ATTACHMENT 3

# Acoustical Assessment

# All-American Speedway

Roseville, California

Job # 2007-095

Prepared For:

**All-American Speedway**

800 All American City Blvd.
Roseville, California 95678

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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. Operation of the facility has been cited as a source of annoyance to local residents in the community. Figure 1 shows the project site.

It should be noted that noise generation from the Speedway is not subject to the City of Roseville or Placer County exterior noise level standards. j.c. brennan & associates, Inc. has been asked to provide an assessment of noise reduction options for the Speedway. Therefore, this analysis will focus on the application of practical noise control solutions versus compliance with local noise ordinance of General Plan Noise Element criteria.

## BACKGROUND ON NOISE AND ACOUSTICAL TERMINOLOGY [1]

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), 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, called Hertz (Hz).

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 of pressure), as a point of reference, defined as 0 dBA. Other sound pressures are then compared to the 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 dBA. Another useful aspect of the decibel scale is that changes in decibel levels correspond closely to human perception of relative loudness. Figure 2 illustrates common noise levels associated with various sources.

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 weighting the frequency response of a sound level meter by means of the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. 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.

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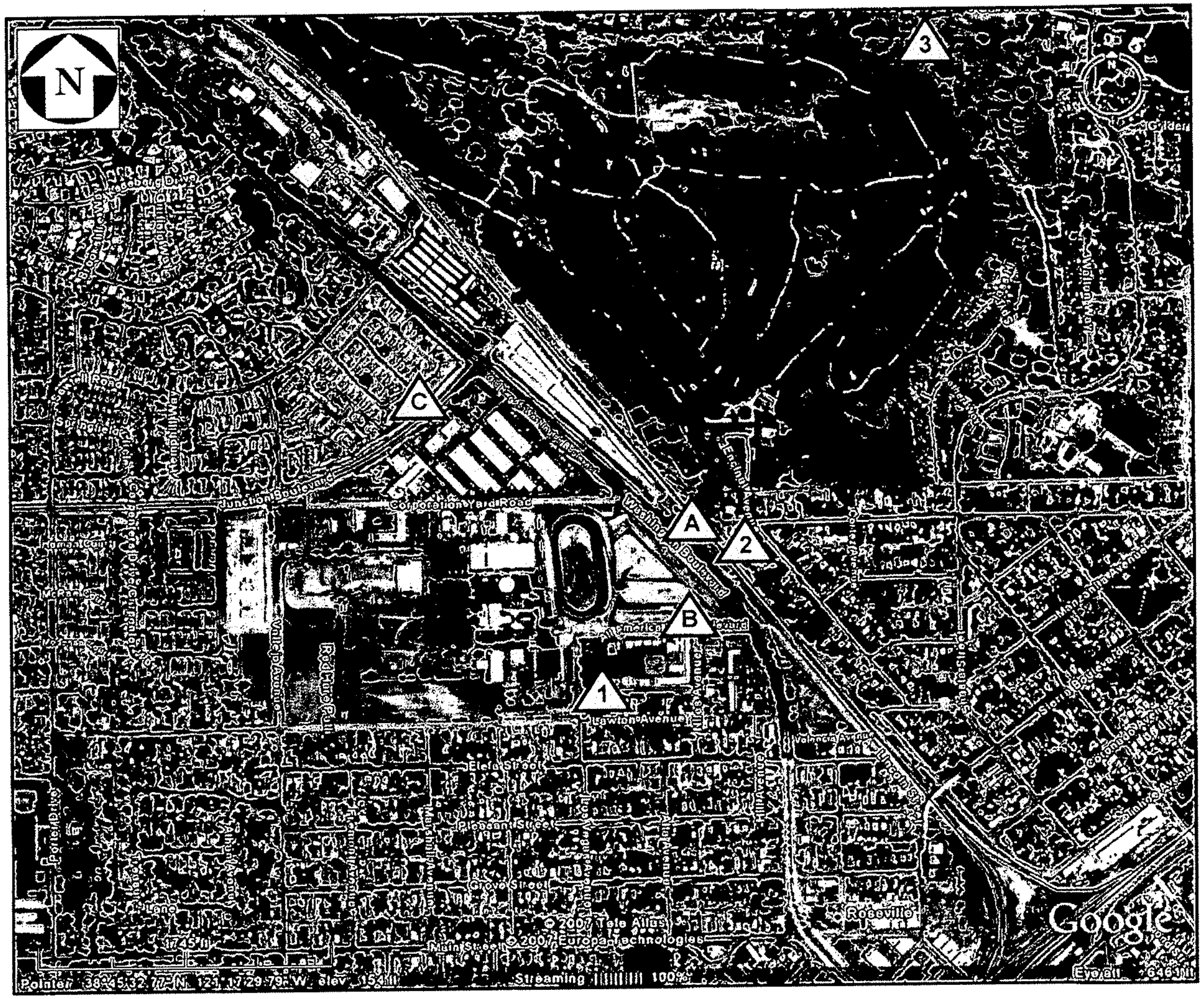
[1] For an explanation of these terms, see Appendix A: "Acoustical Terminology"

**Figure 1**
All-American Speedway - Roseville, California
Noise Measurement Locations




△ : Noise Measurement Site

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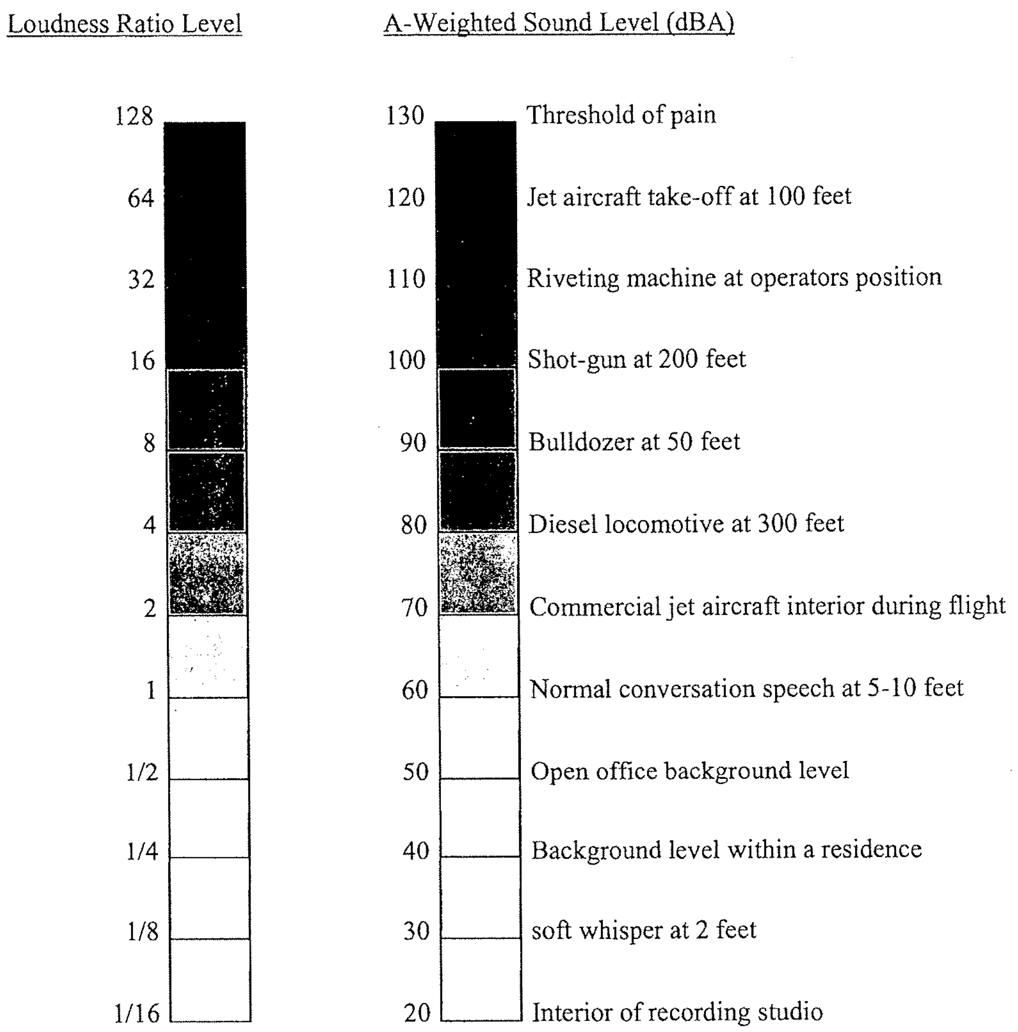
Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (Leq). The Leq is the foundation of the day/night average noise descriptor, Ldn, and shows very good correlation with community response to noise.

**Figure 2**
**Typical A-Weighted Sound Levels of Common Noise Sources**



### Subjective Reaction to Changes in Noise Level Criteria:

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 1 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 1**
**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 1 data, a reduction in overall noise levels of 5 to 10 dB would be considered clearly noticeable and would be a good design goal for any noise reduction plans.

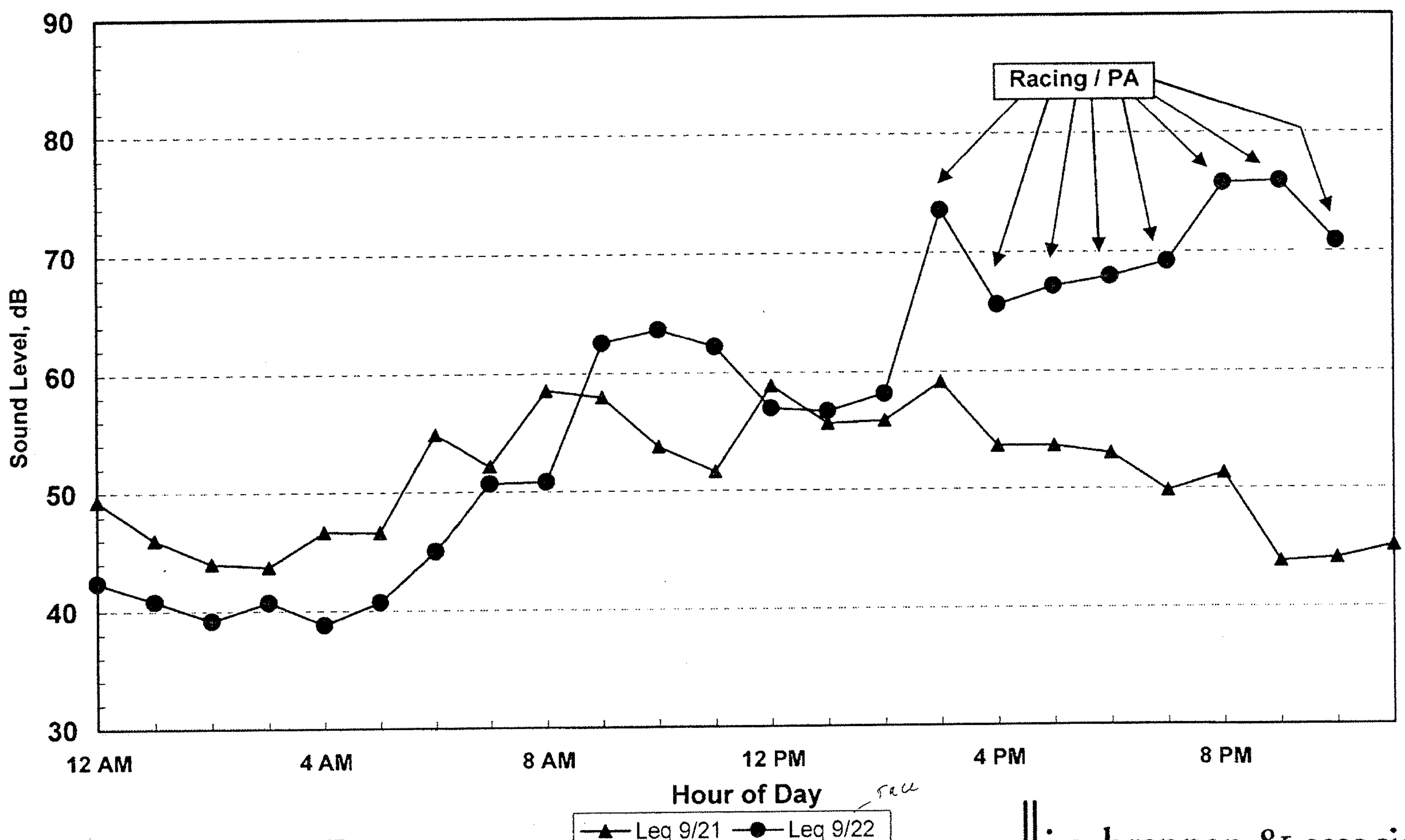
## SPEEDWAY RACING NOISE LEVELS

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. Continuous noise monitoring was also conducted prior to the Saturday race event to establish the approximate baseline ambient noise conditions without a race event.

Noise monitoring locations were chosen to represent the residential uses most affected by racing events, and are shown on Figure 1. Table 2 shows the results of the noise monitoring during the busiest periods of racing. Figure 3 graphically presents the noise levels at the noise measurement locations at each of the three continuous noise measurement sites. The Figures present the hourly average (Leq) noise levels for a race day and non race day. Appendix B provides the results of the continuous noise monitoring data.

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 3A**
24hr Continuous Noise Monitoring - Site 1
All-American Speedway
September 21 & 22, 2007




Non Raceday Ldn = 57 dB
Raceday Ldn = 70 dB

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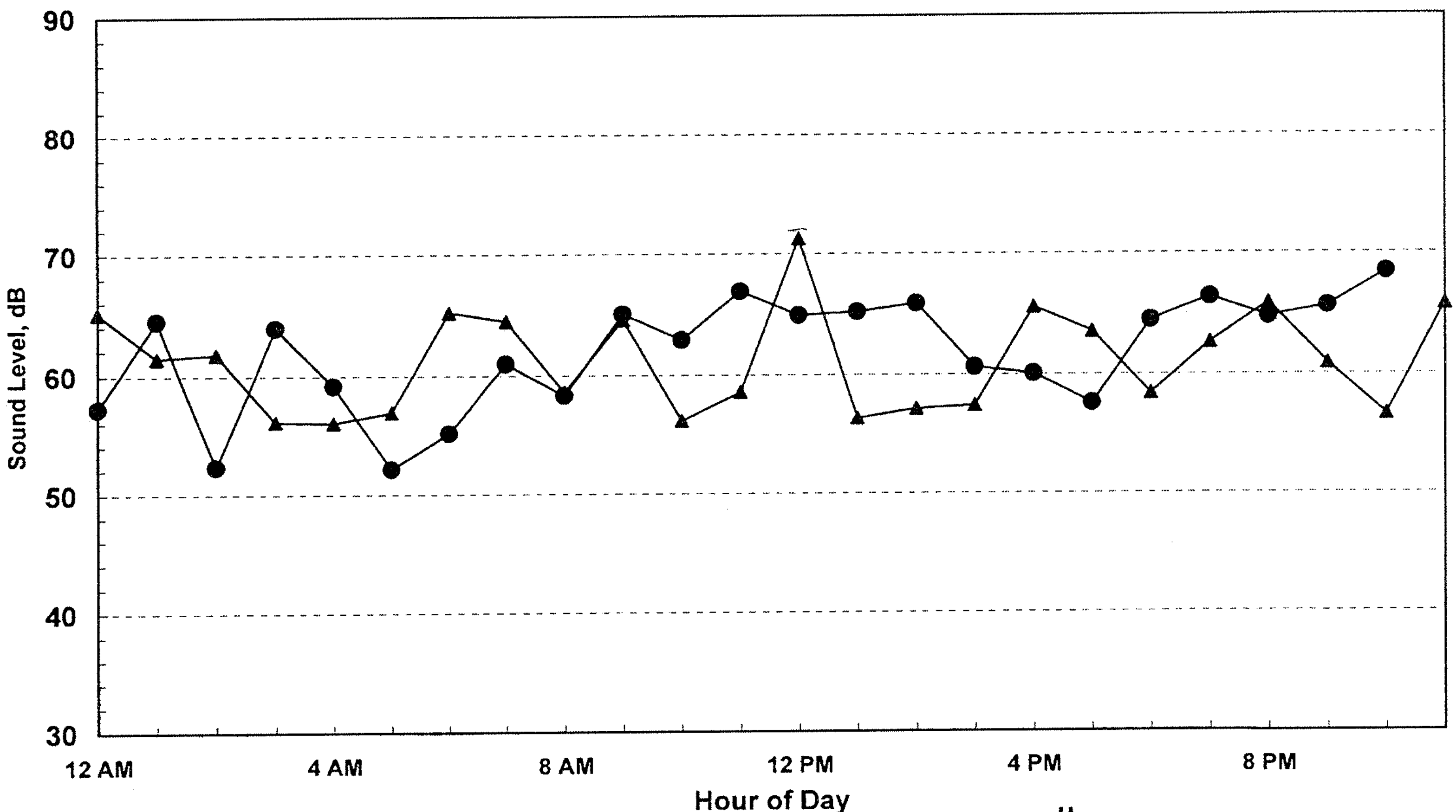
**Figure 3B**

24hr Continuous Noise Monitoring - Site 2

All-American Speedway

September 21 & 22, 2007




**Non Raceday Ldn = 69 dB**
**Raceday Ldn = 70 dB**

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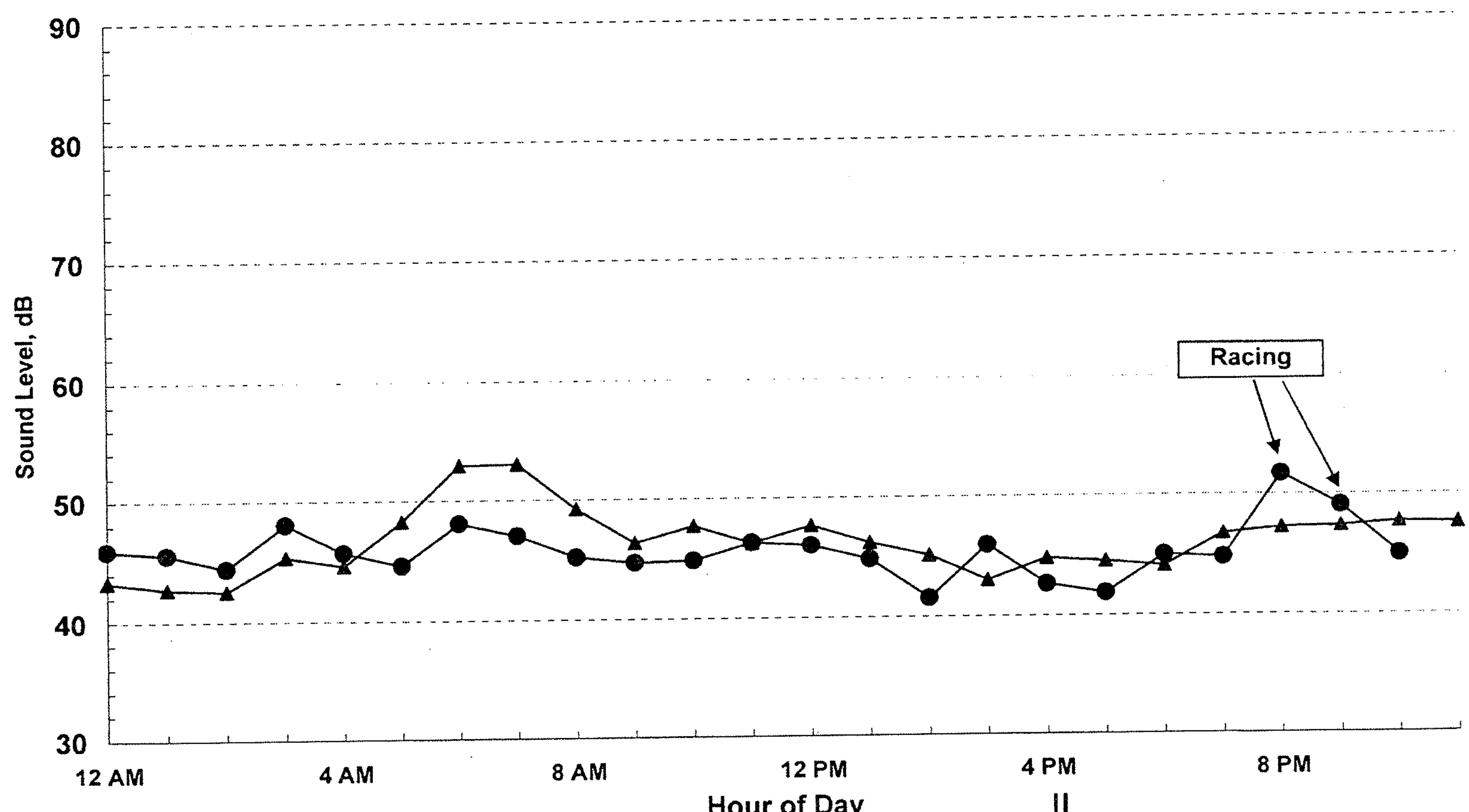
**Figure 3C**

24hr Continuous Noise Monitoring - Site 3

All-American Speedway

September 21 & 22, 2007




Non Raceday Ldn = 54 dB
Raceday Ldn = 53 dB

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| Table 2<br>Short Term Noise Monitoring – September 22, 2007<br>All-American Speedway – Roseville, California | | | | |
|---|---|---|---|---|
| Location | Time | Measured Noise Levels (dB) Leq | Lmax | Notes |
| 1 - (24-hr) 440 Stanford Ave. Front Deck | 7:00 – 8:00 pm | 69 dB | 81 dB | PA system and racing noise dominate ambient noise environment during periods of racing. |
| | 8:00 – 9:00 pm | 76 dB | 85 dB | |
| | 9:00 – 10:00 pm | 76 dB | 85 dB | |
| 2 - (24-hr) 649 Encinal Ave. Backyard | 7:00 – 8:00 pm | 66 dB | 83 dB | Traffic noise from Washington Blvd. was a dominate source of noise at this location. PA system and racing noise was audible during periods of heavy racing and periods of light traffic on Washington Blvd. Train passbys also contributed to the ambient noise environment at this site. |
| | 8:00 – 9:00 pm | 65 dB | 74 dB | |
| | 9:00 – 10:00 pm | 66 dB | 74 dB | |
| 3 – (24-hr) 354 Diamond Oaks Blvd. Backyard | 7:00 – 8:00 pm | 45 dB | 56 dB | Local traffic noise was the primary source of noise at this location. However, periods of heavy racing were audible and did contribute to the ambient noise environment at this site. |
| | 8:00 – 9:00 pm | 52 dB | 81 dB | |
| | 9:00 – 10:00 pm | 49 dB | 63 dB | |
| A – (Short Term) East Side of Washington Blvd., Across from Pit Area | 7:35 pm | 66 dB | 75 dB | Traffic noise, racing, and bull horns at the racing pit contributed to the noise environment. |
| | 8:58 pm | 73 dB | 76 dB | Racing noise dominates. |
| B – (Short Term) SE Corner of Niles & All-American | 8:25 pm | 67 dB | 76 dB | PA system and racing noise dominate ambient noise environment during periods of racing. |
| C – (Short Term) Single Family Residential North of Junction | 8:46 pm | 66 dB | 80 dB | Traffic noise was the dominate noise source. PA system and racing noise was barely audible, but not measurable at this location. |
| j.c. brennan & associates, Inc. – 2007 | | | | |

Based on the data shown in Table 2, PA system and racing noise most affects the residential neighborhood immediately south of the All-American Speedway. Noise levels in this neighborhood were found to be substantially above ambient noise levels which would occur on nights without racing, as shown by Figure 3. Therefore, application of practical noise-reduction measures should be considered the highest priority for this neighborhood.

At the residential neighborhood to the east of the Speedway, across Washington Blvd., traffic and railroad activity were noted to be the most significant sources of noise. However, during lighter periods of traffic, Speedway noise was a significant noise source. Therefore, application of practical noise-reduction measures should be considered for this neighborhood.

The Speedway activities were noted to be audible at other locations. However, none of the other noise measurement locations or residential neighborhoods were found to be exposed to excessive noise levels. Therefore, noise reduction measures are not considered to be necessary for these areas.

## NOISE REDUCTION MEASURES

### Overview of Noise Mitigation Options

Any noise problem may be considered as being composed of three basic elements: the noise source, a transmission path, and a receiver. Fundamental noise control options include the following:

Use of Barriers:

Shielding by barriers can be obtained by placing walls, berms or other structures, such as buildings, between the noise source and the receiver. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increasing the distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "path length difference," and is the basis for calculating barrier noise reduction.

Barrier effectiveness depends upon the relative heights of the source, barrier and receiver. In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path-length-difference for a given increase in barrier height than does a location closer to either source or receiver.

For maximum effectiveness, barriers must be continuous and relatively airtight along their length and height. To ensure that sound transmission through the barrier is insignificant, barrier mass should be about 4 lbs. /square foot, although a lesser mass may be acceptable if the barrier material provides sufficient transmission loss. Satisfaction of the above criteria requires substantial and well-fitted barrier materials, placed to intercept line of sight to all significant noise sources. Earth, in the form of berms or the face of a depressed area, is also an effective barrier material.

There are practical limits to the noise reduction provided by barriers. For vehicle traffic or railroad noise, a 5 to 10 dB noise reduction may often be reasonably attained. A 15 dB noise reduction is sometimes possible, but a 20 dB noise reduction is extremely difficult to achieve. Barriers usually are provided in the form of walls, berms, or berm/wall combinations. The use of an earth berm in lieu of a solid wall may provide up to 3 dB additional attenuation over that attained by a solid wall alone, due to the absorption provided by the earth. Berm/wall combinations offer slightly better acoustical performance than solid walls, and are often preferred for aesthetic reasons.

Use of Vegetation:

Trees and other vegetation are often thought to provide significant noise attenuation. However, approximately 100 feet of dense foliage (so that no visual path extends through the foliage) is required to achieve a 5 dB attenuation of traffic noise. Thus the use of vegetation as a noise barrier should not be considered a practical method of noise control unless large tracts of dense foliage are part of the existing landscape.

Vegetation can be used to acoustically "soften" intervening ground between a noise source and receiver, increasing ground absorption of sound and thus increasing the attenuation of sound with distance. Planting of trees and shrubs is also of aesthetic and psychological value, and may reduce adverse public reaction to a noise source by removing the source from view, even though noise levels will be largely unaffected. It should be noted, however, that trees planted on the top of a noise control berm can actually slightly degrade the acoustical performance of the barrier. This effect can occur when high frequency sounds are diffracted (bent) by foliage and directed downward over a barrier.

In summary, the effects of vegetation upon noise transmission are minor, and are primarily limited to increased absorption of high frequency sounds and to reducing adverse public reaction to the noise by providing aesthetic benefits.

***Racetrack Noise Barrier Modeling***

In order to achieve 5-10 dB noise reduction from racing noise at the nearest residential uses, a noise barrier would be required to be constructed around the south and east sides of the Raceway. In addition, modifications to the PA system would be required to minimize annoyance from the PA system.

In order to estimate the noise reduction that could be achieved by a noise barrier around the Speedway, j.c. brennan & associates, Inc. conducted a noise barrier analysis using the Environmental Noise Model (ENM). A civil survey of the Raceway site was not available; therefore, inputs to the ENM model were obtained from site observations and aerial photography. Noise data was obtained from field measurements. The intent of the noise modeling is to show the affects of noise mitigation at the Raceway and is approximate only. The estimated noise contours for the Speedway are shown on Figure 4. Figure 5 shows the affects of construction of a 10' tall noise barrier around the south and east side of the Speedway. The results of the analysis indicate that an approximate reduction in racing noise of 6 dB would be expected at the nearest residential uses. The contour modeling does not account for modifications to the PA system, which may provide additional noise reductions.

The recommended noise barrier locations are shown on Figure 7. j.c. brennan & associates, Inc. recommends the application of sound barrier curtains applied to the backside of the racing fence, where feasible. Where the barrier cannot be attached to the racing fence, posts and cables can installed to hang the noise barrier.

j.c. brennan & associates, Inc. recommends installation of Illbruck CA-BBC-7-2" 10' tall exterior acoustical barrier with a sound transmission class (STC) 32 rating and noise reduction class (NRC) rating of 0.85. Please contact Michael Pardini with California Acoustics at (408) 309-7055 for more information on this material.

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.

**Figure 5**

All-American Speedway – City of Roseville, California

Unmitigated Noise Contours


**Note: Noise contours do not account for shielding which may occur from intervening buildings. Contours are intended to be used for assessing performance of noise reduction techniques, not for planning purposes or determination with local ordinances.**

**Figure 6**
All-American Speedway – Roseville, California
Mitigated Noise Contours


**Note: Noise contours do not account for shielding which may occur from intervening buildings. Contours are intended to be used for assessing performance of noise reduction techniques, not for planning purposes or determination with local ordinances.**



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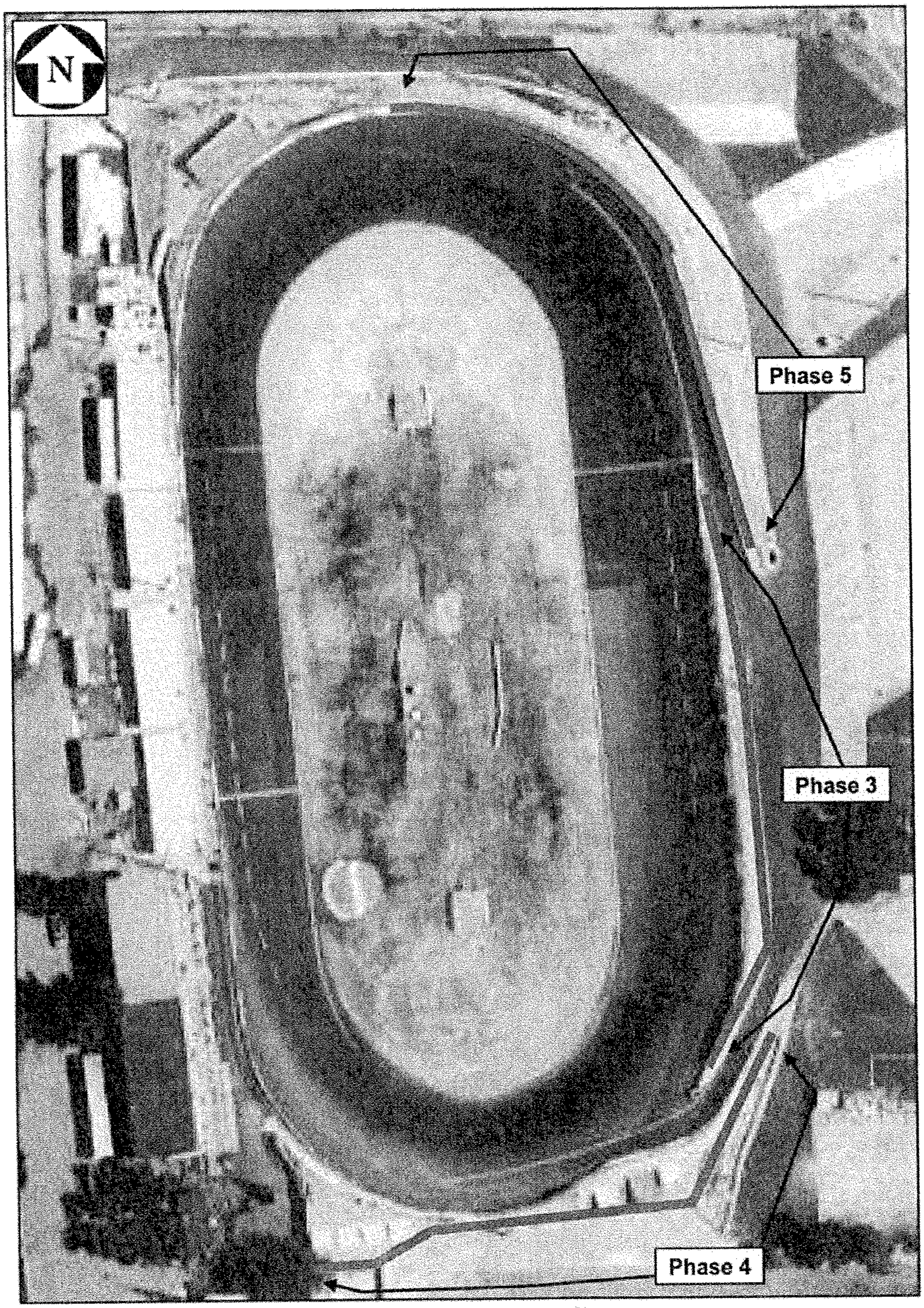
**Figure 7**

All-American Speedway

Recommended Noise Barrier Locations




: Recommended Noise Barrier Location

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***PA System Improvements***

j.c. brennan & associates, Inc. recommends redirecting PA system speakers which currently aim toward residential neighborhoods, such as the one at the southeast corner of the main grandstand roof (See Figure 8). It appears that this speaker is intended to provide coverage to the bleachers located at the south edge of the racetrack. However, an individual speaker(s) could be used to provide coverage to these bleacher areas in order to minimize disturbance to the adjacent neighborhoods.

Figure 9 shows the approximate configuration of the existing PA system. An example of a possible speaker configuration schematic is shown on Figure 10. The Figure 10 configuration of the PA system would redirect a significant amount of the PA system noise away from the residential neighborhood to the south.


**Figure 8: PA Speaker Pointed Towards Residential Areas**

**Figure 9**
All-American Speedway - Roseville, California
Existing PA System Configuration

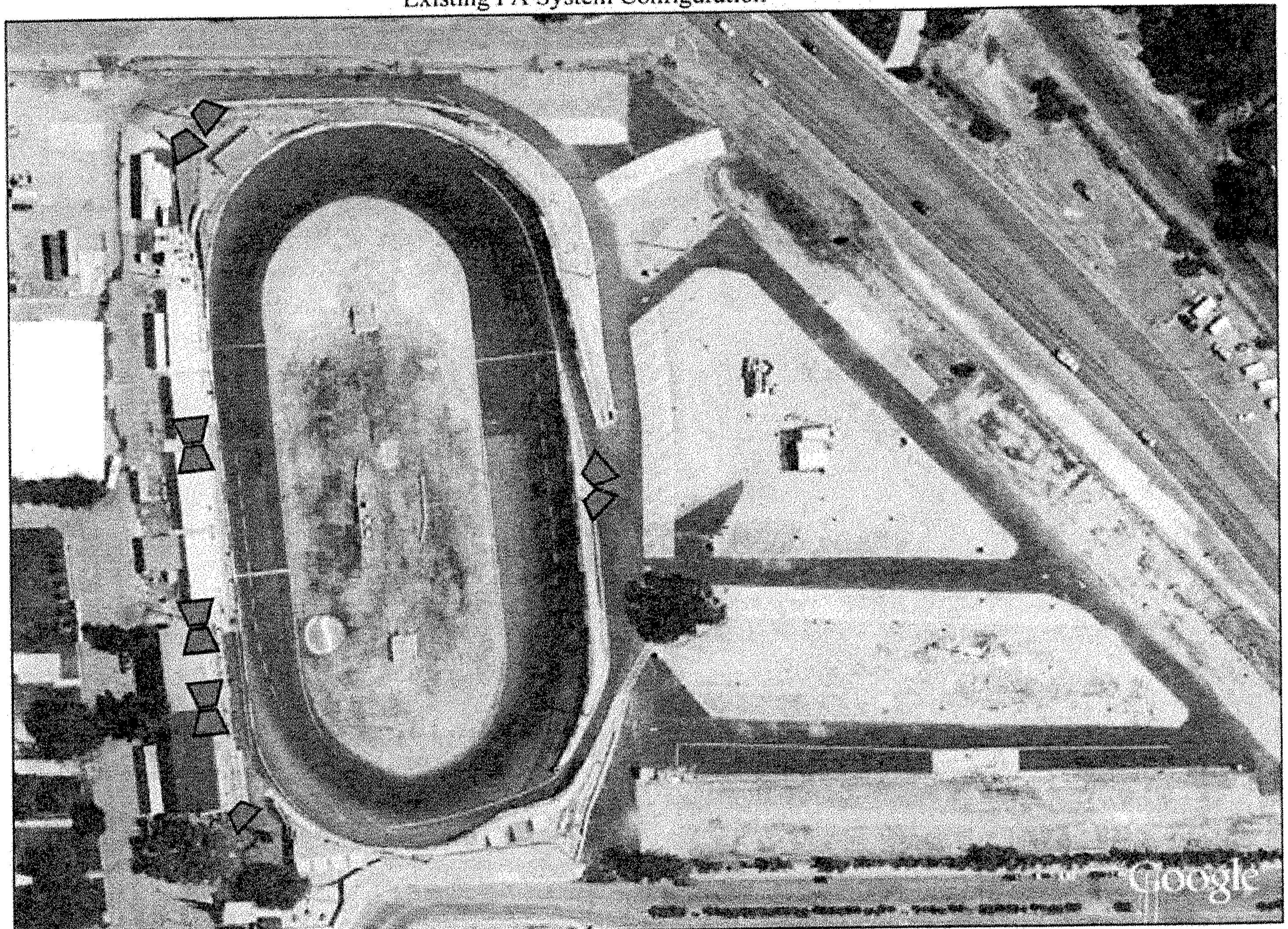


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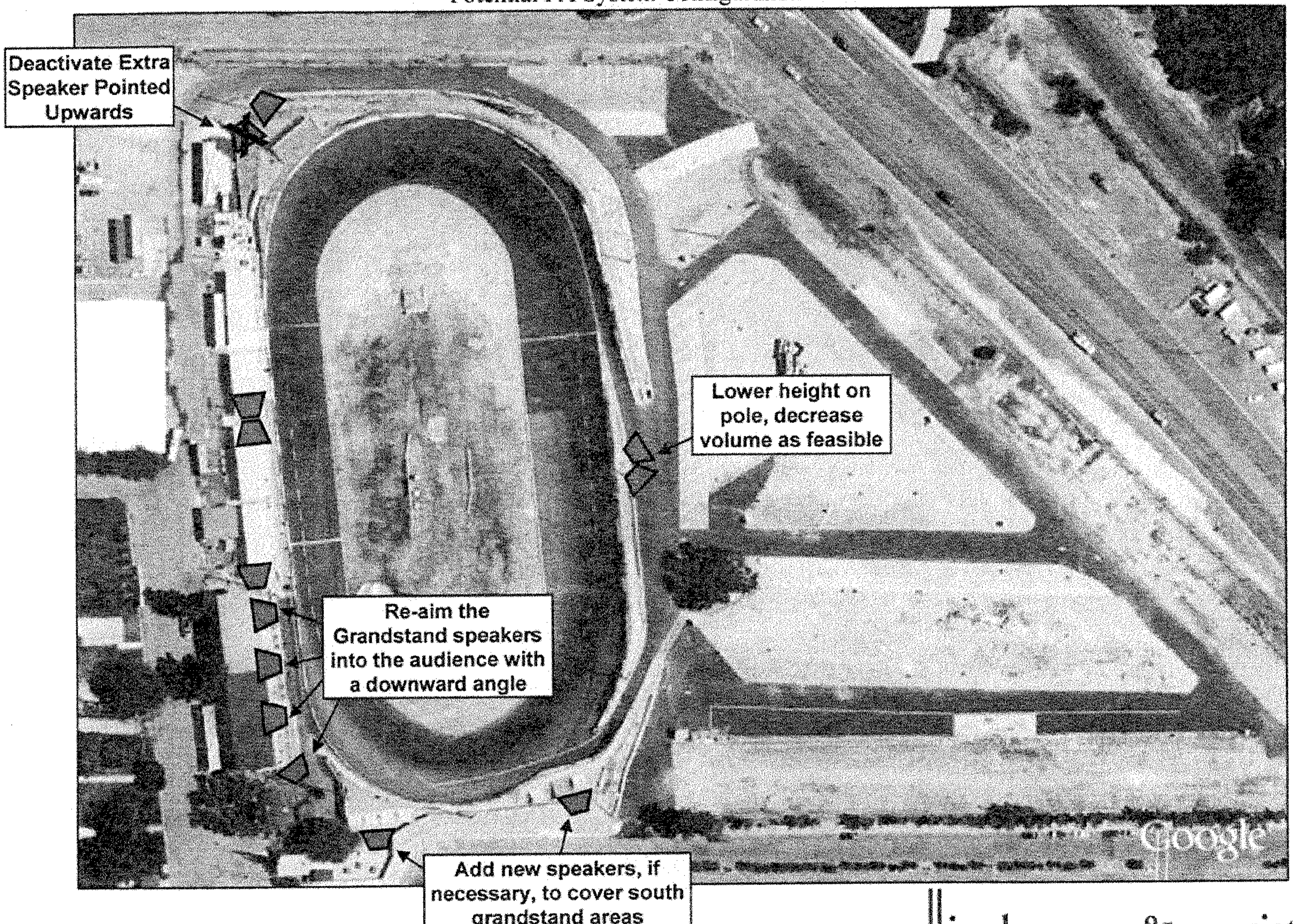
**Figure 10**
All-American Speedway - Roseville, California
Potential PA System Configuration



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## Conclusions

The All-American Speedway was found to be a significant noise producer at the residential neighborhood immediately south of the Speedway. At the neighborhood east of the Speedway, traffic and railroad noise were the most significant sources of noise. However, the Speedway was a significant source of noise at this neighborhood during periods of lighter traffic on Washington Blvd. Therefore, application of noise reduction measures are considered appropriate for the neighborhood east of the Speedway.

Application of noise reduction measures to benefit the residential neighborhood immediately south of the Speedway is considered to be the highest priority. The following is a list of recommended improvements.

- **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 as indicated on Figure 10. 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 at the locations indicated on Figure 7. Please contact Michael Pardini with California Acoustics at (408) 309-7055 for more information on this material. The preferred placement of the material is on the backside of the racing fence. If this is not possible, please contact Mike Pardini to determine the best way to install the material in a post and cable application. If application of the material is phased, we recommend the phasing schedule shown on Figure 7.

  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.

The recommendations in this report are based upon the field noise measurements and field observations conducted on September 22, 2007. Sound levels reported in this report may vary depending on the type of race being conducted and on atmospheric and weather conditions. Sound contours are for informational purposes only and are not intended to be used for planning purposes or for determination with compliance with any federal, state, or local noise ordinance policy or standard. Failure to make improvements to the PA system could result in the PA system noise becoming more noticeable as other noise reductions are implemented. Therefore, all of the recommendations in this report should be implemented.

## 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

## All-American Speedway
## 24hr Continuous Noise Monitoring - Site 1
## September 21 & 22, 2007

| | 21-Sep | | 22-Sep | |
|---|---|---|---|---|
| Hour | Leq 9/21 | Lmax | Leq 9/22 | Lmax |
| 0:00 | 49 | 67 | 42 | 65 |
| 1:00 | 46 | 64 | 41 | 55 |
| 2:00 | 44 | 63 | 39 | 59 |
| 3:00 | 44 | 71 | 41 | 56 |
| 4:00 | 47 | 62 | 39 | 57 |
| 5:00 | 47 | 66 | 41 | 68 |
| 6:00 | 55 | 75 | 45 | 65 |
| 7:00 | 52 | 72 | 51 | 81 |
| 8:00 | 59 | 79 | 51 | 72 |
| 9:00 | 58 | 77 | 63 | 86 |
| 10:00 | 54 | 74 | 64 | 86 |
| 11:00 | 52 | 72 | 62 | 80 |
| 12:00 | 59 | 86 | 57 | 75 |
| 13:00 | 56 | 82 | 57 | 79 |
| 14:00 | 56 | 80 | 58 | 82 |
| 15:00 | 59 | 81 | 74 | 84 |
| 16:00 | 54 | 79 | 66 | 82 |
| 17:00 | 54 | 79 | 67 | 82 |
| 18:00 | 53 | 77 | 68 | 83 |
| 19:00 | 50 | 72 | 69 | 81 |
| 20:00 | 51 | 79 | 76 | 85 |
| 21:00 | 44 | 63 | 76 | 85 |
| 22:00 | 44 | 59 | 71 | 81 |
| 23:00 | 45 | 68 | | |

| | Statistical Summary | | | | | |
|---|---|---|---|---|---|---|
| | Daytime (7 a.m. - 10 p.m.) | | | Nighttime (10 p.m. - 7 a.m.) | | |
| | High | Low | Average | High | Low | Average |
| Leq (Average) | 59.1 | 43.8 | 55.3 | 54.9 | 43.7 | 48.5 |
| Lmax (Maximum) | 86.0 | 62.8 | 76.7 | 75.4 | 59.4 | 66.2 |
| L50 (Median) | 75.9 | 50.7 | 63.8 | 70.8 | 0.0 | 39.8 |
| L90 (Background) | 85.9 | 72.4 | 81.5 | 80.5 | 0.0 | 56.3 |

| | 21-Sep | 22-Sep |
|---|---|---|
| Computed Ldn, dB | 56.8 | 70.2 |
| % Daytime Energy | 89% | 89% |
| % Nighttime Energy | 11% | 11% |

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Appendix B-2

## All-American Speedway
## 24hr Continuous Noise Monitoring - Site 2
## September 21 & 22, 2007

| | 21-Sep | | 22-Sep | |
|---|---|---|---|---|
| Hour | Leq 9/21 | Lmax | Leq 9/22 | Lmax |
| 0:00 | 65 | 86 | 57 | 78 |
| 1:00 | 61 | 84 | 64 | 85 |
| 2:00 | 62 | 84 | 52 | 69 |
| 3:00 | 56 | 71 | 64 | 85 |
| 4:00 | 56 | 75 | 59 | 76 |
| 5:00 | 57 | 74 | 52 | 73 |
| 6:00 | 65 | 91 | 55 | 64 |
| 7:00 | 64 | 84 | 61 | 83 |
| 8:00 | 59 | 75 | 58 | 80 |
| 9:00 | 65 | 83 | 65 | 84 |
| 10:00 | 56 | 75 | 63 | 84 |
| 11:00 | 59 | 83 | 67 | 85 |
| 12:00 | 71 | 89 | 65 | 86 |
| 13:00 | 56 | 71 | 65 | 86 |
| 14:00 | 57 | 72 | 66 | 85 |
| 15:00 | 57 | 82 | 61 | 76 |
| 16:00 | 66 | 84 | 60 | 82 |
| 17:00 | 63 | 83 | 58 | 67 |
| 18:00 | 58 | 79 | 64 | 80 |
| 19:00 | 63 | 83 | 66 | 83 |
| 20:00 | 66 | 84 | 65 | 74 |
| 21:00 | 61 | 80 | 66 | 74 |
| 22:00 | 57 | 66 | 68 | 89 |
| 23:00 | 66 | 87 | | |

| | Statistical Summary | | | | | |
|---|---|---|---|---|---|---|
| | Daytime (7 a.m. - 10 p.m.) | | | Nighttime (10 p.m. - 7 a.m.) | | |
| | High | Low | Average | High | Low | Average |
| Leq (Average) | 71.3 | 56.1 | 63.8 | 65.7 | 56.0 | 62.2 |
| Lmax (Maximum) | 89.0 | 70.7 | 80.5 | 91.0 | 65.9 | 79.9 |
| L50 (Median) | 66.9 | 57.6 | 63.2 | 68.4 | 0.0 | 52.5 |
| L90 (Background) | 86.1 | 66.6 | 80.6 | 88.9 | 0.0 | 68.7 |

| | 21-Sep | 22-Sep |
|---|---|---|
| Computed Ldn, dB | 68.9 | 69.6 |
| % Daytime Energy | 71% | 68% |
| % Nighttime Energy | 29% | 32% |

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Appendix B-3

## All-American Speedway
## 24hr Continuous Noise Monitoring - Site 3
## September 21 & 22, 2007

| | 21-Sep | | 22-Sep | |
|---|---|---|---|---|
| Hour | Leq 9/21 | Lmax | Leq 9/22 | Lmax |
| 0:00 | 43 | 59 | 46 | 59 |
| 1:00 | 43 | 62 | 46 | 59 |
| 2:00 | 43 | 54 | 44 | 64 |
| 3:00 | 45 | 53 | 48 | 63 |
| 4:00 | 45 | 57 | 46 | 58 |
| 5:00 | 48 | 55 | 45 | 64 |
| 6:00 | 53 | 68 | 48 | 59 |
| 7:00 | 53 | 63 | 47 | 62 |
| 8:00 | 49 | 60 | 45 | 59 |
| 9:00 | 46 | 64 | 45 | 59 |
| 10:00 | 48 | 63 | 45 | 54 |
| 11:00 | 46 | 66 | 46 | 59 |
| 12:00 | 48 | 68 | 46 | 55 |
| 13:00 | 46 | 62 | 45 | 62 |
| 14:00 | 45 | 64 | 42 | 54 |
| 15:00 | 43 | 67 | 46 | 67 |
| 16:00 | 45 | 60 | 43 | 59 |
| 17:00 | 45 | 60 | 42 | 58 |
| 18:00 | 44 | 54 | 45 | 61 |
| 19:00 | 47 | 59 | 45 | 56 |
| 20:00 | 47 | 62 | 52 | 81 |
| 21:00 | 47 | 65 | 49 | 63 |
| 22:00 | 48 | 59 | 45 | 64 |
| 23:00 | 48 | 58 | | |

| | Statistical Summary | | | | | |
|---|---|---|---|---|---|---|
| | Daytime (7 a.m. - 10 p.m.) | | | Nighttime (10 p.m. - 7 a.m.) | | |
| | High | Low | Average | High | Low | Average |
| Leq (Average) | 53.1 | 43.0 | 47.4 | 52.9 | 42.5 | 47.5 |
| Lmax (Maximum) | 68.4 | 54.4 | 62.6 | 68.4 | 53.3 | 58.4 |
| L50 (Median) | 51.7 | 41.5 | 45.4 | 48.1 | 0.0 | 40.8 |
| L90 (Background) | 80.7 | 54.0 | 60.7 | 64.0 | 0.0 | 54.5 |

| | 21-Sep | 22-Sep |
|---|---|---|
| Computed Ldn, dB | 53.9 | 52.7 |
| % Daytime Energy | 62% | 62% |
| % Nighttime Energy | 38% | 38% |

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