Noise Control Review

All-American Speedway

Roseville, California

Job # 2011-136

Prepared For:

Placer County Fair & Events Center

800 All American City Blvd.
Roseville, California 95678

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November 21, 2011

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INTRODUCTION

The All-American Speedway facility is located at the Placer County Fairgrounds in Roseville, California. Race nights are held primarily on Saturdays from March through October. Adjacent land uses include commercial and residential uses.

This review has been prepared as a follow-up to the previous *Acoustical Assessment* prepared for the All-American Speedway by j.c. brennan & associates, Inc. (Job #2007-095. December 11, 2007).

The purpose of this review is as follows:

- **Review and update locations of sensitive receptors;**
- **Review of previous noise control measures (as recommended 11/9/2007);**
- **Discussion of noise control measures not implemented (if applicable);**
- **Evaluation of effectiveness of existing attenuation methods;**
- **Collect new noise measurement survey data**
- **Evaluate new or modified noise control measures**
- **Develop a noise level monitoring plan**

BACKGROUND ON NOISE AND ACOUSTICAL TERMINOLOGY

Fundamentals of Acoustics

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

The decibel scale is logarithmic, not linear. In other words, two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (L_{dn}) is based upon the average noise level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment.

Table 1 lists several examples of the noise levels associated with common situations. **Appendix A** provides a summary of acoustical terms used in this report.

Table 1 Typical Noise Levels		
Common Outdoor Activities	**Noise Level (dBA)**	**Common Indoor Activities**
	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft)	--100--	
Gas Lawn Mower at 1 m (3 ft)	--90--	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	--80--	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	--70--	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	--60--	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing
Source: Caltrans, Technical Noise Supplement, Traffic Noise Analysis Protocol. November 2009.		

Subjective Reaction to Changes in Noise Levels:

A means of determining a significant change in noise levels is to judge a persons ability to perceive the relative change in overall noise levels. **Table 2** is commonly used to show expected public reaction to changes in environmental noise levels. This table was developed on the basis of test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dB, which is the usual range of voice and interior noise levels.

Table 2
Subjective Reaction to Changes in Noise Levels of Similar Sources

Change in Level, dB	Subjective Reaction	Factor Change In Acoustical Energy
1	Imperceptible (Except for Tones)	1.3
3	Just Barely Perceptible	2.0
6	Clearly Noticeable	4.0
10	About Twice (or Half) as Loud	10.0

Source: *Architectural Acoustics*, M. David Egan, 1988.

Based upon the **Table 2** data, a reduction in overall noise levels of 6 to 10 dB would be considered clearly noticeable and would be a good design goal for any noise reduction plans.

SENSITIVE RECEPTOR LOCATIONS

j.c. brennan & associates, Inc. reviewed the locations of existing and new sensitive receptors in the project area. Two new noise measurement sites were added to the noise measurement survey plan. Noise measurement locations are presented in **Table 3** and shown on **Figure 1**.

Table 3
Noise Monitoring Locations

Location	Location Description	Approximate Distance from Center of Speedway
LT-1	Single Family Residential – Front Porch – 440 Stanford Avenue	800’
LT-2	Single Family Residential – Backyard – 100 Alta Vista Drive	875’
LT-3	Single Family Residential – Backyard - 354 Diamond Oaks Boulevard.	3,810’ [1]
LT-4	Single Family Residential – Backyard – 318 Ironwood Circle. ***(New Measurement Site)***	3,800’ [2]
LT-5	On track berm, turn 4 – 50’ from track centerline.	325’
ST-A	Single Family Residential – Frontyard. NE corner of Niles Avenue & All-American City Boulevard	830’
ST-B	Single Family Residential – Neighborhood park site at Manza Circle and Rowan Street	1,365’ [1]
ST-C	Multi-Family Residential (Under Construction) – Property line – West boundary of Placer County Fairgrounds. ***(New Measurement Site)***	1,770’ [1]

[1] It should be noted that receptors located over 1,000 feet away from the Speedway will see more fluctuation in racing noise levels due to atmospheric effects (wind, temperature, humidity, temperature inversions, etc…). These variations could range between approximately ± 3 to 5 dB.

[2] In addition to variations in atmospheric conditions, receptors located in the Ironwood Circle have a line-of-site to the Speedway that is less obstructed than receptors located along Diamond Oaks Boulevard. The line-of-site from Ironwood Circle to the Speedway is higher off the ground and looks over homes located along Diamond Oaks Boulevard. Therefore, noise levels at these receptors tend to be approximately 3 dB louder. Providing sound attenuation at these receptors is more difficult due to the elevated line-of-site.

Figure 1

Noise Monitoring Locations

All-American Speedway - Roseville, California

Diamond Oaks Area

All-American Speedway Vicinity

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REVIEW OF NOISE CONTROL MEASURES

Previously Recommended Noise Control Measures

j.c. brennan & associates, Inc. recommended a series of noise control methods in November of 2007. The recommended noise control measures are outlined below:

- **Phases 1-2:** Consider practical modifications to the Grandstand and Pit area Public Address systems. Such changes include re-aiming and re-location of various speakers. If the PA systems continue to be an issue, we recommend working with an audio designer to make additional improvements to the PA systems, as feasible.

- **Phases 3-5:** Install Illbruck CA-BBC-7-2" 10' tall exterior acoustical barrier. The preferred placement of the material is on the backside of the racing fence.

  It should be noted that the Illbruck sound barrier material is preferable to plywood as a sound barrier because of its superior acoustical properties, ease of installation, and durability. Also, its surface is sound absorbing which helps to minimize unwanted reflections. However, plywood can be used as an affective noise barrier when constructed properly. Plywood sound wall construction requires tongue and groove joints, overlapping joints, or sealing of joints against air leakage. Plywood sound walls should be constructed with material at least ½ inch thick, or greater, and should be constructed to a minimum height of 8 feet.

Review of Noise Control Measures Implemented

Phases 1-2: Significant changes have been made to the Grandstand PA system. A new speaker array has been installed according to the design specifications of an audio designer. The new array directs sound into the grandstand areas, with minimal sound spillage into the adjacent residential areas. Some changes also appear to have been made to the Pit PA system, including re-aiming and lowering of several speakers. However, the system remains mostly unchanged.

> ***Measured Effectiveness (June 18, 2011):*** *Modifications to the Grandstand PA system significantly lowered PA system noise levels in the project vicinity. PA system noise was observed to be approximately 15-18 dB quieter at the nearest sensitive receptors.*

Phases 3-5: An 8-12 foot tall plywood sound wall was added to the south, east, and northeast sides of the Speedway track in lieu of the Illbruck sound barrier curtain. The plywood barrier meets the ½" thickness requirement. However, the barrier does not include tongue and groove joints, overlapping joints, or sealing of joints. Additionally, viewing panels where cut into the sound wall in several locations. This lowers the effective height of the sound wall from approximately 8 feet to approximately 5 feet.

> ***Measured Effectiveness (June 18, 2011):*** *Construction of the plywood sound barrier appears to have achieved up to a 10 dB reduction at the nearest sensitive receptors to the south of the Speedway. No significant noise reductions were noted at the sensitive*

receptors to the east or northeast. Additionally, it appears that sound reflections off of the plywood barrier may have caused an increase in noise levels at the sensitive residential receptors located north of the Speedway.

SPEEDWAY NOISE LEVELS

In order to quantify the noise generation during racing events, j.c. brennan & associates, Inc. conducted continuous and short-term noise monitoring on September 22, 2007, follow-up noise monitoring was conducted during the NASCAR Whelen series racing event on June 18, 2011. Noise monitoring was also conducted at the NASCAR K&N Pro Series event held on October 14, 2011.

Noise monitoring locations were chosen to represent the residential uses most affected by racing events, and are shown on **Figure 1**. **Figure 2** shows the highest hourly average (L_{eq}) and maximum (L_{max}) noise levels during each of the above-listed races.

Appendix B graphically shows the results of the minute by minute noise level during the main racing events on Saturday June 1, 2011 and Saturday October 15, 2011 at each of the noise measurement locations.

Appendix C graphically presents the monitored noise levels for the Friday and Saturday, June 17-18, 2011 and October 15, 2011 race days.

Instrumentation used for the measurements were Larson Davis Laboratories (LDL) Model 820 and Model 824 precision integrating sound level meters which were calibrated in the field before use with an LDL CAL-200 acoustical calibrator. The measurement systems meet all pertinent specifications of the American National Standards Institute (ANSI) for precision sound level measurement equipment.

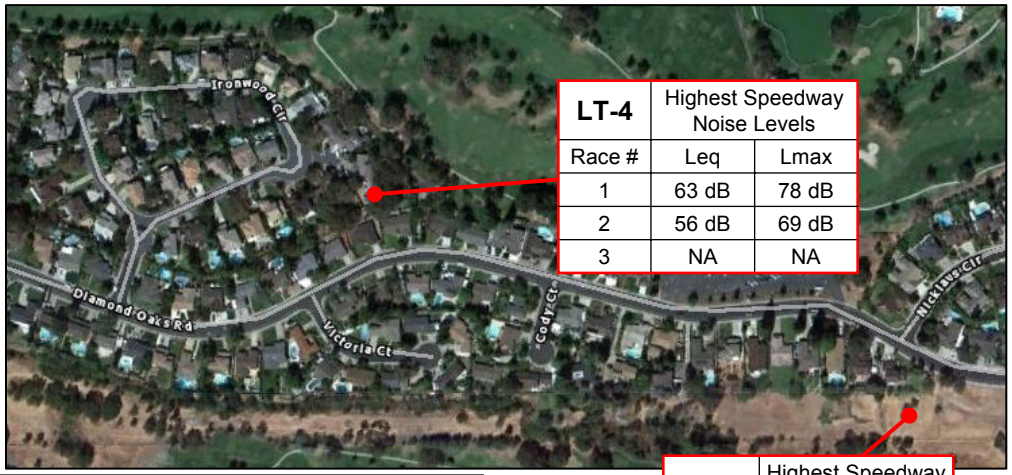
Figure 2

Noise Monitoring Locations and Results

Comparison of Highest Hourly Speedway Noise

1. NASCAR K&N Pro Series: October 15, 2011
2. All-American Speedway Races: June 18, 2011
3. All-American Speedway Races: September 22, 2007

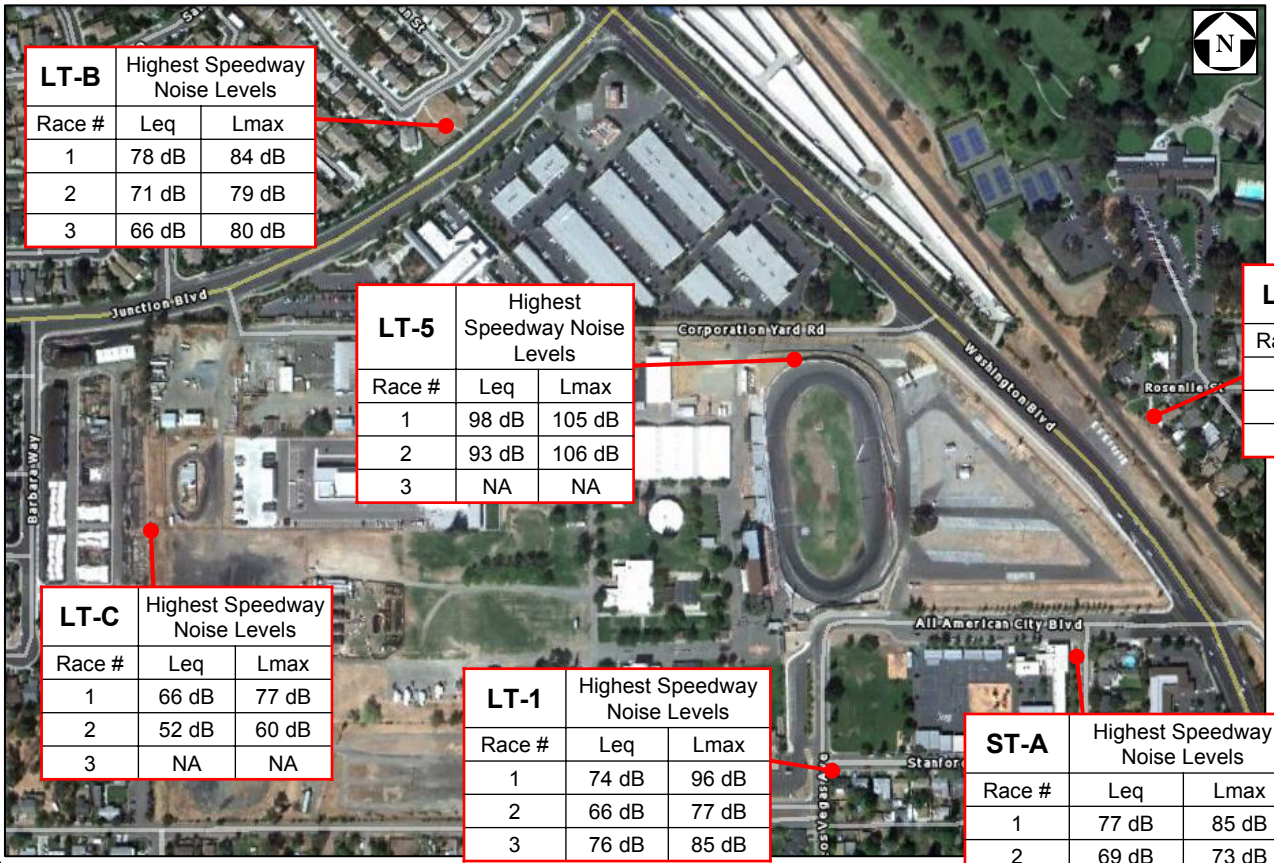
Diamond Oaks Area



LT-4	Highest Speedway Noise Levels	
Race #	Leq	Lmax
1	63 dB	78 dB
2	56 dB	69 dB
3	NA	NA

LT-3	Highest Speedway Noise Levels	
Race #	Leq	Lmax
1	60 dB	74 dB
2	54 dB	68 dB
3	52 dB	71 dB*

* 81 dB previously reported was not from racing.



LT-B	Highest Speedway Noise Levels	
Race #	Leq	Lmax
1	78 dB	84 dB
2	71 dB	79 dB
3	66 dB	80 dB

LT-5	Highest Speedway Noise Levels	
Race #	Leq	Lmax
1	98 dB	105 dB
2	93 dB	106 dB
3	NA	NA

LT-2	Highest Speedway Noise Levels	
Race #	Leq	Lmax
1	74 dB	90 dB
2	64 dB	80 dB
3	66 dB	83 dB

LT-C	Highest Speedway Noise Levels	
Race #	Leq	Lmax
1	66 dB	77 dB
2	52 dB	60 dB
3	NA	NA

LT-1	Highest Speedway Noise Levels	
Race #	Leq	Lmax
1	74 dB	96 dB
2	66 dB	77 dB
3	76 dB	85 dB

ST-A	Highest Speedway Noise Levels	
Race #	Leq	Lmax
1	77 dB	85 dB
2	69 dB	73 dB
3	67 dB	76 dB

All-American Speedway Vicinity

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SUMMARY OF NOISE MONITORING RESULTS

NASCAR Whelen Series Race Event June 18, 2011:

Site 1: (Continuous Sound Monitor Location) – 440 Stanford Avenue

Overall hourly noise levels at this location were measured to be approximately 10 dB less than the levels measured in 2007 during the June 18, 2011 NASCAR Whelen Series races.

In 2007, Grandstand PA system noise was observed to be a significant noise source. During the June 2007 measurements, Grandstand PA system noise levels were not a dominate noise source. Pit PA system noise was still observed as a significant contributor to noise levels at this location.

Noise levels during periods of heavy racing were approximately 80-85 dB during the 2007 measurements and 71-76 dB during the June 2011 noise level measurements.

Site 2: (Continuous Sound Monitor Location) – 100 Alta Vista Avenue

Overall hourly noise levels at this location were measured to be approximately 2-3 dB less than the levels measured in 2007.

Noise levels during periods of heavy racing were approximately 60-74 dB during the 2007 measurements and 60-78 dB during the June 2011 noise level measurements.

Site 3: (Continuous Sound Monitor Location) – 354 Diamond Oaks

Overall hourly noise levels at this location were measured to be approximately 2-3 dB less than the levels measured in 2007.

Noise levels during periods of heavy racing were approximately 50-71 dB during the 2007 measurements and 50-68 dB during the June 2011 noise level measurements.

Site 4: (Continuous Sound Monitor Location) – 318 Ironwood

This was a new noise measurement site added for the June 2011 noise monitoring. Noise levels during periods of heavy racing were approximately 60-66 dB.

Short Term Site A: Southeast Corner of All-American Speedway and Niles Avenue

Noise levels during periods of heavy racing were approximately 70-76 dB during the 2007 measurements and 69-73 dB during the June 2011 noise level measurements.

Short Term Site B: SF Residential Development at Junction and Washington

Racing noise and traffic noise from Junction Blvd. were the primary noise sources at this location. Noise levels during periods of heavy racing were not measureable over traffic noise on Junction Blvd. during the 2007 measurements. During the June 2011 noise measurements, noise levels from periods of heavy racing ranged between 71-79 dB at this location. Traffic noise on Washington Blvd. generated noise levels up to 77-80 dB.

Short Term Site C: New MF Residential Development (Under Construction) Adjacent to West Boundary of Placer County Fairgrounds

This was a new noise measurement site added for the June 2011 noise measurements. Noise levels during racing were clearly audible and measured approximately 50-60 dB during racing events.

NASCAR K&N Pro Series Race Event October 15, 2011:

Site 1: (Continuous Sound Monitor Location) – 440 Stanford Avenue

Overall hourly noise levels at this location were measured to be approximately 8 dB louder at this location, compared to the June 18, 2011 Whelen Series races.

Site 2: (Continuous Sound Monitor Location) – 100 Alta Vista Avenue

Overall hourly noise levels at this location were measured to be approximately 10 dB louder at this location, compared to the June 18, 2011 Whelen Series races.

Site 3: (Continuous Sound Monitor Location) – 354 Diamond Oaks Boulevard

Overall hourly noise levels at this location were measured to be approximately 6 dB louder at this location, compared to the June 18, 2011 Whelen Series races.

Site 4: (Continuous Sound Monitor Location) – 318 Ironwood Circle

Overall hourly noise levels at this location were measured to be approximately 7 dB louder at this location, compared to the June 18, 2011 Whelen Series races.

Short Term Site A: Southeast Corner of All-American Speedway and Niles Avenue

Noise levels during periods of heavy racing were approximately 70-85 dB during the race events.

Short Term Site B: SF Residential Development at Junction and Washington

Racing noise and traffic noise from Junction Blvd. were the primary noise sources at this location. Racing noise levels were measured to range between 75-83 dB.

Short Term Site C: New MF Residential Development (Under Construction) Adjacent to West Boundary of Placer County Fairgrounds

Racing noise was the primary noise sources at this location. Racing noise levels were measured to range between 65-75 dB.

RECOMMENDED NOISE LEVEL MONITORING PLAN (NLMP)

j.c. brennan & associates, Inc. recommends that continuous noise monitoring be conducted during all racing events held at the All-American Speedway. The following outlines the recommended noise monitoring collection and reporting procedures:

- Noise level data should be collected at stationary noise monitoring location located approximately 50 feet from the track centerline to verify compliance with race noise level limits.

- Data collected should include hourly average (L_{eq}) and maximum (L_{max}) noise level statistics during all race events. Data should be collected using the A-weighting network and slow response. Data should be collected a minimum of 5-feet off the ground.

- Noise monitoring equipment should be ANSI Type 1 or Type 2 integrating sound level meter with an appropriate environmental shroud and windscreen. The sound level meter should be regularly laboratory calibrated annually. Field calibration checks should be conducted monthly.

- The sound level data should be tabulated and made available for inspection within 72 hours of the race event.

- The collected data should be reported using the form shown in **Appendix D**. All collected data should be made available for inspection if noise complaints are received.

- The data collection and tabulations should be conducted by a qualified person experienced in the field of environmental noise assessment.

RECOMMENDATIONS:

j.c. brennan & associates, Inc. recommends the following interim noise control procedures be implemented to reduce the potential for annoyance due to Speedway events:

1. Consider scheduling longer races (40-100 laps) earlier in the racing program with shorter races (35 or less) later in the program;

2. Continue scheduling racing vents to end by 10:00 p.m.

3. Black flag cars exceeding a maximum noise levels of 95 dBA at 50 feet (89 dB at 100 feet). The current limit of 82 dBA at 50 feet is not a practical limit as the majority of cars are currently generating noise levels of 90-95 dBA, with some cars up to 105 dBA, at 50 feet. NASCAR K&N Pro Series cars should be limited to 100 dBA, at 50 feet (94 dB at 100 feet).

4. Weekly races should be limited to a maximum noise level of 105 dBA at 50 feet.

5. Fill viewing cutouts in the Speedway sound walls with Plexiglass (or equivalent) having a thickness of 6mm (0.236”), or greater. Caulk gaps in existing sound walls with a flexible and durable caulking. Fill gaps between bottom of sound walls and the ground with additional fill dirt. Increase barrier overlap at pit entrance and exit ramps to minimize sound flanking around the ends of the barriers.

6. Consider replacing the Pit PA system with an FM broadcast system.

7. Monitor noise levels associated with weekly races, according to the NLMP discussed above.

CONCLUSIONS:

Noise control improvements made to the All-American Speedway have reduced hourly noise levels by up to 10 dB at the closest residential receptors. Significant noise reduction was observed from the modifications to the Grandstand PA system.

Further improvements to the project sound walls may be able to achieve additional noise reduction at the residential uses to the south and east. Operational changes as listed above may also help to reduce the potential for noise disturbance to nearby residences. Finally, the proposed noise NLMP will help the Speedway to track racing noise levels and provide data for responding to noise complaints.

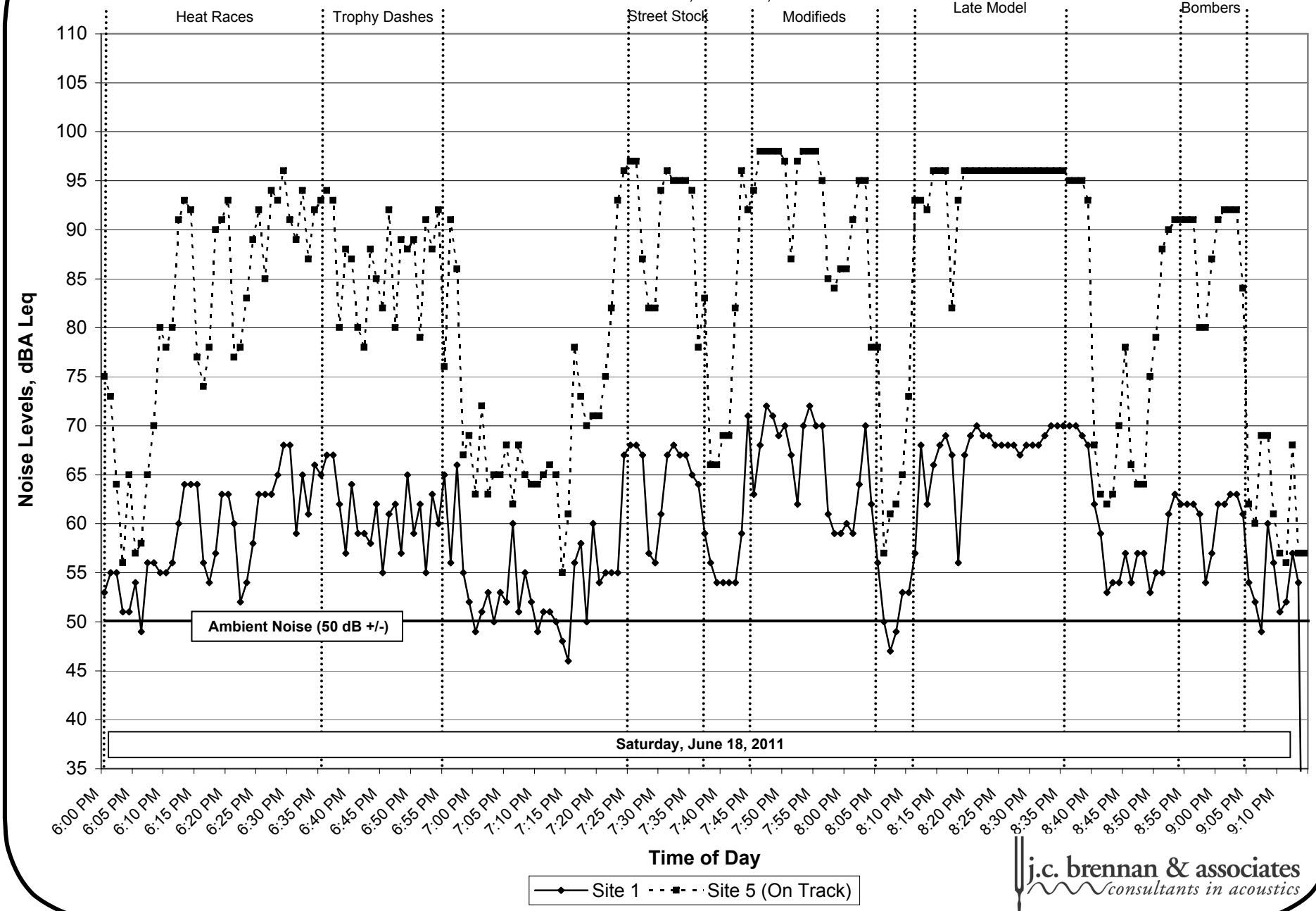
Appendix A
Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	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.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	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.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
L(n)	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.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the "Maximum" level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
SEL	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy into a one-second event.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

Appendix B-1

One-Minute Noise Levels vs. Time - Site 1

AAS Points Race, June 18, 2011



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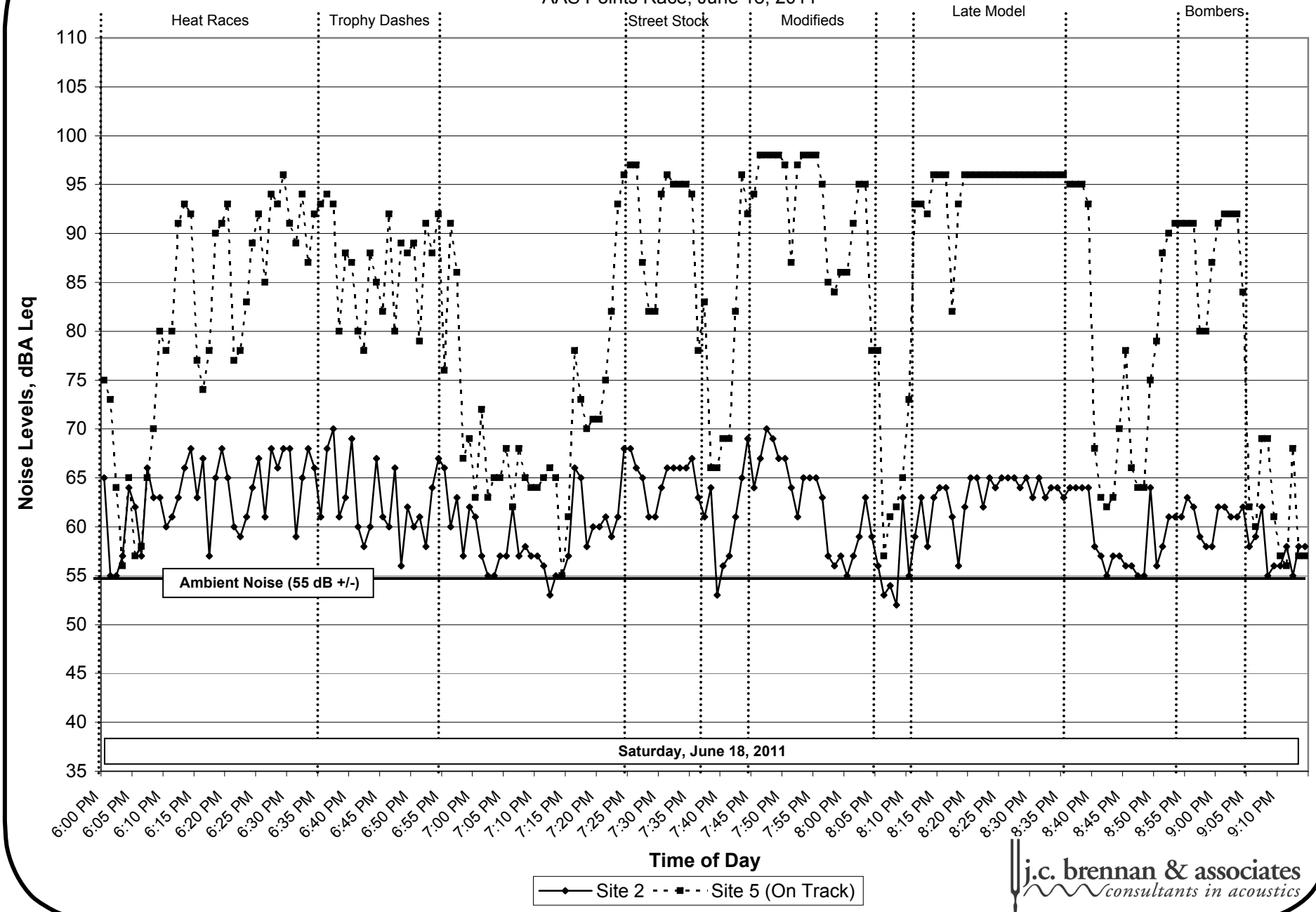
Appendix B-2

One-Minute Noise Levels vs. Time - Site 2

AAS Points Race, June 18, 2011



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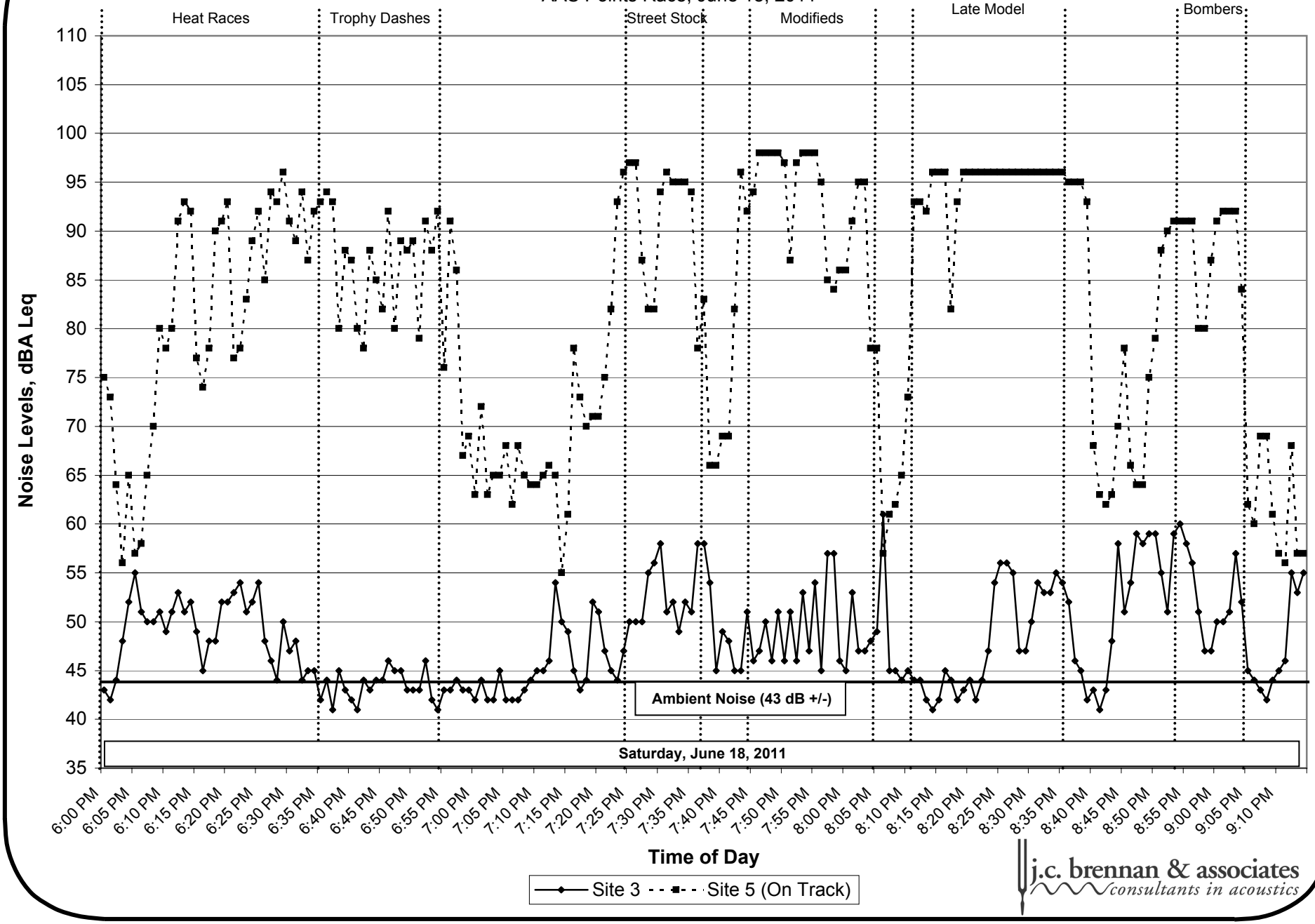
Appendix B-3

One-Minute Noise Levels vs. Time - Site 3

AAS Points Race, June 18, 2011



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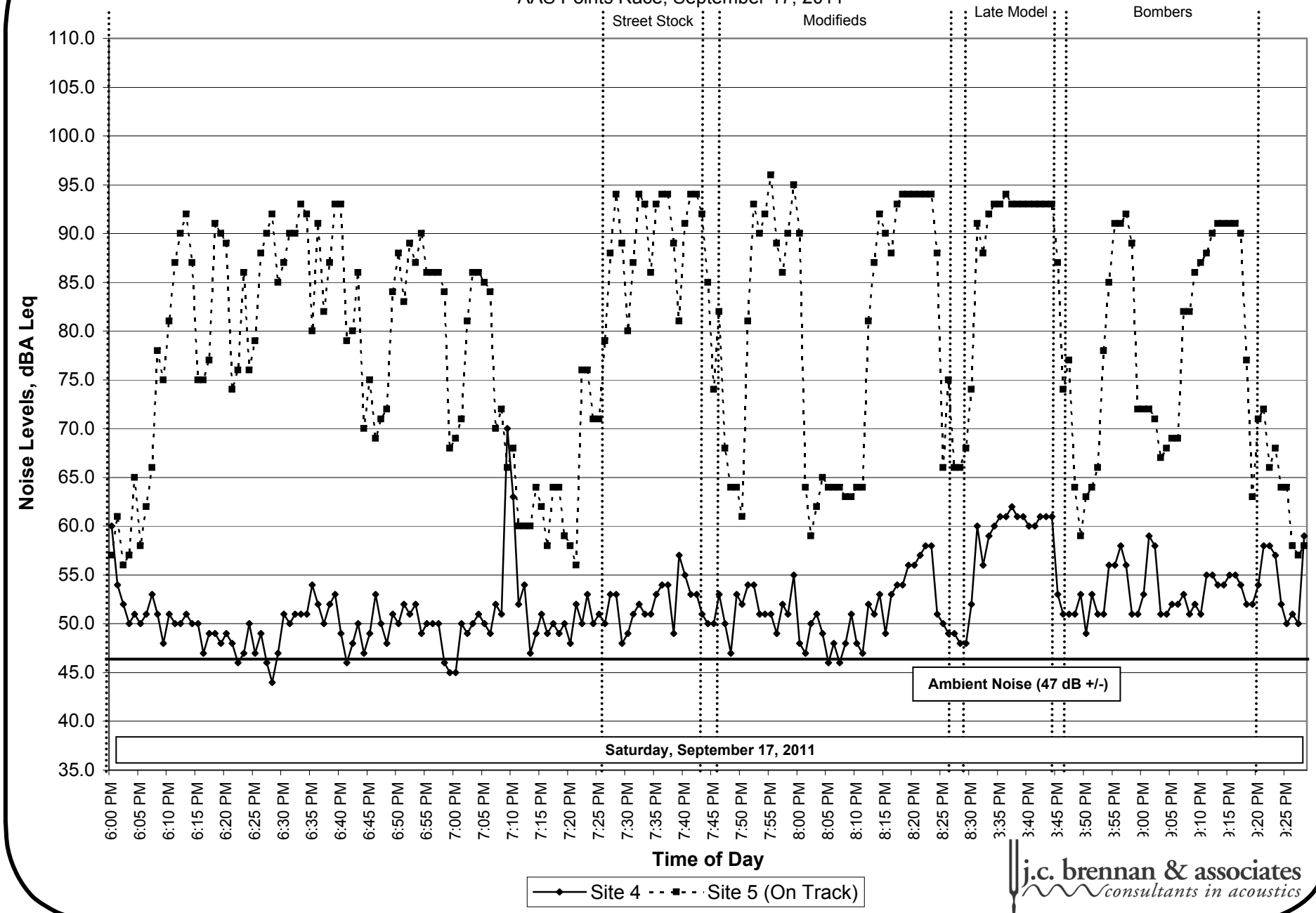
Appendix B-4

One-Minute Noise Levels vs. Time - Site 4

AAS Points Race, September 17, 2011



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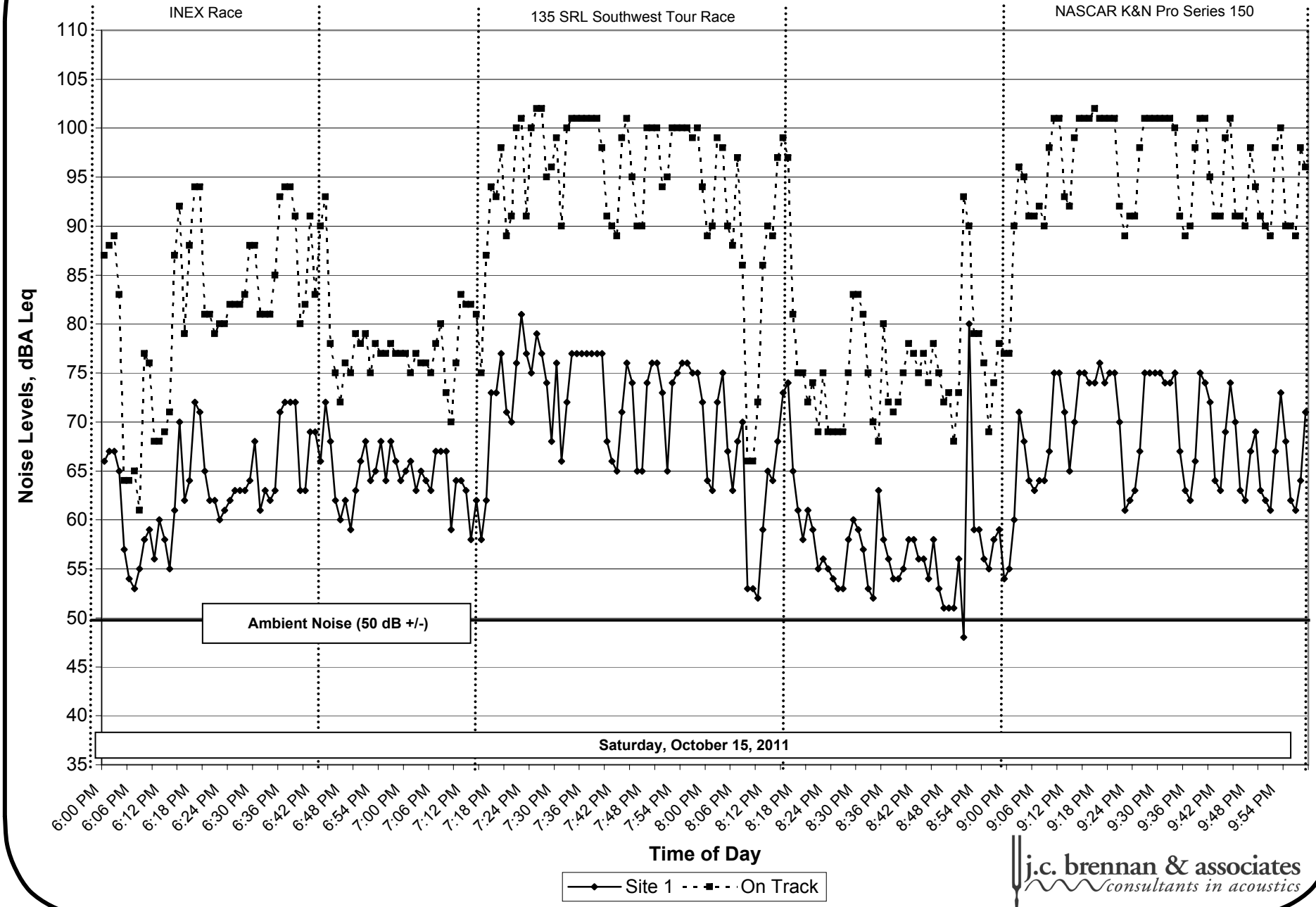
Appendix B-5

One-Minute Noise Levels vs. Time - Site 1

NASCAR K&N Pro Series, October 15, 2011



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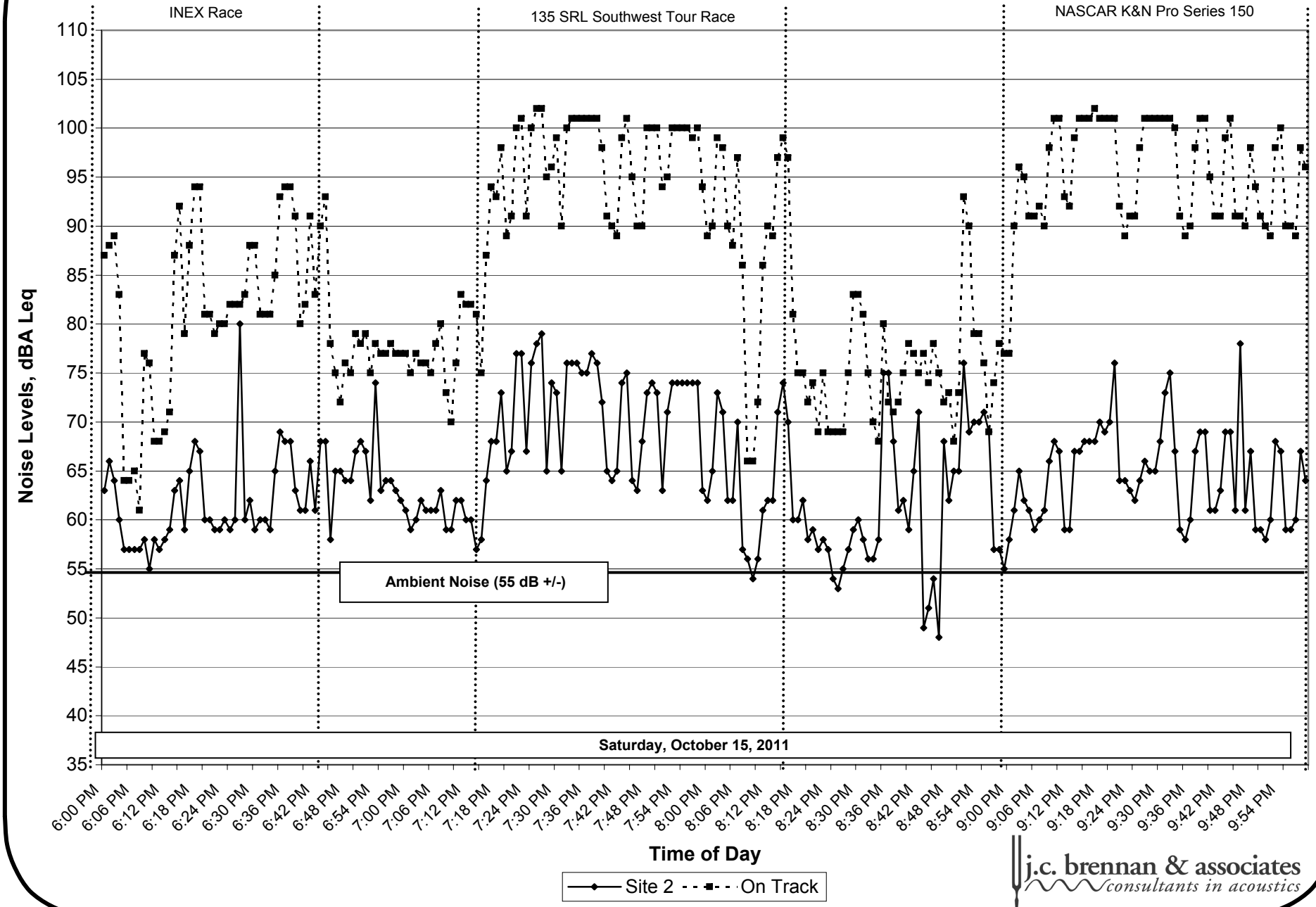
Appendix B-6

One-Minute Noise Levels vs. Time - Site 2

NASCAR K&N Pro Series, October 15, 2011



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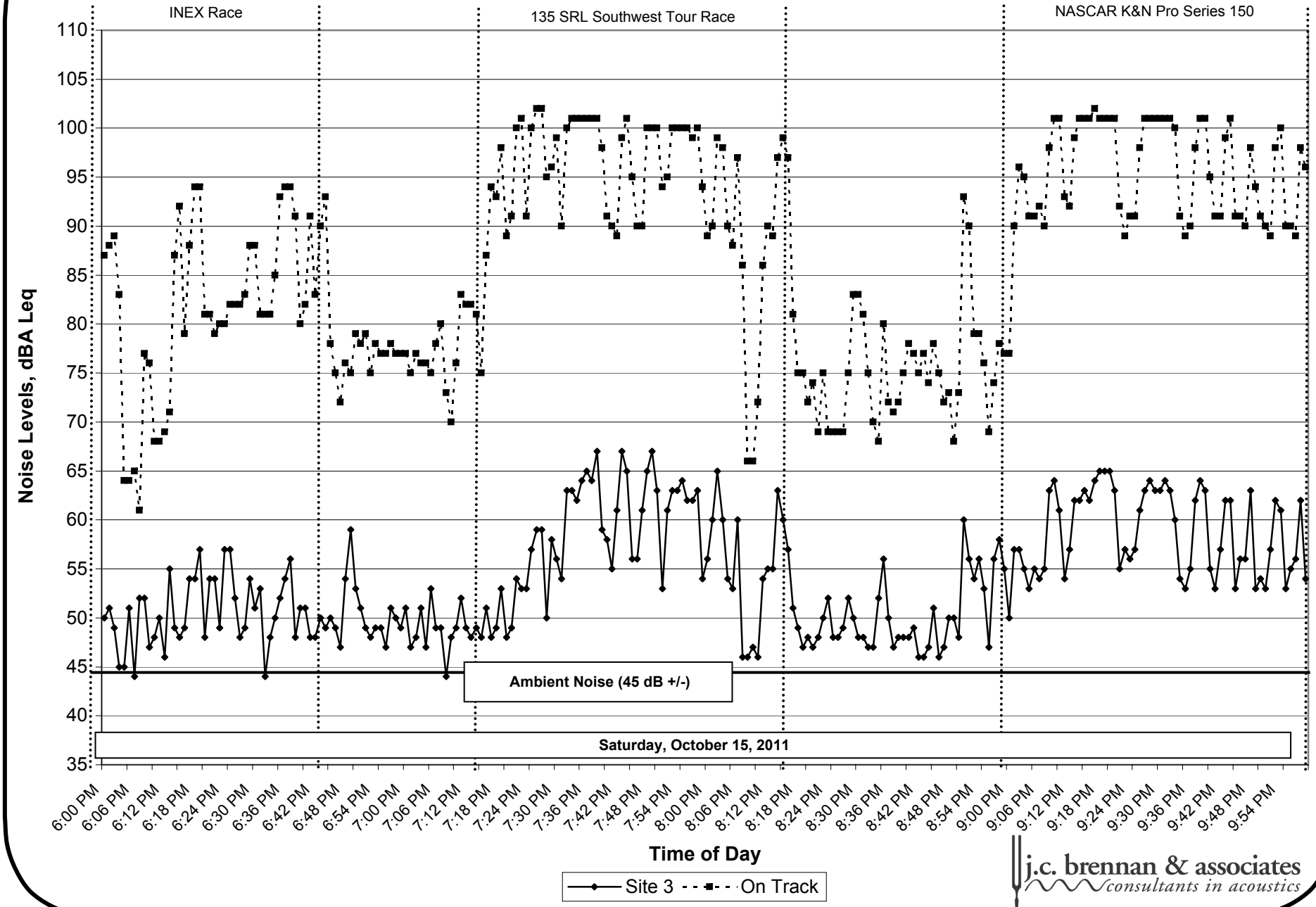
Appendix B-7

One-Minute Noise Levels vs. Time - Site 3

NASCAR K&N Pro Series, October 15, 2011



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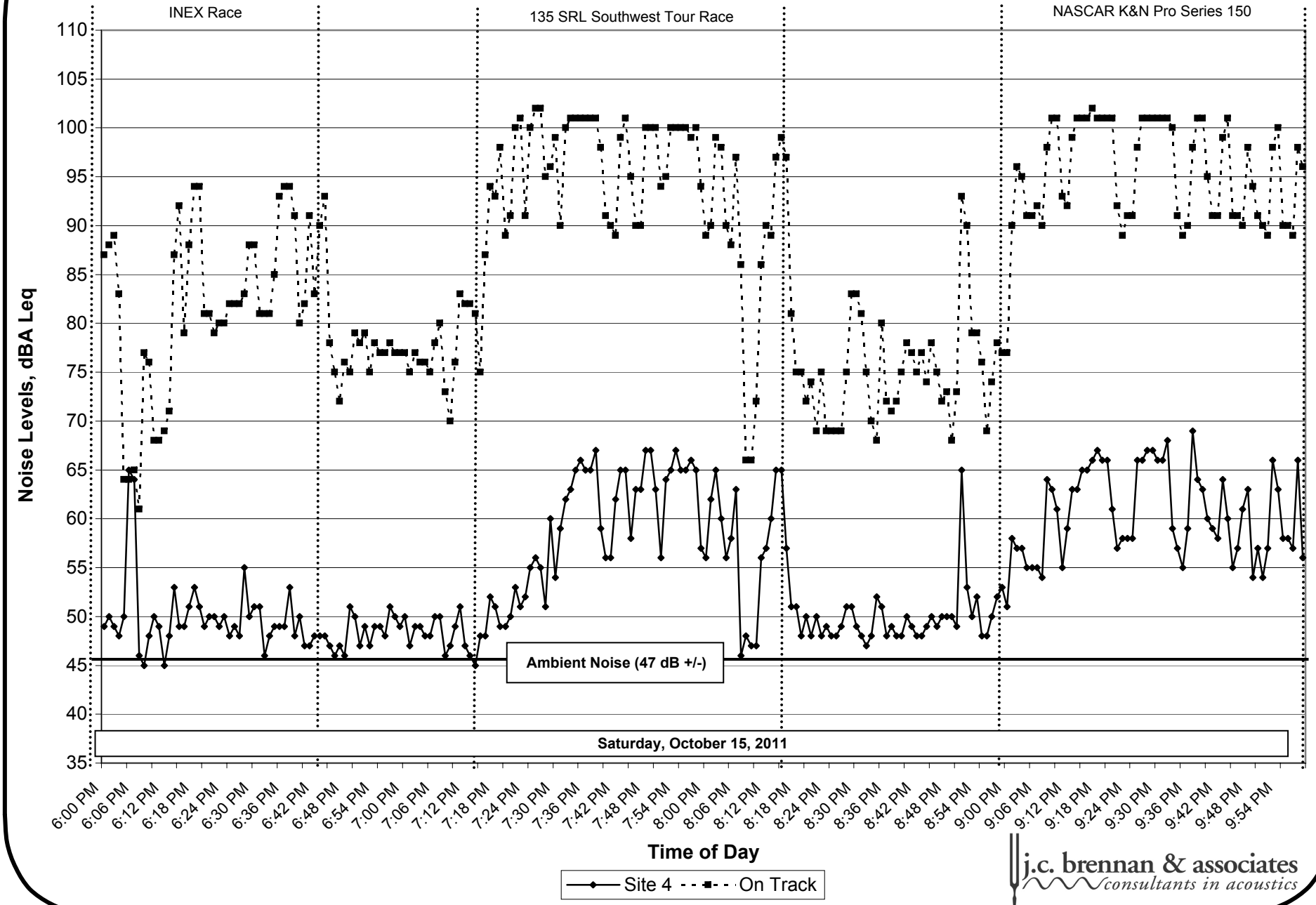
Appendix B-8

One-Minute Noise Levels vs. Time - Site 4

NASCAR K&N Pro Series, October 15, 2011



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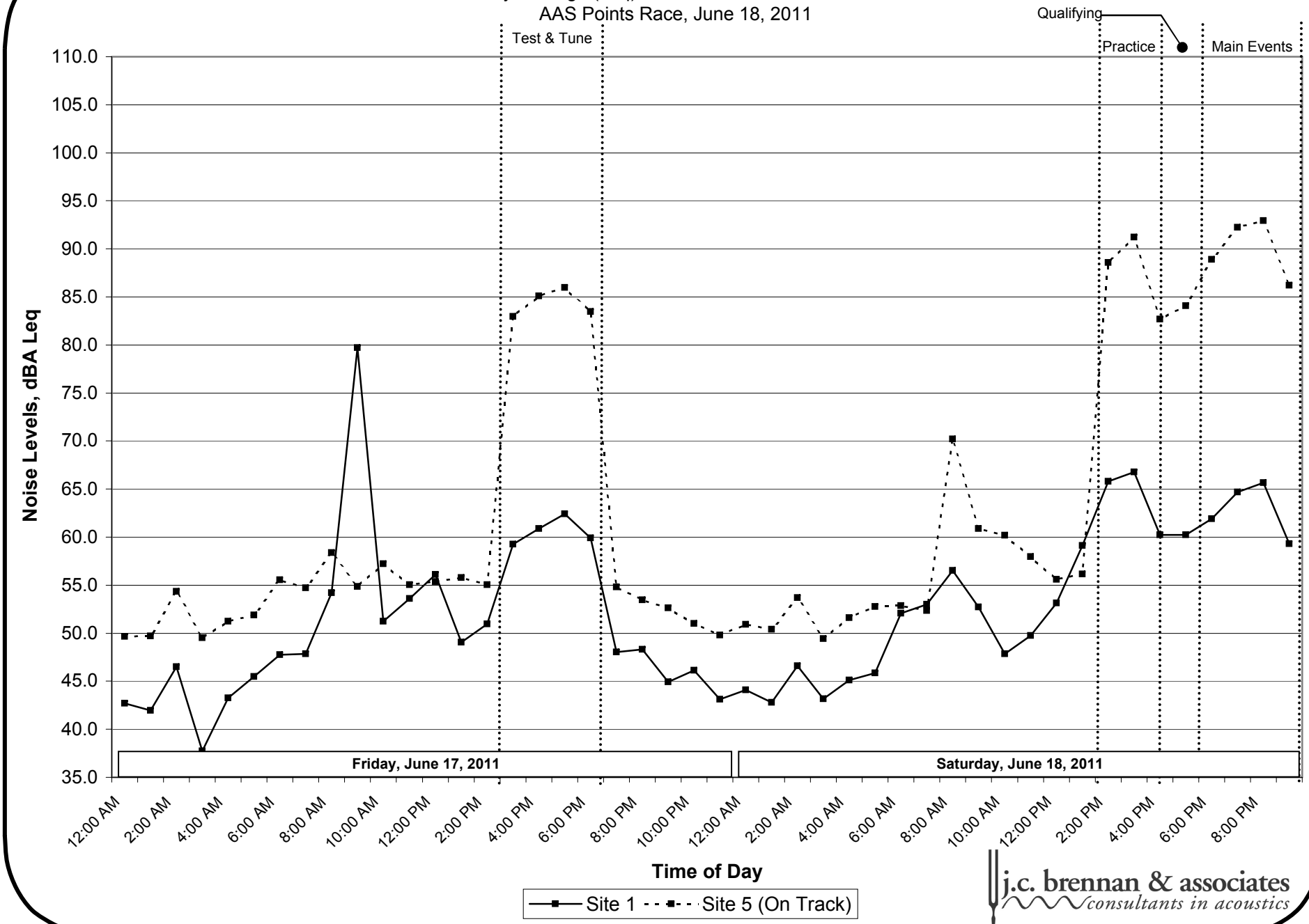
Appendix C-1

Hourly Average (Leq) Noise Levels vs. Time - Site 1

AAS Points Race, June 18, 2011



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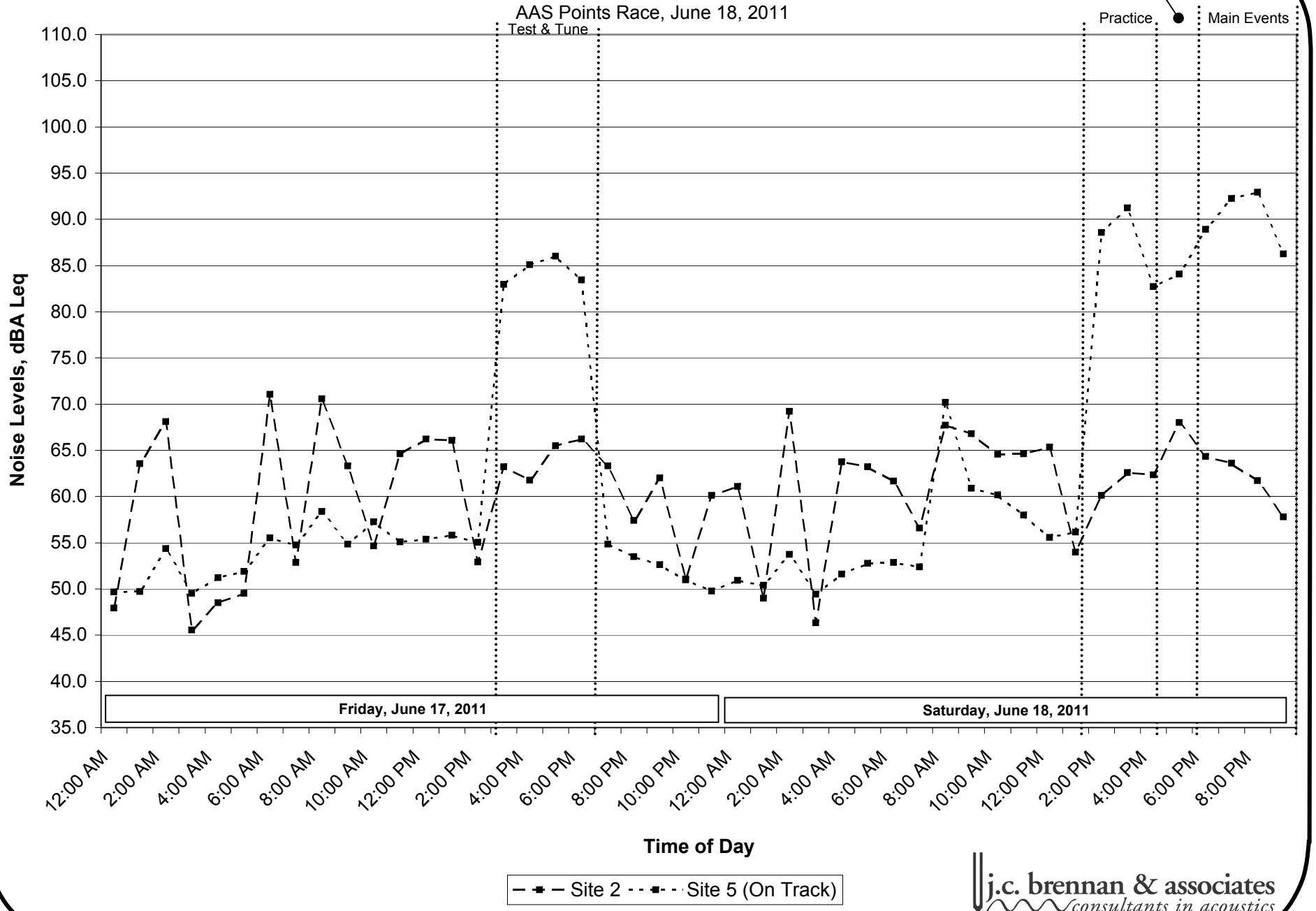
Appendix C-2

Hourly Average (Leq) Noise Levels vs. Time - Site 2

AAS Points Race, June 18, 2011



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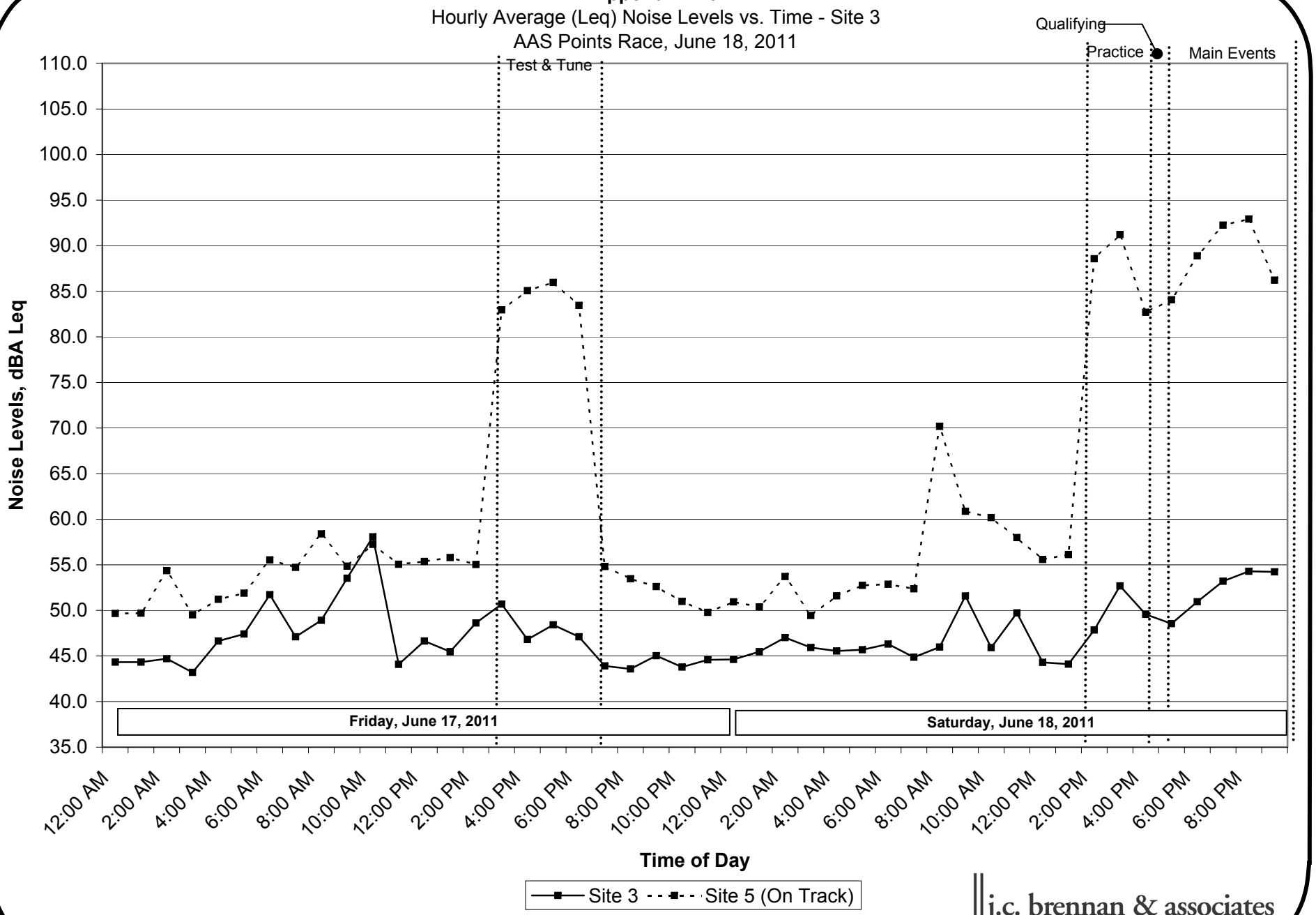
Appendix C-3

Hourly Average (Leq) Noise Levels vs. Time - Site 3

AAS Points Race, June 18, 2011



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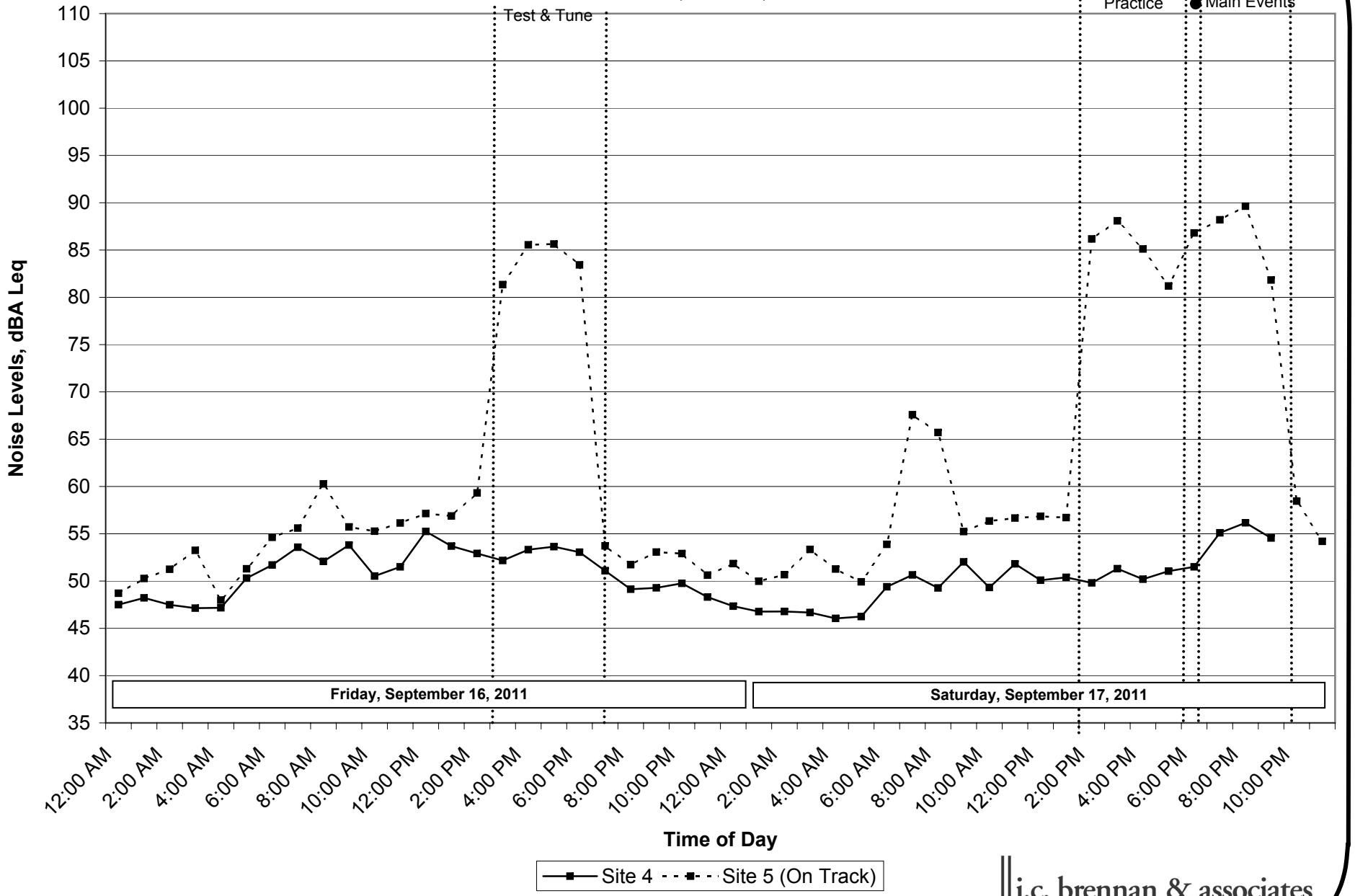
Appendix C-4

Hourly Average (Leq) Noise Levels vs. Time - Site 4

AAS Points Race, June 18, 2011



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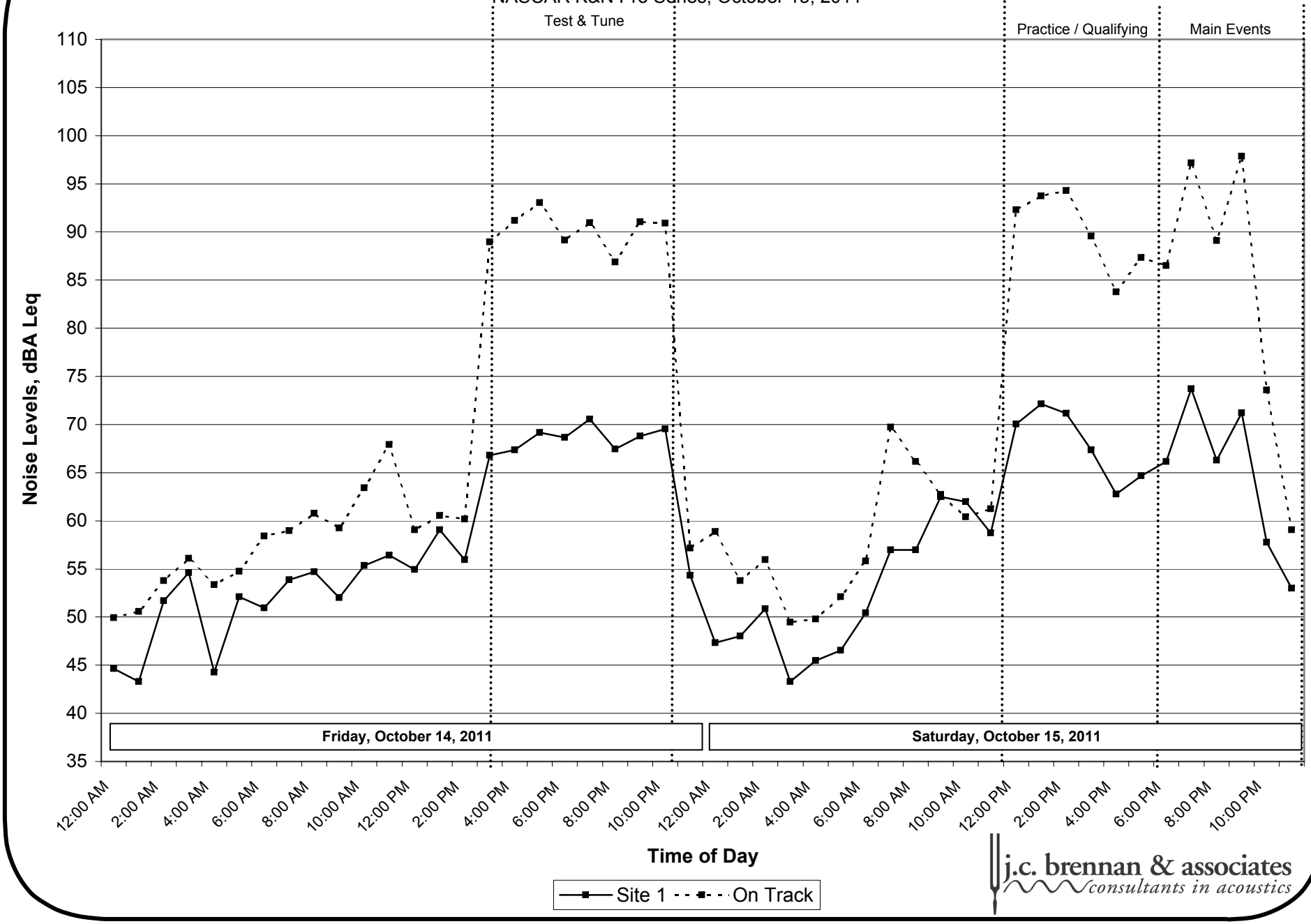
Appendix C-5

Hourly Average (Leq) Noise Levels vs. Time - Site 1

NASCAR K&N Pro Series, October 15, 2011



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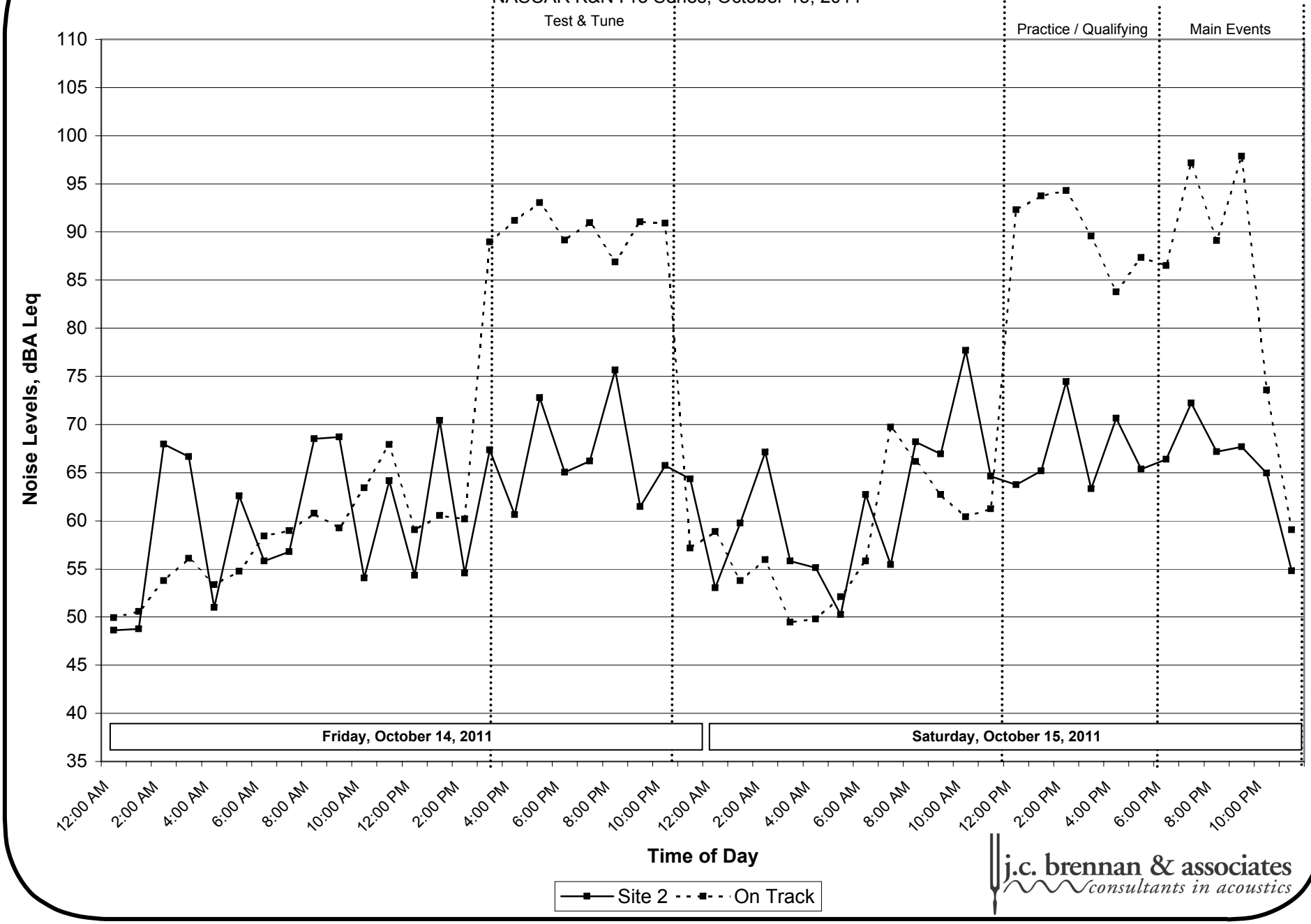
Appendix C-6

Hourly Average (Leq) Noise Levels vs. Time - Site 2

NASCAR K&N Pro Series, October 15, 2011



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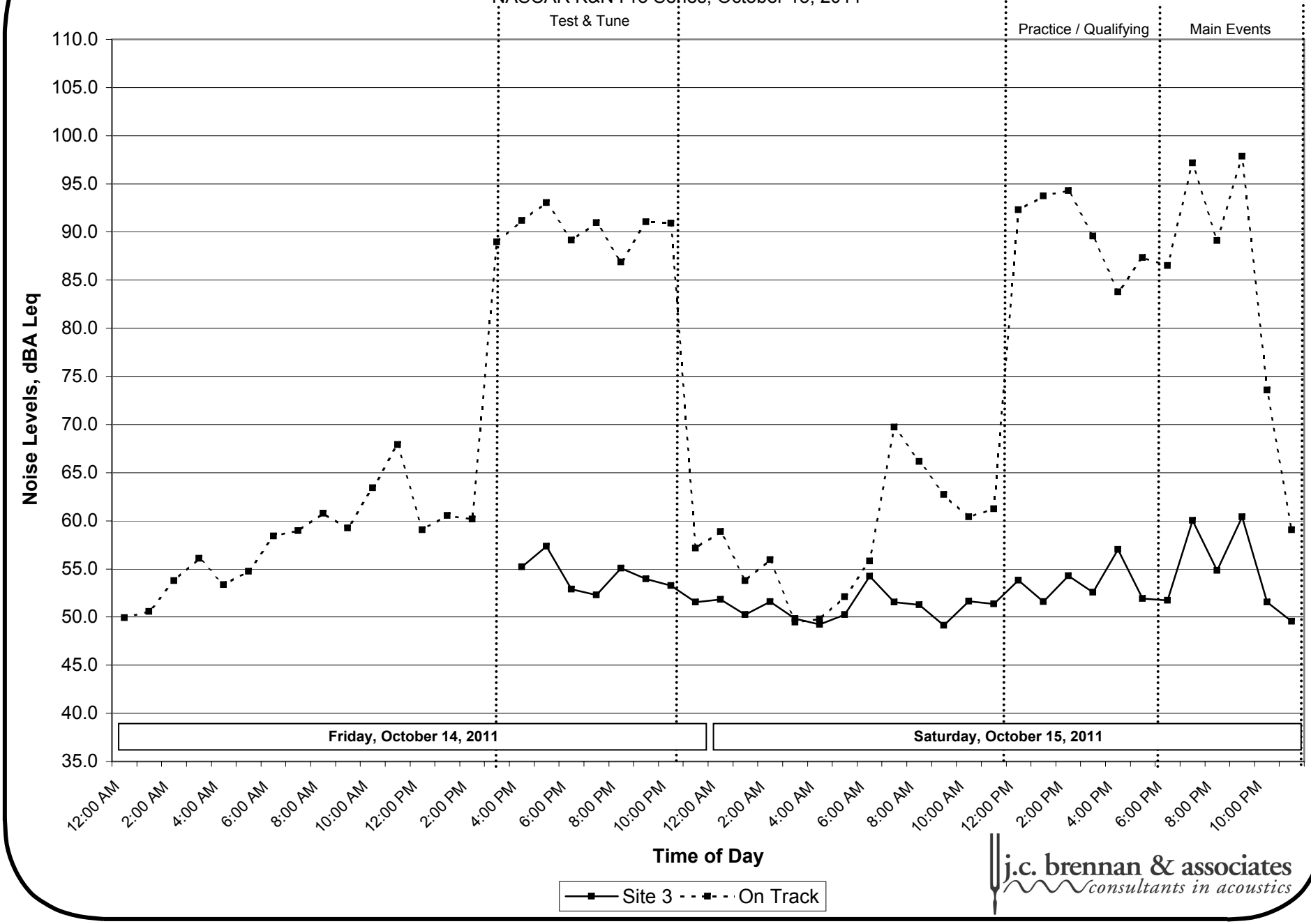
Appendix C-7

Hourly Average (Leq) Noise Levels vs. Time - Site 3

NASCAR K&N Pro Series, October 15, 2011



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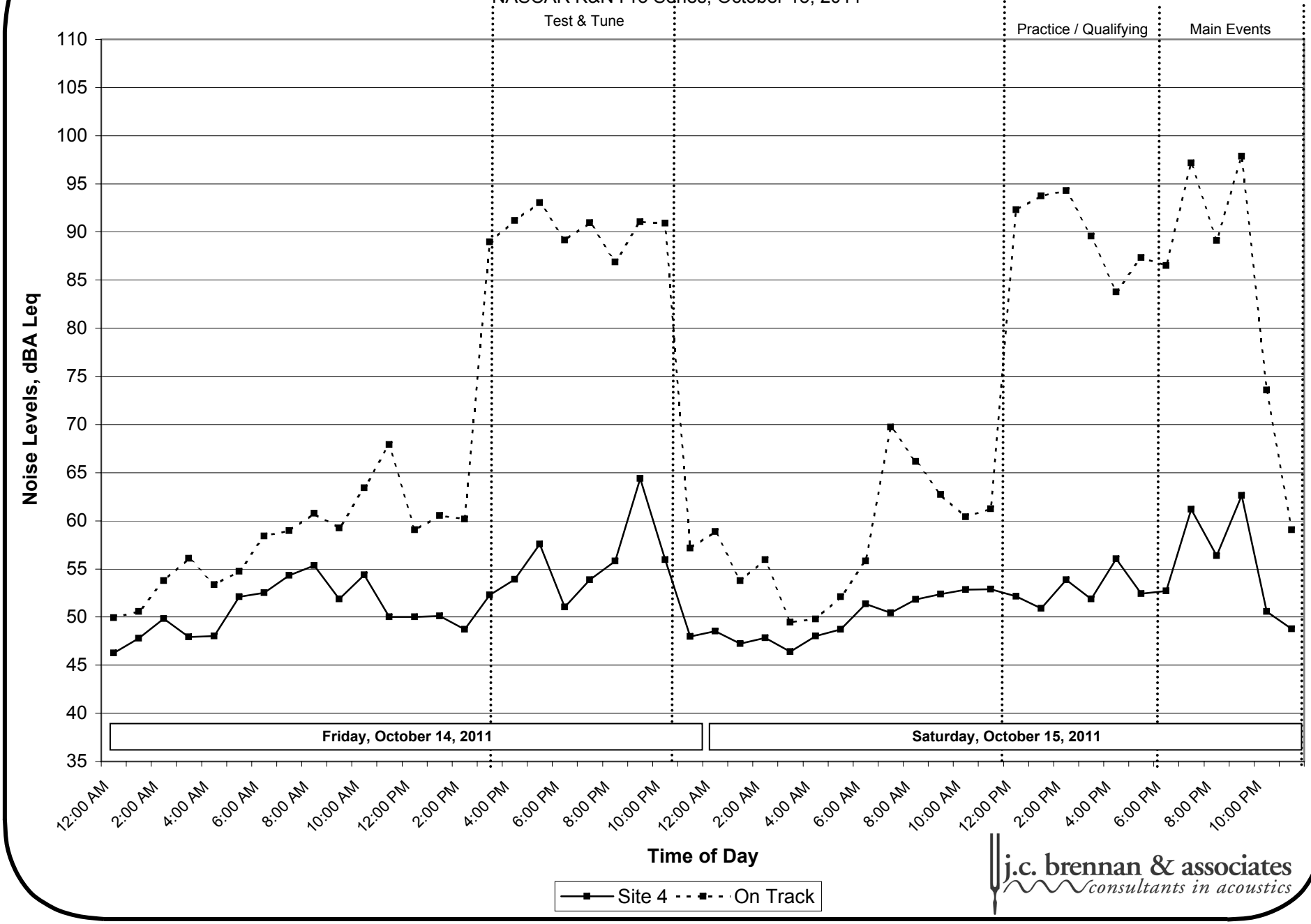
Appendix C-8

Hourly Average (Leq) Noise Levels vs. Time - Site 4

NASCAR K&N Pro Series, October 15, 2011



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Appendix D
All-American Speedway Noise Level Monitoring Report
Trackside Noise Monitoring (50 feet)

Race Date: mm/dd/yyyy
Race Description:
Racing Hours (Attach Schedule):

Hour	Leq	Lmax
0:00	56	74
1:00	49	66
2:00	50	68
3:00	52	71
4:00	56	69
5:00	70	85
6:00	66	76
7:00	63	77
8:00	60	76
9:00	61	83
10:00	92	105
11:00	94	104
12:00	94	103
13:00	90	101
14:00	84	100
15:00	87	102
16:00	87	101
17:00	97	105
18:00	89	105
19:00	98	105
20:00	74	99
21:00	59	74
22:00	58	81
23:00	53	74

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	98	59	91	70	49	62
Lmax (Maximum)	105	74	96	85	66	74

Computed Ldn, dB	89.4
% Daytime Energy	100%
% Nighttime Energy	0%

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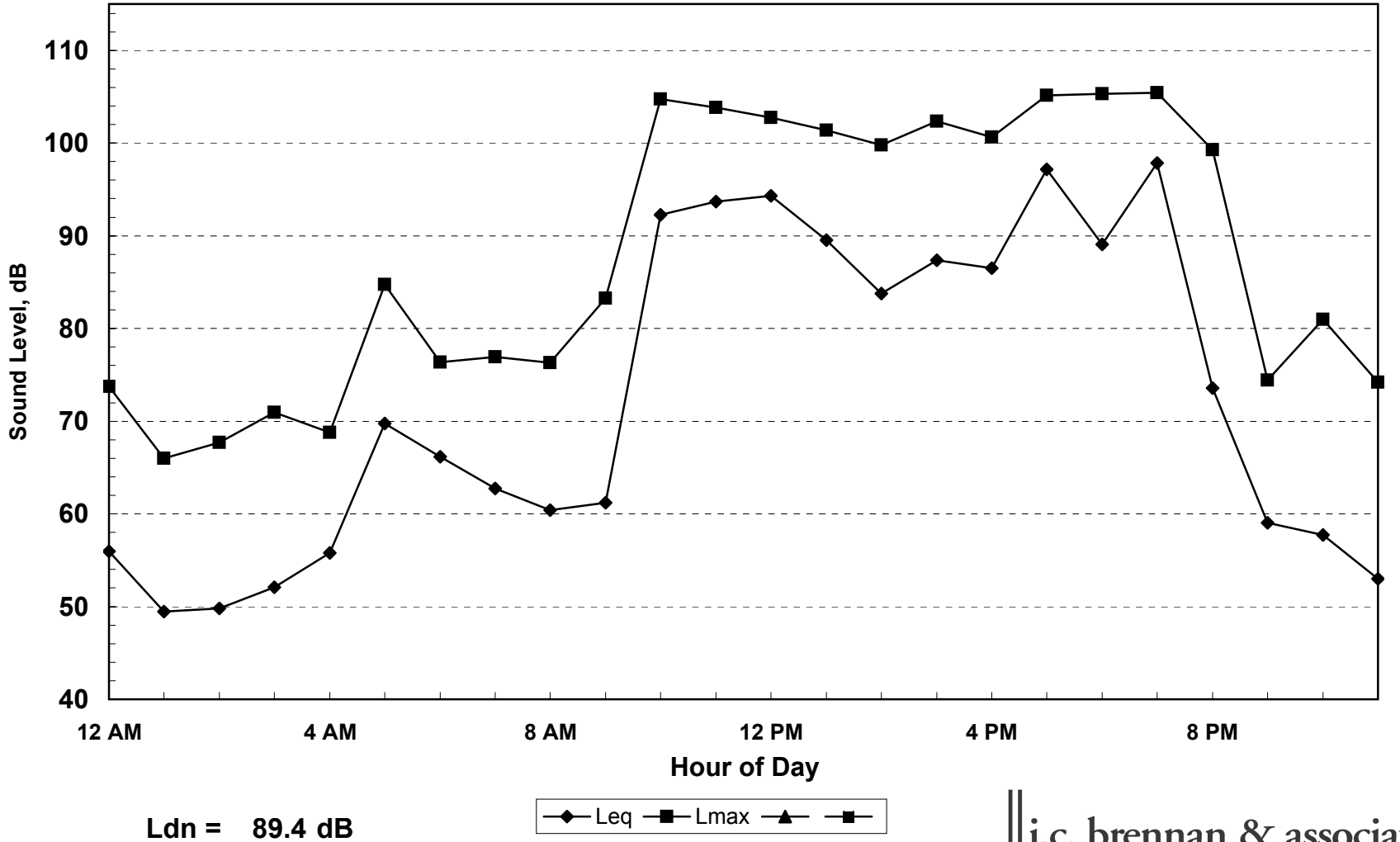
Appendix D

All-American Speedway Noise Level Monitoring Report

Trackside Noise Monitoring (50 feet)

Saturday, January 00, 1900



Ldn = 89.4 dB

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