

e-Memo

Date: MAY/28/2015

Proposal No.: 15.05.101

To: James Smith, JD Sound and Audio

Subject(s): Mountain Lakes High School Football Field Noise Assessment

Attachment(s): njac7_29.pdf, Weather History Mountain Lakes NJ 2015-5-21.pdf, Measurement Result Copy.xlsx

Prepared by Hadi Sumoro

Client's Requirements

- ❖ Excessive noise spill to residential area is noticed during a football event.
- ❖ Noise assessment is requested.

Environmental Observation and Measurement Preparation



- ❖ Mountain Lakes high school football field (HSFB) utilizes point source sound system design as shown in the picture.
- ❖ Three loudspeakers are installed on one pole and one loudspeaker is installed on another pole for side fill. This is a typical HSFB sound system installation.

- ❖ Measurement was conducted on May 21, 2015. Please see 'Weather History Mountain Lakes NJ 2015-5-21.pdf' for weather forecast history. Wind was low and temperature gradient was less than 10F during measurement period (12pm – 4pm).
- ❖ Program material to be used as noise sources were prepared before the visit. Two wave files were created: a Speech Program Material (10 minutes 24 seconds) and a Music Program Material (11 minutes 37 seconds). A typical event contains 90% speech and 10% music. The speech program material was created to model a typical event. Since the noise complaints also include low frequency program material, music program material was also used and contains three examples of typical high school football field music. The measurement length period is targeted for a 10 minute assessment (for each speech and program material), however due to interference from unauthorized individuals and unstable background noises, the net (after extraneous noises are removed) measurement time is 378s – 450s.
- ❖ Background noise (residual noise) was taken to have a net measurement time of 120s.
- ❖ Noise SPL sample is taken every 1s (i.e in 100s net measurement, there are 100 samples).

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Extraneous Noise Description

- ❖ All extraneous noises are excluded for analysis. The SPL meter provides a back-erase (10s) feature that was constantly used during measurement.
- ❖ Wind gusts that exceed 12mph (happened only once) were recorded and the measurement time during the gust is excluded.
- ❖ Unauthorized individuals present near SPL meter location often create disturbance to the measurement.
- ❖ Unstable background noises are very difficult to deal with. This includes:
 - Kids' activity in the field
 - Megaphone from athletic teacher
 - Kids' screaming at distance and in the field
 - Airplane traffic (very often)

All extraneous noises were marked and back-erase function was utilized. Since the program material time is only 10-11min, the minimum practical measurement target of the net noise assessment analysis is reduced to 5 min / 300s. This condition is achieved/exceeded. All measurements that have a net period of less than 5 min (too much disturbance or waiting for the noise to go away) are discarded. Only three set of measurements are valid.

Any uncertainty during measurement will be regarded as extraneous noise and was excluded using back-erase feature.

Noise Assessment Procedure

- ❖ As previously explained in page 1, two program materials were prepared. The program materials are being played back in the field and one position is taken as a loudness reference. This reference position is the front row of visitor's bleacher at the middle location. The sound system is playing back the program materials and the volume is turned up to an appropriate level that approximates what the spectators sitting on the visitor bleacher would hear during an event. This reference level was measured at $Leq = 61.5$ dBA for speech program material and $Leq = 65.5$ dBA for music program material. The electronic volume was not changed during measurement period and two different locations in the neighborhood were chosen to evaluate the relative level.

Note: The reference playback level in the visitor bleacher is considered too low for a football field general event. A typical football field may have background noise of >70 dBA. For a sound system to create an intelligible output, the sound pressure level (SPL) shall be 10dB higher than the background noise. This is important in the event of emergency.

- ❖ Noise assessment locations:
 - 136 Kenilworth rd., backyard, near the swamp area, in the middle of trees/shrubs.
 - 39 Briarcliff rd., backyard, near the lake.

Equipments

Equipment was rented from Scantek inc. and all devices were annually calibrated. All of the equipment was sufficiently warmed up before each measurement/calibration.

Norsonic Nor140 Class1 with windscreen (electronic correction for windscreen is used during measurement) as an integrating SPL meter with logging and back erase function.

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540-1994 Part 1
ACCREDITED BY NVLAP (an ILAC MRA signatory)

NVLAP
NVLAP Lab Code: 200625-0

Calibration Certificate No. 33290

Instrument: **Sound Level Meter**
Model: **140**
Manufacturer: **Norsonic**
Serial number: **1405046**
Tested with: **Microphone 1225 s/n 142437**
Preamplifier 1209 s/n 14553
Type (class): **1**
Customer: **Scantek, Inc.**
Tel/Fax: **410-290-7726 / 410-290-9167**

Date Calibrated: **2/20/2015** Cal Due: **2/20/2016**
Status: **Received** Sent
In tolerance: **X** **X**
Out of tolerance:
See comments:
Contains non-accredited tests: **Yes X, No**
Calibration service: **Basic X, Standard**
Address: **6430 Dobbin Road, Suite C, Columbia, MD 21045**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/22/2012
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Due	Traceability evidence	Cal. Lab / Accreditation	Cal. Due
4835-Norsonic	SMS Cal Line	31052	Oct 7, 2014	Scantek, Inc./ NVLAP	Oct 7, 2015	
DS-160-SMS	Function Generator	33384	Sep 30, 2013	ACR Env./AZLA	Oct 30, 2015	
34401A-Agilant Technologies	Digital Voltmeter	US56120781	Oct 3, 2014	ACR Env./AZLA	Oct 3, 2015	
HM30-Thomson	Metrop Station	10401709993	Oct 3, 2014	ACR Env./AZLA	Oct 3, 2015	
PC Program 2019-Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.		
1233-Norsonic	Calibrator	30878	Nov 10, 2014	Scantek, Inc./ NVLAP	Nov 10, 2015	

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:
Temperature (°C): 24.1
Barometric pressure (kPa): 101.37
Relative Humidity (%): 30.6

Calibrated by: **Lydon Dawkins** Authorized signatory: **Mariana Buzduga**
Signature: *Lydon Dawkins* Signature: *Mariana Buzduga*
Date: **2/20/2015** Date: **2/20/2015**

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory. This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.
Document stored: Z:\Calibration Lab\SLM 2015\Nor140_1405046_M3.doc Page 1 of 2

Results summary: Device complies with following clauses of mentioned specifications:

CLAUSES FROM IEC/ANSI STANDARDS	REFERENCES IN PROCEURES	RESULT**	EXPANDED UNCERTAINTY (coverage factor 2) (dB)
INDICATION AT THE CALIBRATION CHECK FREQUENCY - ANSI S1.4 CLAUSE 3.3		Passed	0.15
LEVEL LINEARITY TEST - ANSI S1.4-1983, CLAUSE 6.9 & 6.10		Passed	0.25
WEIGHTING NETWORK TEST: A NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1		Passed	0.25
WEIGHTING NETWORK TEST: C NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1		Passed	0.25
WEIGHTING NETWORK TEST: LINEAR NETWORK - ANSI S1.4-1983 CLAUSE 8.2.1		Passed	0.25
CYCLING DETECTOR TEST: A NETWORK - ANSI S1.4-1983 CLAUSE 8.3.2		Passed	0.25
F/V/PEAK TEST: STEADY STATE RESPONSE - ANSI S1.4-1983 CLAUSE 8.4		Passed	0.25
FAST-SLOW TEST: OVERSHOOT TEST - ANSI S1.4-1983 CLAUSE 8.4.1		Passed	0.25
SINGLE SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.1 & 8.4.3		Passed	0.25
IMPULSE TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.3		Passed	0.25
IMPULSE TEST: SINGLE SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.1 & 8.4.3		Passed	0.25
PEAK DETECTOR TEST: SINGLE SQUARE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.4		Passed	0.25
RMS DETECTOR TEST: CREST FACTOR TEST - ANSI S1.4-1983 CLAUSE 8.4.2		Passed	0.25
RMS DETECTOR TEST: CONTINUOUS SINE WAVE BURST - ANSI S1.4-1983 CLAUSE 8.4.2		Passed	0.25
TIME AVERAGING TEST: AVERAGING FUNCTIONS - ANSI S1.43 CLAUSE 9.3.3		Passed	0.25
LINEARITY TEST - ANSI S1.43 CLAUSE 9.3.3		Passed	0.25
FILTER TEST 1/OCTAVE: RELATIVE ATTENUATION - IEC 61510, CLAUSE 4.4 & 4.5.3		Passed	0.25
FILTER TEST 1/OCTAVE: RELATIVE ATTENUATION - IEC 61510, CLAUSE 4.4 & 4.5.3		Passed	0.25
SUMMATION OF ACOUSTIC TESTS - ANSI S1.4 CLAUSE 5 USING ACTUATOR		Passed	0.2-0.3

1. The results of this calibration apply only to the instrument type with serial number identified in this report.
2. Parameters are certified at actual environmental conditions.
3. The tests marked with (*) are not covered by the current NVLAP accreditation.

Comments: The instrument was tested and met all specifications found in the referenced procedures.

Note: The instrument was tested for the parameters listed in the table above, using the test methods described in the listed standards. All tests were performed around the reference conditions. The test results were compared with the manufacturer's or with the standard's specifications, whichever are larger. Compliance with any standard cannot be claimed based solely on the periodic tests.

Tests made with the following attachments to the instrument:
Microphone: Norsonic 1225 s/n 142437 for acoustical test
Preamplifier: Norsonic 1209 s/n 14553 for all tests
Other: line adaptor ADP005 (18pF) for electrical tests
Accompanying acoustical calibrator: none
Windscreen: none

Measured Data: in Test Report # 33290 of 12 + 1 pages.

Place of Calibration: Scantek, Inc.
6430 Dobbin Road, Suite C
Columbia, MD 21045 USA
Ph/Fax: 410-290-7726/ 9167
call@scantek.com

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory. This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.
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Rion NC-74 Class 1 mic calibrator is used before and after each measurement period. The unit is annually calibrated.



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Temperature and humidity were monitored using Extech HD500. Wind speed was monitored using Extech AN100.

Specifications	Range	Basic Accuracy
InfraRed Thermometer	-58 to 932°F (-50 to 500°C)	±2% or ±4°F/2°C
Distance to Target Ratio	30:1	
Type K Temperature	-148 to 2501°F (-100 to 1372°C)	±(1% + 1°C)
Air Temperature	14 to 140°F (-10 to 60°C)	±(2% ±4°F/2°C)
RH Range	0 to 100%RH	±2%RH
Dew Point	-90.4 to 140°F (-68 to 60°C)	
Wet Bulb	-6.88 to 140°F (-21.6 to 60°C)	
Dimensions	10 x 2.9 x 2" (255 x 75 x 50mm)	
Weight	12.3oz (350g)	

HD500 spec

Specifications	Range	Resolution	Basic Accuracy
Air Velocity	0.40 to 30.00 m/s	0.01 m/s	±3% m/s
	1.4 to 108.0 km/h	0.1 km/h	±3% km/h
	80 to 5906 ft/min	1 ft/min	±3% ft/min
	0.9 to 67.2 mph	0.1 mph	±3% mph
	0.8 to 58.3 knots	0.1 knots	±3% knots
Air Temperature	14 to 140°F (-10 to 60°C)	0.1°F/°C	±6.0°F (3°C)
InfraRed Temperature (AN200 Only)	-58 to -4°F (-50 to -20°C)	0.1°F/°C	±9.0°F (5.0°C)
	-4 to 500°F (-20 to 260°C)	1°F/°C	±2% reading or ±2°F (°C) whichever is greater
Airflow			
AN100	0 to 9999 CMM (m³/min)	0.1	
	0 to 9999 CFM (ft³/min)	0.1	
AN200	0 to 999,999 CMM (m³/min)	0.1	
	0 to 999,999 CFM (ft³/min)	0.1	
Dimensions/Weight	7 x 2.9 x 1.3" (178 x 74 x 33mm)/1.6lbs (700g)		

AN100 Spec

Additional Notes:

The picture below is taken at the Briarcliff location during preparation.



During the measurement, the SPL meter's microphone is facing toward the imaginary point of the sound source.

SPL meter is approximately 1.3m above the ground, mounted on a microphone stand.

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Measurement Definitions

SPL: Sound Pressure Level, the level of a sound measured in dB units with a SPL meter.

dBA: A-weighted SPL, ignores low frequency.

dBC: C-weighted SPL, full range spectrum (20-20000Hz).

Leq: Equivalent continuous SPL, average sound level over the period of the measurement.

Fast/Slow weighting: Time weighting, fast time constant equals to 125ms and slow (often referred as continuous) time constant equals to 1s.

L₁₀: SPL with fast time constant, which is exceeded for 10 percent of the measurement period. Note: For speech program material, this value is equivalent to the loud period (such as music playback) of the event. For music program material, this value is equivalent to the loudest part of the music (such as chorus).

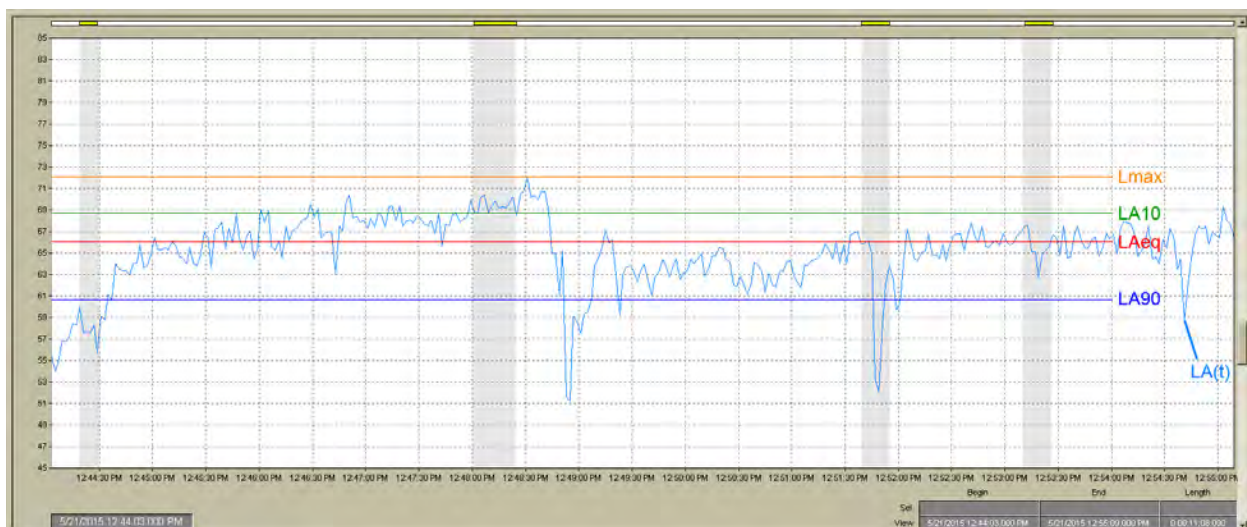
L₉₀: SPL with fast time constant, which is exceeded for 90 percent of the measurement period.

L_{max}: The maximum measured SPL during the measurement period. Note: Due to unstable background noise, L_{max} measurement may not be accurate. Although extraneous sounds are mostly removed, nearby birds or other critters can contribute to a peak SPL in a short duration.

Background Noise: Ambient noise, exclusive of extraneous sound and the sound from the source of interest.

Note: Please also see njac7_29.pdf for more definitions.

A graphic illustration to further explain several definitions above can be noted below.



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Measurement Result

The Total/Raw level is the measured SPL. The Corrected level is the measured SPL minus background noise. Due to unstable background noise, several measurement resulted in a background noise that is slightly higher than the total measured SPL. The corrected level follows the higher SPL and is marked in italics.

Wind speed measurement only reports the gust/maximum wind during the measurement period. Temperature, humidity and wind speed are monitored throughout the measurement period.

The program material playback levels are not changed electronically. If reference = 70dB, and at property line = 50dB, bringing down the level 10dB from the source will result in the same relative level, i.e reference will be 60dB and at property line will be 40dB.

Lmax level is for informational purposes only. The measurement may not be accurate due to unstable background noise and the maximum level may happen only at 1 sample (1s) throughout the measurement period.

Octave band analysis is only performed to background noise and music program material measurements.

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Date	5/21/2015					
Location	Visitor Bleacher, front row, middle					
Calibration Time	Before 12:24pm	After 1:03pm	Info 0.3dB off			
Weather Condition	Temp 73.2F	Humidity 20.10%	Wind (Max) 7.3mph			
Measurement# 1	Background Noise					
120s total	Leq	56.2 dBA	61 dBC			
10% = 12s	Lmax	67.1 dBA (slow)	67.6 dBC (slow)			
90% = 108s		71.5 dBA (fast)	70.8 dBC (fast)			
	L10	59.1 dBA (fast)	64.2 dBC (fast)			
	L90	45.5 dBA (fast)	56.5 dBC (fast)			
	Associated NOR140 Files					
				Back. Noise	12	
				Speech	11	
				Music	13	
	Frequency (Hz)	Leq (dB)	Lmax (slow)	L10 (fast)		
	Octave band	dB	dB	dB		
	31.5	58.6	67.7	63		
	63	55.2	61.6	57.8		
	125	52.6	58.4	54.7		
	250	47.1	56.9	49.3		
	500	45.9	53.5	49.6		
	1000	51.8	61.3	55.5		
	2000	52.4	65.1	53.3		
	4000	38.9	53.9	39.6		
	8000	22.8	37	24.2		
Measurement# 2	Speech Program Material (Total/Raw Measurement)					
494s total	Leq	62.6 dBA	72.1 dBC			
10% = 49s	Lmax	71.8 dBA (slow)	79.5 dBC (slow)			
90% = 444s		75 dBA (fast)	81.2 dBC (fast)			
	L10	66 dBA (fast)	76.2 dBC (fast)			
	L90	54.9 dBA (fast)	64.4 dBC (fast)			
	Speech Program Material (Corrected)					
	Leq	61.5 dBA	71.7 dBC			
	Lmax	70.0 dBA (slow)	79.2 dBC (slow)			
		72.4 dBA (fast)	80.8 dBC (fast)			
	L10	65.0 dBA (fast)	75.9 dBC (fast)			
	L90	54.4 dBA (fast)	63.6 dBC (fast)			
Measurement# 3	Music Program Material (Total/Raw Measurement)					
600s total	Leq	66 dBA	76.6 dBC			
10% = 60s	Lmax	72.1 dBA (slow)	80.9 dBC (slow)			
90% = 540s		74.2 dBA (fast)	83.2 dBC (fast)			
	L10	68.7 dBA (fast)	79.3 dBC (fast)			
	L90	60.6 dBA (fast)	69.7 dBC (fast)			
	Music Program Material (Corrected)					
	Leq	65.5 dBA	76.5 dBC			
	Lmax	70.4 dBA (slow)	80.7 dBC (slow)			
		70.9 dBA (fast)	82.9 dBC (fast)			
	L10	68.2 dBA (fast)	79.2 dBC (fast)			
	L90	60.5 dBA (fast)	69.5 dBC (fast)			
	Frequency (Hz)	Total/Raw Measurement			Corrected	
	Octave band	Leq (dB)	Lmax (slow)	L10 (fast)	Leq (dB)	Lmax (slow)
		dB	dB	dB	dB	dB
	31.5	59.1	73.7	59.6	49.5	72.4
	63	69	74.2	72.5	68.8	74.0
	125	75.1	80.3	78.4	75.1	80.3
	250	66.7	72.5	69.5	66.7	72.4
	500	59	66.5	62.4	58.8	66.3
	1000	59	65.3	62.4	58.1	63.1
	2000	59.4	68.4	63.2	58.4	65.7
	4000	53.2	60.4	57	53.0	59.3
	8000	38.2	46.7	41.6	38.1	46.2
Background Noise Descriptio	Tree and leaves sound, kids on the field playing & screaming (continuously), birds sound at distance, car on roadways at distance, airplanes					

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Date	5/21/2015					
Location	136 Kenilworth Rd, backyard near swamp, under trees and between shrubs					
Calibration Time	Before 1:28pm	After 2:01pm	Info 0.1dB off			
Weather Condition	Temp 69.9F	Humidity 38.90%	Wind (Max)	3mph		
Measurement# 1	Background Noise					
123s total	Leq	44.7 dBA	57.8 dBC			
10% = 12s	Lmax	53 dBA (slow)	61.1 dBC (slow)			
90% = 110s		50.9 dBA (fast)	61.9 dBC (fast)			
	L10	45.9 dBA (fast)	59.1 dBC (fast)			
	L90	43.1 dBA (fast)	56.3 dBC (fast)			
		Frequency (Hz)	Leq (dB)	Lmax (slow)	L10 (fast)	
		Octave band	dB	dB	dB	
		31.5	55	57.9	57.1	
		63	54.8	58.4	56.7	
		125	49.6	54.6	51.6	
		250	46.5	54.9	48.6	
		500	44.4	52.6	46.2	
		1000	38.4	45.2	39.5	
		2000	30.8	45.4	32.2	
		4000	24.3	38.3	26.8	
		8000	20.7	34.5	18.7	
Measurement# 2	Speech Program Material (Total/Raw Measurement)					
473s total	Leq	48.8 dBA	60.1 dBC			
10% = 47s	Lmax	67.3 dBA (slow)	71.4 dBC (slow)			
90% = 425s		56.2 dBA (fast)	65.6 dBC (fast)			
	L10	51 dBA (fast)	62.3 dBC (fast)			
	L90	45.4 dBA (fast)	57.5 dBC (fast)			
	Speech Program Material (Corrected)					
	Leq	46.7 dBA	56.2 dBC			
	Lmax	67.1 dBA (slow)	71.0 dBC (slow)			
		54.7 dBA (fast)	63.2 dBC (fast)			
	L10	49.4 dBA (fast)	59.5 dBC (fast)			
	L90	41.5 dBA (fast)	51.3 dBC (fast)			
Measurement# 3	Music Program Material (Total/Raw Measurement)					
500s total	Leq	51.8 dBA	63.2 dBC			
10% = 50s	Lmax	61.4 dBA (slow)	68.4 dBC (slow)			
90% = 450s		58.5 dBA (fast)	69 dBC (fast)			
	L10	53.7 dBA (fast)	65.1 dBC (fast)			
	L90	48.3 dBA (fast)	59.1 dBC (fast)			
	Music Program Material (Corrected)					
	Leq	50.9 dBA	61.7 dBC			
	Lmax	60.7 dBA (slow)	67.5 dBC (slow)			
		57.7 dBA (fast)	68.1 dBC (fast)			
	L10	52.9 dBA (fast)	63.8 dBC (fast)			
	L90	46.7 dBA (fast)	55.9 dBC (fast)			
	Frequency (Hz)	Total/Raw Measurement			Corrected	
	Octave band	Leq (dB)	Lmax (slow)	L10 (fast)	Leq (dB)	Lmax (slow)
		dB	dB	dB	dB	dB
	31.5	54.9	63.2	57	54.9	61.7
	63	60.4	66.2	63.1	59.0	65.4
	125	57.5	62.2	60.4	56.7	61.4
	250	54.5	64.5	56.8	53.8	64.0
	500	50.5	59.7	53.1	49.3	58.8
	1000	45.4	50.3	47.8	44.4	48.7
	2000	39.2	54.9	41.8	38.5	54.4
	4000	28.6	52.9	31.1	26.6	52.7
	8000	17.8	45.7	19.4	17.8	45.4
Background Noise Descriptio	Birds are closeby and continuously chirping, critters are running around continuously, airplanes, car on roadway at distance, generator noise at distance (con't) and kids are playing/screaming at distance. Lmax measurement may not					

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Date	5/21/2015						
Location	39 Briarcliff Rd., near the lake						
Calibration Time	Before 2:41pm	After 3:12pm	Info	0dB off			
Weather Condition	Temp 71.5F	Humidity 36.80%	Wind (Max)	7.2mph			
Measurement# 1	Background Noise						
121s total	Leq	48.9 dBA	62.9 dBC				
10% = 12s	Lmax	54 dBA (slow)	67 dBC (slow)				
90% = 108s		56.1 dBA (fast)	69.4 dBC (fast)				
	L10	50.6 dBA (fast)	64.6 dBC (fast)				
	L90	45.5 dBA (fast)	60.4 dBC (fast)				
	Frequency (Hz)	Leq (dB)	Lmax (slow)	L10 (fast)			
	Octave band	dB	dB	dB			
	31.5	57.2	59.9	59.1			
	63	61.5	66.7	63.8			
	125	56	59.1	58.3			
	250	49.2	55	52			
	500	45.8	54.2	48.5			
	1000	43.9	47.1	45.6			
	2000	39.4	49.1	40.7			
	4000	33.2	43	36.2			
	8000	22	42.5	23.7			
Measurement# 2	Speech Program Material (Total/Raw Measurement)						
457s total	Leq	49.6 dBA	62.9 dBC				
10% = 45s	Lmax	54.3 dBA (slow)	67.8 dBC (slow)				
90% = 411s		57.5 dBA (fast)	70.8 dBC (fast)				
	L10	51.6 dBA (fast)	65 dBC (fast)				
	L90	46.8 dBA (fast)	60.6 dBC (fast)				
	Speech Program Material (Corrected)						
	Leq	41.3 dBA	62.9 dBC				
	Lmax	42.5 dBA (slow)	60.1 dBC (slow)				
		51.9 dBA (fast)	65.2 dBC (fast)				
	L10	44.7 dBA (fast)	54.4 dBC (fast)				
	L90	40.9 dBA (fast)	47.1 dBC (fast)				
Measurement# 3	Music Program Material (Total/Raw Measurement)						
421s total	Leq	51.9 dBA	64.6 dBC				
10% = 42s	Lmax	57.2 dBA (slow)	70.4 dBC (slow)				
90% = 378s		60.4 dBA (fast)	72 dBC (fast)				
	L10	54.5 dBA (fast)	66.9 dBC (fast)				
	L90	48.4 dBA (fast)	61.6 dBC (fast)				
	Music Program Material (Corrected)						
	Leq	48.9 dBA	59.7 dBC				
	Lmax	54.4 dBA (slow)	67.7 dBC (slow)				
		58.4 dBA (fast)	68.5 dBC (fast)				
	L10	52.2 dBA (fast)	63.0 dBC (fast)				
	L90	45.3 dBA (fast)	55.4 dBC (fast)				
	Frequency (Hz)	Total/Raw Measurement			Corrected		
	Octave band	Leq (dB)	Lmax (slow)	L10 (fast)	Leq (dB)	Lmax (slow)	L10 (fast)
		dB	dB	dB	dB	dB	dB
	31.5	57.8	61.4	60	48.9	56.1	52.7
	63	60.8	68.4	62.8	60.8	63.5	62.8
	125	60.5	66.3	63.7	58.6	65.4	62.2
	250	55.7	62	58.9	54.6	61.0	57.9
	500	48.6	55.3	51.4	45.4	48.8	48.3
	1000	44.5	53	46.8	35.6	51.7	40.6
	2000	39.1	45.7	41.7	39.1	45.7	34.8
	4000	33.2	43.7	36.2	33.2	35.4	36.2
	8000	18.7	39.6	20.8	18.7	39.6	20.8
Background Noise Description	Leaves sound, generators are on/off in 10-20min cycle and may contaminate the measurements (owners are not helping), distance roadway with few loud passing cars, birds are flying close, airplanes. Background noise spectrum keeps						

e-Memo

Data Analysis

The received complaints state that residents do not want to hear any noises from the HSFb sound system. Objectively, this is translated that the noise spill from the HSFb at the residential property line shall be less than the residential background noise.

Description	Speech (dBA)		Music (dBA)		NJAC 7:29 Limit (7am-10pm)
	Leq	L10	Leq	L10	
Reference	61.5	65.0	65.5	68.2	---
Kenilworth	46.7	49.4	50.9	52.9	65dBA
Briarcliff	41.3	44.7	48.9	52.2	

Octave Band (Hz)	136 Kenilworth		39 Briarcliff		NJAC 7:29 Limit (7am-10pm)
	Leq	L10	Leq	L10	
31.5	54.9	57.0	48.9	52.7	96.0
63	59.0	62.0	60.8	62.8	82.0
125	56.7	59.8	58.6	62.2	74.0
250	53.8	56.1	54.6	57.9	67.0
500	49.3	52.1	45.4	48.3	63.0
1000	44.4	47.1	35.6	40.6	60.0
2000	38.5	41.3	39.1	34.8	57.0
4000	26.6	29.1	33.2	36.2	55.0
8000	17.8	11.1	18.7	20.8	53.0

In general, if the visitors' bleachers (middle front row) receive 61.5 – 68.2dBA of SPL, the noise spill at other locations (Kenilworth and Briarcliff) do not exceed the SPL limit stated in NJAC 7:29.

To fulfill the subjective request of the resident, the play back was reduced 12dB to match the background noise. One resident states this is acceptable, and one resident states that if the kids are not screaming in the football field, the noise can still be heard and was not acceptable. Later, it was found that 15dB attenuation is required to completely put the noise spill below the background noise. As stated in page 2, using the current reference output, the SPL is already considered low for a general event and may not be heard properly, especially in the visitors' bleachers. Any reduction in SPL may degrade the function of the sound system, and can present safety issue in the event of emergency.

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