, when MPO was open for their midnight madness event, did the sound levels approach (but not exceed) the nighttime (Leq - 50 dB(A)) criteria. Specifically, Black Friday nighttime period sound levels ranged from 46.4 to 49.5 dB(A) which falls below the nighttime (Leq - 50 dB(A)) criteria.

**Table 2
Noise Monitoring Sound Levels (1-Hour Leq)**

Number	Monitoring Location*	A-Weighted Sound Level in Decibels (dBA)	
		Criteria	2012 Sound Levels
M 1**	End of Englewood Dr. cul-de-sac	Day: 65 Night: 55	Day: 55.3 Night: 51.6
M 2	South of Whittier Rd.	Day: 60 Night: 50	Day: 42.6 Night: 40.6
M 3	Corner of Douglas St and Spruce St	Day: 60 Night: 50	Day: 40.6 - 53.0 Typical Night: 31.0 - 46.6 Black Fri. Night: 46.4 - 49.5

Source: Yanasse Hangen Brustlin, Inc.

* The monitoring sites are depicted in Figure 1.

** M1 is located within 750 feet of the F.E. Everett Turnpike.

Conclusions

The noise monitoring program demonstrated that all of the daytime and nighttime period Leq sound levels for the receptor locations (M1, M2, and M3) throughout the 2012 peak shopping weekend (Thanksgiving) were below the Project Operational Noise Impact Criteria (as identified in the September 16, 2008 *Operations and Maintenance Plan*).

Appendix

-
- M1 – Englewood Drive Noise Monitoring Summary
 - M2 – Whittier Road Noise Monitoring Summary
 - M3 – Spruce Street/Douglas Street Noise Monitoring Summary



M1 – Englewood Drive

Noise Monitoring Summary



101 Walnut Street
Post Office Box 9151
Watertown
Massachusetts 02272
617 924 1770
FAX 617 924 2286

Noise
Monitoring
Data

Notes Taken
By: NBS

Date: 1/35/2010

Project No.:

Site: M1

Weather: cloudy 34° wind

Noise Monitor: Larsen Davis 824

Time Start: 2:10 PM

Duration: 20 Minutes 50

What was the name of the data run? M1 # 5

Results

Leq

55.3

Sketch

Traffic Data Volumes Speeds

- Automobiles
- Medium Trucks
- Heavy Trucks

Notes:

What was the angle of exposure to the highway? 70°

Were there any objects blocking the highway noise sources? (Such as buildings or hills)

Some hills

Were there other roadway or highway noise sources nearby? NO

Were there significant other non-highway noise sources? Wind

SLM & RTA Summary

Translated: 3-Dec-12 15:46:48
 File Translated: C:\Users\qat\Documents\VHB5.slm\dl
 Model Number: 824
 Serial Number: A0184
 Firmware Rev: 4.29
 Software Version: 3.12
 Name: VHB
 Descr1: 101 Walnut Street
 Descr2: Watertown, MA 02471
 Setup: VHBGen1h.ssa
 Setup Descr: VHB-Gen1hr-1sec
 Location: M1 - Englewood Drive
 Note 1:
 Note 2:

Overall Any Data

Start Time: 25-Nov-12 14:10:29
 Elapsed Time: 50:04.3

	A Weight	C Weight	Flat
Leq:	55.3 dBA	67.5 dBC	73.5 dBF
SEL:	90.1 dBA	102.3 dBC	108.3 dBF
Peak:	89.2 dBA	100.7 dBC	105.2 dBF
	11/25/2012 14:43	11/25/2012 14:14	11/25/2012 14:14
Lmax (slow):	62.2 dBA	84.9 dBC	91.3 dBF
	11/25/2012 14:55	11/25/2012 14:14	11/25/2012 14:24
Lmin (slow):	49.9 dBA	57.0 dBC	58.7 dBF
	11/25/2012 14:52	11/25/2012 14:36	11/25/2012 14:36
Lmax (fast):	63.4 dBA	91.6 dBC	98.4 dBF
	11/25/2012 14:14	11/25/2012 14:24	11/25/2012 14:24
Lmin (fast):	49.5 dBA	55.3 dBC	57.0 dBF
	11/25/2012 14:51	11/25/2012 14:36	11/25/2012 14:36
Lmax (impulse):	66.5 dBA	94.8 dBC	101.2 dBF
	11/25/2012 14:43	11/25/2012 14:24	11/25/2012 14:24
Lmin (impulse):	49.7 dBA	57.4 dBC	59.1 dBF
	11/25/2012 14:51	11/25/2012 14:36	11/25/2012 14:36

Spectra

Start Time: 25-Nov-12 14:10:29 Run Time: 50:04.3

Freq Hz	Leq 1/1 Oct	Max 1/1 Oct	Min 1/1 Oct
16	16.4	41.8	-6.5
31.5	25.7	47.4	8.9
63	34.1	51.1	20.7
125	35.4	49.6	23.2
250	38.1	41.7	27.6
500	45.3	49.8	38.6
1000	52.9	55.5	46.4
2000	48.8	57.4	41.5
4000	43.2	59.1	29.4
8000	42.1	56.7	27.2
16000	34.2	46.7	29.4

Ln Start Level:

15 dB	
L 1.00	60.1 dBA
L 5.00	58 dBA
L 50.00	54.7 dBA
L 90.00	52.6 dBA
L 10.00	52.6 dBA
L 99.00	50.7 dBA

Detector:

Fast
 Weighting: A
 SPL Exceedance Level 1: 85.0 dB Exceeded: 0 times
 SPL Exceedance Level 2: 60 dB Exceeded: 17 times
 Peak-1 Exceedance Level: 105 dB Exceeded: 0 times
 Peak-2 Exceedance Level: 100 dB Exceeded: 0 times
 Hysteresis: 2
 Overloaded: 0 time(s)
 Paused: 0 times for 00:00:00

Current Any Data

Start Time: 25-Nov-12 14:10:29
 Elapsed Time: 50:04.3

	A Weight	C Weight	Flat
Leq:	55.3 dBA	67.5 dBC	73.5 dBF
SEL:	90.1 dBA	102.3 dBC	108.3 dBF
Peak:	89.2 dBA	100.7 dBC	105.2 dBF
	11/25/2012 14:43	11/25/2012 14:14	11/25/2012 14:14
Lmax (slow):	62.2 dBA	84.9 dBC	91.3 dBF
	11/25/2012 14:55	11/25/2012 14:14	11/25/2012 14:24
Lmin (slow):	49.9 dBA	57.0 dBC	58.7 dBF
	11/25/2012 14:52	11/25/2012 14:36	11/25/2012 14:36
Lmax (fast):	63.4 dBA	91.6 dBC	98.4 dBF
	11/25/2012 14:14	11/25/2012 14:24	11/25/2012 14:24
Lmin (fast):	49.5 dBA	55.3 dBC	57.0 dBF
	11/25/2012 14:51	11/25/2012 14:36	11/25/2012 14:36
Lmax (impulse):	66.5 dBA	94.8 dBC	101.2 dBF
	11/25/2012 14:43	11/25/2012 14:24	11/25/2012 14:24
Lmin (impulse):	49.7 dBA	57.4 dBC	59.1 dBF
	11/25/2012 14:51	11/25/2012 14:36	11/25/2012 14:36

Calibrated:

6/7/2000 8:11 Offset: -46.0 dB
 Checked: 11/25/2012 11:49 Level: 114.0 dB
 Calibrator not set Level: 114.0 dB
 Cal Records Count: 0

Interval Records:

Enabled Number Interval Rec: 1
 History Records: Enabled Number History Rec: 3006
 Run/Stop Records: Number Run/Stop Re: 2



101 Walnut Street
Post Office Box 9151
Watertown
Massachusetts 02272
617 924 1770
FAX 617 924 2286

Noise
Monitoring
Data

Notes Taken
By: NBS

Date: 11/24/2012

Project No.:

Site: MIT

Weather: Clear 30° High 45°

Noise Monitor: Larsen Davis 824

Time Start: 11:30 AM

Duration: 20 Minutes

What was the name of the data run? MIT - #1

Results

Leq

51.6 dBA

Sketch

Traffic Data Volumes Speeds

- Automobiles
- Medium Trucks
- Heavy Trucks

Notes:

What was the angle of exposure to the highway? 90°

Were there any objects blocking the highway noise sources? (Such as buildings or hills)

SOME TREES

Were there other roadway or highway noise sources nearby? NO

Were there significant other non-highway noise sources? WIND

SLM & RTA Summary

Translated: 3-Dec-12 15:40:27
 File Translated: C:\Users\qtat\Documents\VHB1.slmld
 Model Number: 824
 Serial Number: A0184
 Firmware Rev: 4.29
 Software Version: 3.12
 Name: VHB
 Descr1: 101 Walnut Street
 Descr2: Watertown, MA 02471
 Setup: VHBGen1h.ssa
 Setup Descr: VHB-Gen1hr-1sec
 Location: M1 - Englewood Drive
 Note 1:
 Note 2:

Overall Any Data

Start Time: 24-Nov-12 23:34:48
 Elapsed Time: 50:06.8

	A Weight	C Weight	Flat
Leq:	51.6 dBA	59.7 dBC	64.1 dBF
SEL:	86.4 dBA	94.4 dBC	98.9 dBF
Peak:	92.4 dBA	90.8 dBC	95.6 dBF
	11/25/2012 0:22	11/25/2012 0:22	11/25/2012 0:13
Lmax (slow):	61.6 dBA	77.2 dBC	84.0 dBF
	11/25/2012 0:12	11/25/2012 0:13	11/25/2012 0:13
Lmin (slow):	41.8 dBA	48.7 dBC	39.5 dBF
	11/25/2012 0:18	11/24/2012 23:53	11/24/2012 23:34
Lmax (fast):	64.4 dBA	82.0 dBC	88.4 dBF
	11/24/2012 23:55	11/25/2012 0:13	11/25/2012 0:13
Lmin (fast):	41.5 dBA	47.6 dBC	38.8 dBF
	11/25/2012 0:18	11/25/2012 0:18	11/24/2012 23:34
Lmax (impulse):	68.5 dBA	84.6 dBC	91.0 dBF
	11/25/2012 0:22	11/25/2012 0:13	11/25/2012 0:13
Lmin (impulse):	41.7 dBA	49.1 dBC	39.1 dBF
	11/25/2012 0:18	11/24/2012 23:53	11/24/2012 23:34

Spectra

Start Time:	24-Nov-12	23:34:48	Run Time:	50:06.8
Leq 1/1 Oct	Max 1/1 Oct	Min 1/1 Oct		
16	7.4	---	-6.5	
31.5	18	28.3	-6.5	
63	28.7	37.4	10.3	
125	28.2	36.8	16.7	
250	31.9	40.2	22.6	
500	42.2	63.1	32.8	
1000	49.6	59.7	37.4	
2000	45.2	52.1	31.2	
4000	36.3	40.1	25.3	
8000	34.1	33.1	26.2	
16000	30.9	30.9	29.2	

Ln Start Level: 15 dB

L 1.00	57.7 dBA
L 5.00	55.3 dBA
L 50.00	50.4 dBA
L 90.00	46.6 dBA
L 10.00	46.6 dBA
L 99.00	43.5 dBA

Detector:

Fast
 Weighting: A
 SPL Exceedance Level 1: 85.0 dB Exceeded: 0 times
 SPL Exceedance Level 2: 60 dB Exceeded: 6 times
 Peak-1 Exceedance Level: 105 dB Exceeded: 0 times
 Peak-2 Exceedance Level: 100 dB Exceeded: 0 times
 Hysteresis: 2
 Overloaded: 0 time(s)
 Paused: 0 times for 00:00:00.0

Current Any Data

Start Time: 24-Nov-12 23:34:48
 Elapsed Time: 50:06.8

	A Weight	C Weight	Flat
Leq:	51.6 dBA	59.7 dBC	64.1 dBF
SEL:	86.4 dBA	94.4 dBC	98.9 dBF
Peak:	92.4 dBA	90.8 dBC	95.6 dBF
	11/25/2012 0:22	11/25/2012 0:22	11/25/2012 0:13
Lmax (slow):	61.6 dBA	77.2 dBC	84.0 dBF
	11/25/2012 0:12	11/25/2012 0:13	11/25/2012 0:13
Lmin (slow):	41.8 dBA	48.7 dBC	39.5 dBF
	11/25/2012 0:18	11/24/2012 23:53	11/24/2012 23:34
Lmax (fast):	64.4 dBA	82.0 dBC	88.4 dBF
	11/24/2012 23:55	11/25/2012 0:13	11/25/2012 0:13
Lmin (fast):	41.5 dBA	47.6 dBC	38.8 dBF
	11/25/2012 0:18	11/25/2012 0:18	11/24/2012 23:34
Lmax (impulse):	68.5 dBA	84.6 dBC	91.0 dBF
	11/25/2012 0:22	11/25/2012 0:13	11/25/2012 0:13
Lmin (impulse):	41.7 dBA	49.1 dBC	39.1 dBF
	11/25/2012 0:18	11/24/2012 23:53	11/24/2012 23:34

Calibrated:

6/7/2000 8:11 Offset: -46.0 dB
 Checked: 11/25/2012 11:49 Level: 114.0 dB
 Calibrator: not set Level: 114.0 dB
 Cal Records Count: 1

Interval Records: Enabled Number Interval Re 2
 History Records: Enabled Number History Re 3008
 Run/Stop Records: Number Run/Stop I 2



M2 – Whittier Road

Noise Monitoring Summary



101 Walnut Street
Post Office Box 9151
Watertown
Massachusetts 02272
617 924 1770
FAX 617 924 2286

Noise
Monitoring
Data

Notes Taken
By: NBS

Date: 11/25/2008

Project No.:

Site: MZ

Weather: cloudy 35° LIGHT WIND

Noise Monitor: Larsen Davis 824

Time Start: 1:15 PM SUMMER

Duration: 20 Minutes TO

What was the name of the data run? MZ # 4

Results

Leq

42.6 Leq dBA

Sketch

Traffic Data Volumes Speeds

- Automobiles
- Medium Trucks
- Heavy Trucks

Notes:

What was the angle of exposure to the highway? 0

Were there any objects blocking the highway noise sources? (Such as buildings or hills) hills

Were there other roadway or highway noise sources nearby? NO

Were there significant other non-highway noise sources? WIND

SLM & RTA Summary

Translated: 9-Dec-12 15:45:23
 File Translated: C:\Users\jqtat\Documents\VHB4.slm.dl
 Model Number: 824
 Serial Number: A0184
 Firmware Rev: 4.29
 Software Version: 3.12
 Name: VHB
 Descr1: 101 Walnut Street
 Descr2: Watertown, MA 02471
 Setup: VHBGen1h.ssa
 Setup Descr: VHB-Gen1hr-1sec
 Location: M2 - Whittier Road
 Note 1:
 Note 2:

Overall Any Data

Start Time: 25-Nov-12 13:15:27
 Elapsed Time: 50:07.6

	A Weight	C Weight	Flat
Leq:	42.6 dBA	60.1 dBC	66.4 dBF
SEL:	77.4 dBA	94.9 dBC	101.2 dBF
Peak:	81.2 dBA	90.8 dBC	98.6 dBF
	11/25/2012 13:21	11/25/2012 13:49	11/25/2012 13:51
Lmax (slow):	52.3 dBA	80.1 dBC	87.6 dBF
	11/25/2012 13:21	11/25/2012 13:51	11/25/2012 13:51
Lmin (slow):	38.9 dBA	49.6 dBC	52.1 dBF
	11/25/2012 13:23	11/25/2012 13:23	11/25/2012 13:44
Lmax (fast):	60.8 dBA	83.2 dBC	90.8 dBF
	11/25/2012 13:21	11/25/2012 13:51	11/25/2012 13:51
Lmin (fast):	38.4 dBA	47.6 dBC	49.7 dBF
	11/25/2012 13:23	11/25/2012 13:23	11/25/2012 13:23
Lmax (impulse):	65.7 dBA	86.0 dBC	94.3 dBF
	11/25/2012 13:21	11/25/2012 13:51	11/25/2012 13:51
Lmin (impulse):	38.7 dBA	50.7 dBC	52.6 dBF
	11/25/2012 13:23	11/25/2012 13:44	11/25/2012 13:44

Spectra

Start Time: 25-Nov-12 13:15:27 Run Time: 50:07.6

Freq Hz	Leq 1/1 Oct	Max 1/1 Oct	Min 1/1 Oct
16	16	9.4	-6.5
31.5	31.5	18.4	-5.3
63	63	24.8	10.7
125	125	31	15.7
250	250	33.1	21.2
500	500	37.1	30.5
1000	1000	38.1	32.6
2000	2000	31.1	25
4000	4000	29.1	24
8000	8000	29.2	26
16000	16000	30.3	29.2

Ln Start Level:

15 dB
 L1.00 48.2 dBA
 L5.00 45.4 dBA
 L50.00 41.8 dBA
 L90.00 40.3 dBA
 L10.00 40.3 dBA
 L99.00 39.3 dBA

Detector:

Fast
 Weighting: A
 SPL Exceedance Level 1: 85.0 dB Exceeded: 0 times
 SPL Exceedance Level 2: 60 dB Exceeded: 0 times
 Peak-1 Exceedance Level: 105 dB Exceeded: 0 times
 Peak-2 Exceedance Level: 100 dB Exceeded: 0 times
 Hysteresis: 2
 Overloaded: 0 time(s)
 Paused: 0 times for 00:00:00.0

Current Any Data

Start Time: 25-Nov-12 13:15:27
 Elapsed Time: 50:07.6

	A Weight	C Weight	Flat
Leq:	42.6 dBA	60.1 dBC	66.4 dBF
SEL:	77.4 dBA	94.9 dBC	101.2 dBF
Peak:	81.2 dBA	90.8 dBC	98.6 dBF
	11/25/2012 13:21	11/25/2012 13:49	11/25/2012 13:51
Lmax (slow):	52.3 dBA	80.1 dBC	87.6 dBF
	11/25/2012 13:21	11/25/2012 13:51	11/25/2012 13:51
Lmin (slow):	38.9 dBA	49.6 dBC	52.1 dBF
	11/25/2012 13:23	11/25/2012 13:23	11/25/2012 13:44
Lmax (fast):	60.8 dBA	83.2 dBC	90.8 dBF
	11/25/2012 13:21	11/25/2012 13:51	11/25/2012 13:51
Lmin (fast):	38.4 dBA	47.6 dBC	49.7 dBF
	11/25/2012 13:23	11/25/2012 13:23	11/25/2012 13:23
Lmax (impulse):	65.7 dBA	86.0 dBC	94.3 dBF
	11/25/2012 13:21	11/25/2012 13:51	11/25/2012 13:51
Lmin (impulse):	38.7 dBA	50.7 dBC	52.6 dBF
	11/25/2012 13:23	11/25/2012 13:44	11/25/2012 13:44

Calibrated:

6/7/2000 B:11 Offset: -46.0 dB
 Checked: 11/25/2012 11:49 Level: 114.0 dB
 Calibrator: not set Level: 114.0 dB
 Cal Records Count: 0

Interval Records: Enabled Number Interval Rec: 1
 History Records: Enabled Number History Rec: 3009
 Run/Stop Records: Number Run/Stop Rec: 2



101 Walnut Street
Post Office Box 9151
Watertown
Massachusetts 02272
617 924 1770
FAX 617 924 2286

Noise
Monitoring
Data

Notes Taken
By: NBS

Date: 11/25/2002

Project No.:

Site:

Weather: 30° clear light wind

Noise Monitor: Larsen Davis 824

Time Start: 12:30 AM Sunday

Duration: 20 Minutes 50

What was the name of the data run? VAZ 02

Results

Sketch

Leq

Traffic Data Volumes Speeds

- Automobiles
- Medium Trucks
- Heavy Trucks

Notes:

What was the angle of exposure to the highway? 0

Were there any objects blocking the highway noise sources? (Such as buildings or hills) Hill

Were there other roadway or highway noise sources nearby? No

Were there significant other non-highway noise sources? Wind

SLM & RTA Summary

Translated: 3-Dec-12 15:42:43
 File Translated: C:\Users\qat\Documents\VHB2.slmidl
 Model Number: 824
 Serial Number: A0184
 Firmware Rev: 4.29
 Software Version: 3.12
 Name: VHB
 Descr1: 101 Walnut Street
 Descr2: Watertown, MA 02471
 Setup: VHBGen1h.ssa
 Setup Descr: VHB-Gen1hr-1sec
 Location: M2 - Whittier Road
 Note 1:
 Note 2:

Overall Any Data

Start Time: 25-Nov-12 0:29:06
 Elapsed Time: 50:07.3

	A Weight	C Weight	Flat
Leq:	40.6 dBA	60.8 dBC	67.5 dBF
SEL:	75.4 dBA	95.6 dBC	102.3 dBF
Peak:	80.2 dBA	98.0 dBC	102.5 dBF
	11/25/2012 0:29	11/25/2012 0:29	11/25/2012 0:29
Lmax (slow):	53.0 dBA	84.8 dBC	91.6 dBF
	11/25/2012 0:29	11/25/2012 0:29	11/25/2012 0:29
Lmin (slow):	35.2 dBA	43.1 dBC	45.9 dBF
	11/25/2012 1:09	11/25/2012 1:13	11/25/2012 1:13
Lmax (fast):	59.4 dBA	88.6 dBC	94.9 dBF
	11/25/2012 0:29	11/25/2012 0:29	11/25/2012 0:29
Lmin (fast):	34.9 dBA	41.3 dBC	43.6 dBF
	11/25/2012 1:09	11/25/2012 1:17	11/25/2012 1:17
Lmax (impulse):	63.5 dBA	91.9 dBC	97.8 dBF
	11/25/2012 0:29	11/25/2012 0:29	11/25/2012 0:29
Lmin (impulse):	35.0 dBA	43.9 dBC	47.0 dBF
	11/25/2012 1:09	11/25/2012 1:13	11/25/2012 1:13

Spectra

Start Time: 25-Nov-12 0:29:06 Run Time: 50:07.3

Freq Hz	Leq 1/1 Oct	Max 1/1 Oct	Min 1/1 Oct
16	13.1	---	-6.5
31.5	18.5	20.7	-6.5
63	23.2	26.1	0.5
125	25	32.3	8.5
250	30.2	42.7	16
500	33.4	43.5	23.8
1000	35.4	46.2	24.1
2000	31.6	47.9	22.9
4000	30.5	50.3	23.6
8000	30	53.2	25.9
16000	30.3	39.1	29.1

Ln Start Level:

15 dB
L 1.00 48.9 dBA
L 5.00 44.8 dBA
L 50.00 39.1 dBA
L 90.00 36 dBA
L 100.00 36 dBA
L 99.00 35.4 dBA

Detector:

Fast
 Weighting: A
 SPL Exceedance Level 1: 85.0 dB Exceeded: 0 times
 SPL Exceedance Level 2: 60 dB Exceeded: 0 times
 Peak-1 Exceedance Level: 105 dB Exceeded: 0 times
 Peak-2 Exceedance Level: 100 dB Exceeded: 0 times
 Hysteresis: 2
 Overloaded: 0 time(s)
 Paused: 0 times for 00:00:00.0

Current Any Data

Start Time: 25-Nov-12 0:29:06
 Elapsed Time: 50:07.3

	A Weight	C Weight	Flat
Leq:	40.6 dBA	60.8 dBC	67.5 dBF
SEL:	75.4 dBA	95.6 dBC	102.3 dBF
Peak:	80.2 dBA	98.0 dBC	102.5 dBF
	11/25/2012 0:29	11/25/2012 0:29	11/25/2012 0:29
Lmax (slow):	53.0 dBA	84.8 dBC	91.6 dBF
	11/25/2012 0:29	11/25/2012 0:29	11/25/2012 0:29
Lmin (slow):	35.2 dBA	43.1 dBC	45.9 dBF
	11/25/2012 1:09	11/25/2012 1:13	11/25/2012 1:13
Lmax (fast):	59.4 dBA	88.6 dBC	94.9 dBF
	11/25/2012 0:29	11/25/2012 0:29	11/25/2012 0:29
Lmin (fast):	34.9 dBA	41.3 dBC	43.6 dBF
	11/25/2012 1:09	11/25/2012 1:17	11/25/2012 1:17
Lmax (impulse):	63.5 dBA	91.9 dBC	97.8 dBF
	11/25/2012 0:29	11/25/2012 0:29	11/25/2012 0:29
Lmin (impulse):	35.0 dBA	43.9 dBC	47.0 dBF
	11/25/2012 1:09	11/25/2012 1:13	11/25/2012 1:13

Calibrated:

6/7/2000 8:11 Offset: -46.0 dB
 Checked: 11/25/2012 11:49 Level: 114.0 dB
 Calibrator not set Level: 114.0 dB
 Cal Records Count: 0

Interval Records:

Enabled Number Interval Record 1
 History Records: Enabled Number History Record: 3009
 Run/Stop Records: Number Run/Stop Reco: 2



M3 – Spruce Street/Douglas Street

Noise Monitoring Summary

Record #	Date	Day	Time	Duration	L _{Aeq} (MPO prop.)	L _{Aeq} (prop. line)*	Day/Night	Threshold	Below Threshold	Comment
Reference Distances (measured / calculated):					110	150				
1	2012/11/21	Wed	16:07:16	00:52:43.6	57.1	55.1	Day	60	Yes	Set-Up Monitor (noise)
2	2012/11/21	Wed	17:00:00	01:00:00.0	51.9	49.8	Day	60	Yes	
3	2012/11/21	Wed	18:00:00	01:00:00.0	55.0	53.0	Day	60	Yes	Daytime High
4	2012/11/21	Wed	19:00:00	01:00:00.0	50.6	48.6	Day	60	Yes	
5	2012/11/21	Wed	20:00:00	01:00:00.0	47.9	45.8	Day	60	Yes	
6	2012/11/21	Wed	21:00:00	01:00:00.0	46.5	44.5	Day	60	Yes	
7	2012/11/21	Wed	22:00:00	01:00:00.0	44.1	42.1	Night	50	Yes	
8	2012/11/21	Wed	23:00:00	01:00:00.0	43.2	41.2	Night	50	Yes	
9	2012/11/22	Thur	00:00:00	01:00:00.0	39.6	37.6	Night	50	Yes	
10	2012/11/22	Thur	01:00:00	01:00:00.0	38.0	36.0	Night	50	Yes	
11	2012/11/22	Thur	02:00:00	01:00:00.0	42.4	40.4	Night	50	Yes	
12	2012/11/22	Thur	03:00:00	01:00:00.0	33.6	31.6	Night	50	Yes	
13	2012/11/22	Thur	04:00:00	01:00:00.0	35.0	33.0	Night	50	Yes	
14	2012/11/22	Thur	05:00:00	01:00:00.0	38.7	36.7	Night	50	Yes	
15	2012/11/22	Thur	06:00:00	01:00:00.0	38.4	36.3	Night	50	Yes	
16	2012/11/22	Thur	07:00:00	01:00:00.0	41.7	39.7	Day	60	Yes	MPO Closed - Thanksgiving Day
17	2012/11/22	Thur	08:00:00	01:00:00.0	41.6	39.6	Day	60	Yes	MPO Closed - Thanksgiving Day
18	2012/11/22	Thur	09:00:00	01:00:00.0	41.8	39.8	Day	60	Yes	MPO Closed - Thanksgiving Day
19	2012/11/22	Thur	10:00:00	01:00:00.0	39.5	37.5	Day	60	Yes	MPO Closed - Thanksgiving Day
20	2012/11/22	Thur	11:00:00	01:00:00.0	41.8	39.8	Day	60	Yes	MPO Closed - Thanksgiving Day
21	2012/11/22	Thur	12:00:00	01:00:00.0	40.7	38.6	Day	60	Yes	MPO Closed - Thanksgiving Day
22	2012/11/22	Thur	13:00:00	01:00:00.0	40.6	38.6	Day	60	Yes	MPO Closed - Thanksgiving Day
23	2012/11/22	Thur	14:00:00	01:00:00.0	39.3	37.3	Day	60	Yes	MPO Closed - Thanksgiving Day
24	2012/11/22	Thur	15:00:00	01:00:00.0	40.3	38.3	Day	60	Yes	MPO Closed - Thanksgiving Day
25	2012/11/22	Thur	16:00:00	01:00:00.0	44.3	42.3	Day	60	Yes	MPO Closed - Thanksgiving Day
26	2012/11/22	Thur	17:00:00	01:00:00.0	47.2	45.2	Day	60	Yes	MPO Closed - Thanksgiving Day
27	2012/11/22	Thur	18:00:00	01:00:00.0	48.4	46.4	Day	60	Yes	MPO Closed - Thanksgiving Day
28	2012/11/22	Thur	19:00:00	01:00:00.0	49.8	47.8	Day	60	Yes	MPO Closed - Thanksgiving Day
29	2012/11/22	Thur	20:00:00	01:00:00.0	51.2	49.1	Day	60	Yes	
30	2012/11/22	Thur	21:00:00	01:00:00.0	51.4	49.4	Day	60	Yes	
31	2012/11/22	Thur	22:00:00	01:00:00.0	51.4	49.4	Night	50	Yes	MPO Open - Black-Friday
32	2012/11/22	Thur	23:00:00	01:00:00.0	51.5	49.5	Night	50	Yes	Nighttime High
33	2012/11/23	Fri	00:00:00	01:00:00.0	51.2	49.2	Night	50	Yes	MPO Open - Black-Friday
34	2012/11/23	Fri	01:00:00	01:00:00.0	50.3	48.2	Night	50	Yes	MPO Open - Black-Friday
35	2012/11/23	Fri	02:00:00	01:00:00.0	49.1	47.1	Night	50	Yes	MPO Open - Black-Friday
36	2012/11/23	Fri	03:00:00	01:00:00.0	48.5	46.4	Night	50	Yes	MPO Open - Black-Friday
37	2012/11/23	Fri	04:00:00	01:00:00.0	48.4	46.4	Night	50	Yes	Nighttime Low
38	2012/11/23	Fri	05:00:00	01:00:00.0	49.5	47.5	Night	50	Yes	MPO Open - Black-Friday
39	2012/11/23	Fri	06:00:00	01:00:00.0	50.4	48.3	Night	50	Yes	MPO Open - Black-Friday
40	2012/11/23	Fri	07:00:00	01:00:00.0	52.2	50.2	Day	60	Yes	
41	2012/11/23	Fri	08:00:00	01:00:00.0	52.3	50.3	Day	60	Yes	
42	2012/11/23	Fri	09:00:00	01:00:00.0	51.8	49.8	Day	60	Yes	
43	2012/11/23	Fri	10:00:00	01:00:00.0	50.4	48.4	Day	60	Yes	
44	2012/11/23	Fri	11:00:00	01:00:00.0	49.8	47.8	Day	60	Yes	
45	2012/11/23	Fri	12:00:00	01:00:00.0	52.1	50.1	Day	60	Yes	
46	2012/11/23	Fri	13:00:00	01:00:00.0	51.6	49.5	Day	60	Yes	
47	2012/11/23	Fri	14:00:00	01:00:00.0	52.0	50.0	Day	60	Yes	
48	2012/11/23	Fri	15:00:00	01:00:00.0	52.5	50.5	Day	60	Yes	
49	2012/11/23	Fri	16:00:00	01:00:00.0	52.9	50.9	Day	60	Yes	
50	2012/11/23	Fri	17:00:00	01:00:00.0	53.7	51.7	Day	60	Yes	
51	2012/11/23	Fri	18:00:00	01:00:00.0	51.8	49.8	Day	60	Yes	
52	2012/11/23	Fri	19:00:00	01:00:00.0	51.0	49.0	Day	60	Yes	
53	2012/11/23	Fri	20:00:00	01:00:00.0	50.2	48.2	Day	60	Yes	
54	2012/11/23	Fri	21:00:00	01:00:00.0	48.9	46.8	Day	60	Yes	
55	2012/11/23	Fri	22:00:00	01:00:00.0	48.6	46.6	Night	50	Yes	Nighttime High
56	2012/11/23	Fri	23:00:00	01:00:00.0	47.6	45.6	Night	50	Yes	
57	2012/11/24	Sat	00:00:00	01:00:00.0	44.5	42.4	Night	50	Yes	
58	2012/11/24	Sat	01:00:00	01:00:00.0	43.7	41.6	Night	50	Yes	
59	2012/11/24	Sat	02:00:00	01:00:00.0	44.0	42.0	Night	50	Yes	
60	2012/11/24	Sat	03:00:00	01:00:00.0	44.2	42.2	Night	50	Yes	
61	2012/11/24	Sat	04:00:00	01:00:00.0	44.1	42.1	Night	50	Yes	
62	2012/11/24	Sat	05:00:00	01:00:00.0	43.9	41.8	Night	50	Yes	
63	2012/11/24	Sat	06:00:00	01:00:00.0	45.0	43.0	Night	50	Yes	
64	2012/11/24	Sat	07:00:00	01:00:00.0	46.0	44.0	Day	60	Yes	
65	2012/11/24	Sat	08:00:00	01:00:00.0	47.8	45.8	Day	60	Yes	
66	2012/11/24	Sat	09:00:00	01:00:00.0	50.9	48.9	Day	60	Yes	
67	2012/11/24	Sat	10:00:00	01:00:00.0	50.4	48.4	Day	60	Yes	
68	2012/11/24	Sat	11:00:00	01:00:00.0	51.0	48.9	Day	60	Yes	
69	2012/11/24	Sat	12:00:00	01:00:00.0	51.1	49.1	Day	60	Yes	
70	2012/11/24	Sat	13:00:00	01:00:00.0	51.8	49.8	Day	60	Yes	
71	2012/11/24	Sat	14:00:00	01:00:00.0	51.3	49.3	Day	60	Yes	
72	2012/11/24	Sat	15:00:00	01:00:00.0	51.9	49.9	Day	60	Yes	
73	2012/11/24	Sat	16:00:00	01:00:00.0	51.1	49.1	Day	60	Yes	
74	2012/11/24	Sat	17:00:00	01:00:00.0	49.8	47.8	Day	60	Yes	
75	2012/11/24	Sat	18:00:00	01:00:00.0	48.9	46.9	Day	60	Yes	
76	2012/11/24	Sat	19:00:00	01:00:00.0	47.9	45.9	Day	60	Yes	
77	2012/11/24	Sat	20:00:00	01:00:00.0	47.0	44.9	Day	60	Yes	
78	2012/11/24	Sat	21:00:00	01:00:00.0	47.0	45.0	Day	60	Yes	
79	2012/11/24	Sat	22:00:00	01:00:00.0	46.8	44.7	Night	50	Yes	
80	2012/11/24	Sat	23:00:00	01:00:00.0	42.8	40.8	Night	50	Yes	
81	2012/11/25	Sun	00:00:00	01:00:00.0	40.5	38.5	Night	50	Yes	
82	2012/11/25	Sun	01:00:00	01:00:00.0	35.4	33.3	Night	50	Yes	
83	2012/11/25	Sun	02:00:00	01:00:00.0	40.4	38.4	Night	50	Yes	
84	2012/11/25	Sun	03:00:00	01:00:00.0	39.1	37.0	Night	50	Yes	Nighttime Low
85	2012/11/25	Sun	04:00:00	01:00:00.0	36.7	34.6	Night	50	Yes	
86	2012/11/25	Sun	05:00:00	01:00:00.0	37.7	35.7	Night	50	Yes	
87	2012/11/25	Sun	06:00:00	01:00:00.0	40.5	38.4	Night	50	Yes	
88	2012/11/25	Sun	07:00:00	01:00:00.0	42.6	40.6	Day	60	Yes	Daytime Low
89	2012/11/25	Sun	08:00:00	01:00:00.0	44.8	42.7	Day	60	Yes	
90	2012/11/25	Sun	09:00:00	01:00:00.0	46.2	44.2	Day	60	Yes	
91	2012/11/25	Sun	10:00:00	01:00:00.0	48.0	46.0	Day	60	Yes	
92	2012/11/25	Sun	11:00:00	01:00:00.0	48.4	46.4	Day	60	Yes	
93	2012/11/25	Sun	12:00:00	01:00:00.0	49.5	47.5	Day	60	Yes	
94	2012/11/25	Sun	13:00:00	01:00:00.0	50.0	48.0	Day	60	Yes	
95	2012/11/25	Sun	14:00:00	01:00:00.0	50.4	48.4	Day	60	Yes	
96	2012/11/25	Sun	15:00:00	00:12:42.3	52.8	50.8	Day	60	Yes	Break-Down Monitor (noise)

* The L_{Aeq} (prop. line) value is calculated from the measured results on the MPO property using the principals of noise propagation.

Summary

Filename VHB.005 M3 - Spruce St / Douglas St
Serial Number 2555
Model 831
Firmware Version 2.000
User VHB
Location MPO - M3 - Spruce St / Douglas St
Job Description
Note
Measurement Description
Start 2012/11/21 16:07:16
Stop 2012/11/25 15:12:42
Duration 3 Days 23:05:25.9
Run Time 3 Days 23:05:18.0
Pause 0:00:07.9

Pre Calibration 2012/11/21 15:47:51
Post Calibration None
Calibration Deviation ---

Overall Settings

RMS Weight A Weighting
Peak Weight A Weighting
Detector Slow
Preamp PRM831
Integration Method Linear
OBA Range Normal
OBA Bandwidth 1/3 Octave
OBA Freq. Weighting A Weighting
OBA Max Spectrum Bin Max
Gain 0.0 dB
Overload 143.7 dB

	A	C	Z
Under Range Peak	76.2	73.2	78.2 dB
Under Range Limit	26.3	26.6	32.1 dB
Noise Floor	17.1	17.4	22.7 dB

Results

LAeq	49.0 dB		
LAE	104.3 dB		
EA	2.996 mPa ² h		
LApeak (max)	2012/11/21 16:10:12	107.6 dB	
LASmax	2012/11/21 16:10:12	79.4 dB	
LASmin	2012/11/25 4:02:53	25.7 dB	
SEA	-99.9 dB		

LAS > 60.0 dB (Exceedence Counts / Duration)	116	626.2 s
LAS > 85.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0	0.0 s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0	0.0 s

Community Noise

	Ldn	LDay 07:00-22:00	LNight 22:00-07:00	Lden	LDay 07:00-19:00	LEvening 19:00-22:00	LNight 22:00-07:00
	53.3		50.2	46.1 53.3	50.3	49.4	46.1
LCeq	59.2 dB						
LAeq	49.0 dB						
LCeq - LAeq	10.2 dB						
LAteq	50.5 dB						
LAeq	49.0 dB						
LAteq - LAeq	1.6 dB						
# Overloads	0						
Overload Duration	0.0 s						
# OBA Overloads	0						
OBA Overload Duration	0.0 s						

Statistics

LAS1.00	55.3 dB
LAS5.00	53.3 dB
LAS10.00	52.3 dB
LAS50.00	47.0 dB
LAS70.00	42.6 dB
LAS90.00	35.7 dB

Distance Correction Calculation

Line Sources (Traffic)	Equation to Determine Sound Level at a Receptor Location using Reference Sound Level & Distance	Sound Level Reductions for Doubling of the Distance
<i>Hard Ground</i>	$RSL - (10 * \text{LOG}(D/D_0))$	3
<i>Soft Ground</i>	$RSL - (15 * \text{LOG}(D/D_0))$	4.5
Stationary Sources		
<i>Hard Ground</i>	$RSL - (20 * \text{LOG}(D/D_0))$	6
<i>Soft Ground</i>	$RSL - (25 * \text{LOG}(D/D_0))$	7.5

RSL = Reference Sound Level

D = distance between sensitive receptor and noise source

D₀ = distance between noise source and location where reference sound level was measured

Location M3 (Douglas & Spruce St):

Reference Sound Level, dB(A)

Reference Distance, feet

Distance to Receptor Location, feet

Source/Ground Type Coefficient

Receptor Location Sound Level, dB(A)

51.5

110

150

15

49.5

Black Friday at 11:00 PM on MPO Property



SPRUCE

R=217.27
A-I=209.57
B-I=210.67
C-I=208.27
(24" CMP)

R=216.89
I=213.09

SHED

SHED

M3
M4

METLAND 'D'

4'x4' BOX CULVERT
(SEE BOX CULVERT
DETAIL)

110' 150'

105'

170'

226.5-TW
212.0± BW

228.5-TW
212.5± BW

230.0 TW
214.0± BW



30' ROP

213.9

216

220

224

228

230

234

238

242

30' ROP

215

218

222

226

230

234

238

242

246

30' ROP

219

222

226

230

234

238

242

246

250

30' ROP

223

226

230

234

238

242

246

250

254

30' ROP

227

230

234

238

242

246

250

254

258

30' ROP

231

234

238

242

246

250

254

258

262

30' ROP

235

238

242

246

250

254

258

262

266

30' ROP

239

242

246

250

254

258

262

266

270

30' ROP

243

246

250

254

258

262

266

270

274

30' ROP

247

250

254

258

262

266

270

274

278

DRAP