Appendix G

Noise Technical Data
(45 dBA.com Acoustics Consulting, 2006)

NOISE E.I.R. APPENDIX

Measurement Method, Instrument Specifications and Data

Wind Measurement

Sound level measurements become less reliable when average wind speed is greater than 11 m.p.h. at the measurement site. Therefore, wind speed and direction are measured periodically at the measurement site and the results are correlated with wind data from a nearby established weather station. A Larson Davis WS 001 windscreen is used as wind protection for all microphones and is left in place at all times.

Wind speed and direction were noted throughout the measurement period and compared with data from KSMX weather station located at the Santa Maria Airport. A magnetic compass was used to estimate wind direction. A Davis Turbo Wind meter was used to measure wind speed at the measurement site. The Turbo Wind meter is a high performance wind speed indicator with exceptional accuracy.

The KSMX weather station is located at Lat/Long: 34.8989167/-120.4574444; Elevation: 261 ft./79.6 m (surveyed). The Mahoney Ranch Location is approximately one mile from the weather station.

Sound Level Meters

Precision of Sound Level Meters. The American National Standards Institute (ANSI) specifies several types of sound level meters according to their precision. Types 1,2, and 3 are referred to as “precision,” “general-purpose,” and “survey” meters, respectively. Most measurements carefully taken with a type 1 sound level meter will have an error not exceeding 1 dB. The corresponding error for a type 2 sound level meter is about 2 dB. The sound level meters used for measurements shown in this report are Larson-Davis Laboratories Model 812 and Model 820. These meters meet all requirements of ANSI s1.4, IEC 651 for Type 1 accuracy and include the following features: 110 dB dynamic range for error free measurements. Measures FAST, SLOW, Unweighted PEAK, Weighted PEAK, Impulse, Leq, LDOD, LOSHA, Dose, Time Weighted Average, SEL, Lmax, Lmin, LDN. Time history sampling periods from 32 samples per second up to one sample every 255 seconds.

Field calibration of the meter is accomplished before and after all field measurements with an external calibrator. Laboratory calibration of the all instruments is performed at least biannually and accuracy can be traced to the U.S. National Institute of Science and Technology standard.

The following Type 1 Sound Level Meters were used for this study: Each sound level meter is factory calibrated as three separate components; the body of the meter itself plus the preamplifier and the microphone, each of which has a Certificate of Calibration and Conformance. When calibrated, the instrument is certified as meeting factory specifications; Normal elapsed time between factory calibrations should not exceed two years.

Type 1 Larson Davis model 812 Sound Level Meter, Serial Number 0433. Factory calibrated, Certificate Number 2006-77140; Certificate of Calibration and Conformance issued 07 FEB 2006. Calibration due 07 FEB 2008; Preamp 828, Serial Number 1482 Factory calibrated, Certificate Number 2006-77138; Certificate of Calibration and Conformance issued 07 FEB 2006. Calibration due 07 FEB 2008; Microphone 2560, Serial Number 3153 Factory calibrated, Certificate Number 2006-76883 Certificate of Calibration and Conformance issued 09 FEB 2006. Calibration due 09 FEB 2008

Type 1 Larson Davis model 812 Sound Level Meter with 2560 microphone, Serial Number 489. Preamp 828, Serial Number 1482; Microphone 2560, Serial Number 3153; Certificate of Calibration and Conformance issued 26 Oct 2005. Calibration due 26 Oct 2007.

Type 1 Larson Davis model 820 Sound Level Meter with 2561 microphone, Serial Number 0318; Preamp 827, Serial Number 2157; Microphone 2560, Serial Number 1083; Certificate of Calibration and Conformance issued 01-17-2005. Calibration due 01-17-2007.

Type 1 Larson Davis model 820 Sound Level Meter with 2561 microphone, Serial Number 0292. Preamp 827, Serial Number 1479; Microphone 2560, Serial Number 3199; Certificate of Calibration and Conformance issued 01-17-2005. Calibration due 01-17-2007.

Calibrator used in this study:

Larson Davis CA250 Acoustic Calibrator, Serial Number 1931. Certificate of Calibration and Conformance, Certificate Number 2006-66284. Factory Calibrated on 02MAR2006. Calibration due 02MAR2008. The instrument meets factory specifications per Procedure D0001.8192. The instrument was found to be in calibration as received. Full calibration report available on request.

The above instruments meet factory specifications per ANSI S1.4 1983.

Sound Level Measurement Method

The protocol for conducting sound level measurements is prescribed in detail by the American Society for Testing and Materials (ASTM) in their E 1014 publication and the Cal Trans Traffic Noise Analysis Protocol. The procedures and standards in those documents are met or exceeded for sound level measurements shown in this report. The standards of ASTM E 1014 are exceeded by using Type 1 sound level meters for all measurements in this report instead of the less accurate Type 2 meters. Therefore, the precision of the measurements in this report is likely to be better than +/- 2 dB as stated in ASTM E1014.

Caltrans Noise Measurement Guidelines

Caltrans makes available general guidelines for taking into account environmental elements in noise measurements. The following is an excerpt from their guidelines. The Traffic Noise

Analysis Protocol (hereafter referred to as the Protocol) contains Caltrans noise policies, which fulfill the highway noise analysis and abatement/mitigation requirements stemming from the following State and Federal environmental statutes:

- California Environmental Quality Act (CEQA)
- National Environmental Policy Act (NEPA)
- Title 23 United States Code of Federal Regulations, Part 772 “Procedures for Abatement of Highway Traffic Noise and Construction Noise” (23 CFR 772)
- Section 216 et seq. of the California Streets and Highways Code

Wind speed and direction, temperature profiles, relative humidity, and sky conditions can cause changes in noise measurement results at normal receiver distances from the highway. Information concerning these effects is made part of the documentation accompanying the noise measurement data. Without it, there is no baseline against which subsequent measurements can be compared. The prevailing wind direction is expressed in degrees clockwise from the north direction, or it can be expressed as a direction on a 16-point compass, where north is 0 degrees, east is 90 degrees, south is 180 degrees and west is 270 degrees. Wind, air temperature, and humidity observations are ideally made at the average height above the ground that noise is traveling between the source and the receiver. The minimum height should is at least 1.5 meter, or 5 feet, above the ground. In addition to the wind, temperature and humidity observations, sky conditions are also documented.

Meteorological conditions can affect noise measurements in two ways: they can affect the measurement instruments directly, or they can affect the actual noise levels. Wind speeds of 5 meters per second, or 11 miles per hour, create a wind noise of about 45 dBA on a typical ½” microphone with windscreen. This means that measurements of noise below 55 dBA will be contaminated under these conditions. Extreme hot or cold temperatures and humidity can also affect the operation of noise measurement instruments. High humidity or rapid changes in temperature can cause droplets of moisture to form on the microphone diaphragm, creating a popping noise. This can contaminate the noise measurement. Rain, or wet pavement will change tire-pavement noise characteristics, altering traffic noise both in level and frequency. Changes in wind speed and direction relative to the location of the noise source and receiver can cause changes in the magnitude and direction of wind shear. This can result in refraction effects that can redirect sound energy away from or toward a receiver and change overall noise levels.

For normal highway traffic noise measurements, meteorological conditions are restricted as follows: If wind speeds, regardless of direction, are greater than 5 meters per second, or 11 miles per hour, those measurements are not included in the noise analysis. For research or special studies this criterion is often lower, depending on the objectives of the study. Temperatures and humidity are within the operational ranges specified for the equipment used. [reference: Caltrans Traffic Noise Analysis Protocol For New Highway Construction and Highway Reconstruction Projects, October, 1998]

Roadway Traffic Noise Analysis

The traffic noise study was prepared using a combination of noise measurements and traffic noise modeling. Long-term 24-hour traffic noise measurements were performed at four sites and correlated with existing average daily traffic (ADT) counts performed by Associated Transportation Engineers. This data was used in turn to calibrate the noise modeling program using the algorithms of the Federal Highway Administration Highway Traffic Noise Model (TNM 2.5). The TNM 2.5 model is the analytical method currently favored for traffic noise prediction by most state and local agencies. It is applied to federal and state roadway projects by the California Department of Transportation (Caltrans). The model is based upon the CALVENO noise emission factors for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the project site. In addition, sound level measurements were performed over 24-hour periods at two locations to describe ambient sound levels in the project area, and to derive suitable LDN day/night traffic noise distribution factors for traffic noise modeling.

Noise Contour Modeling

Noise contours incorporating the measured sound level values were generated using CADNA A, an acoustical modeling program that incorporates the TNM 2.5 algorithms, and which was developed to predict hourly Leq values for free-flowing traffic conditions. This computer modeling tool, made by Datakustik GmbH, is an internationally accepted acoustical modeling software program, used by many acoustics and noise control professional offices in the U.S. and abroad. The software has been validated and by comparison with actual values in many different settings. The program has a high level of reliability and follows methods specified by the International Standards Organization in their ISO 9613-2 standard, "Acoustics – Attenuation of sound during propagation outdoors, Part 2: General Method of Calculation." The standard states that, "this part of ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level … under meteorological conditions favorable to propagation from sources of known sound emissions. These conditions are for downwind propagation … under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night."

The computer modeling software takes into account source sound power levels, surface reflection and absorption, atmospheric absorption, geometric divergence, meteorological conditions, walls, barriers, berms, and terrain variations. The CADNA A software uses a grid of receivers covering the project site, based on the ADT characteristics of the transportation noise source, supplied for this report by Associated Transportation Engineers.

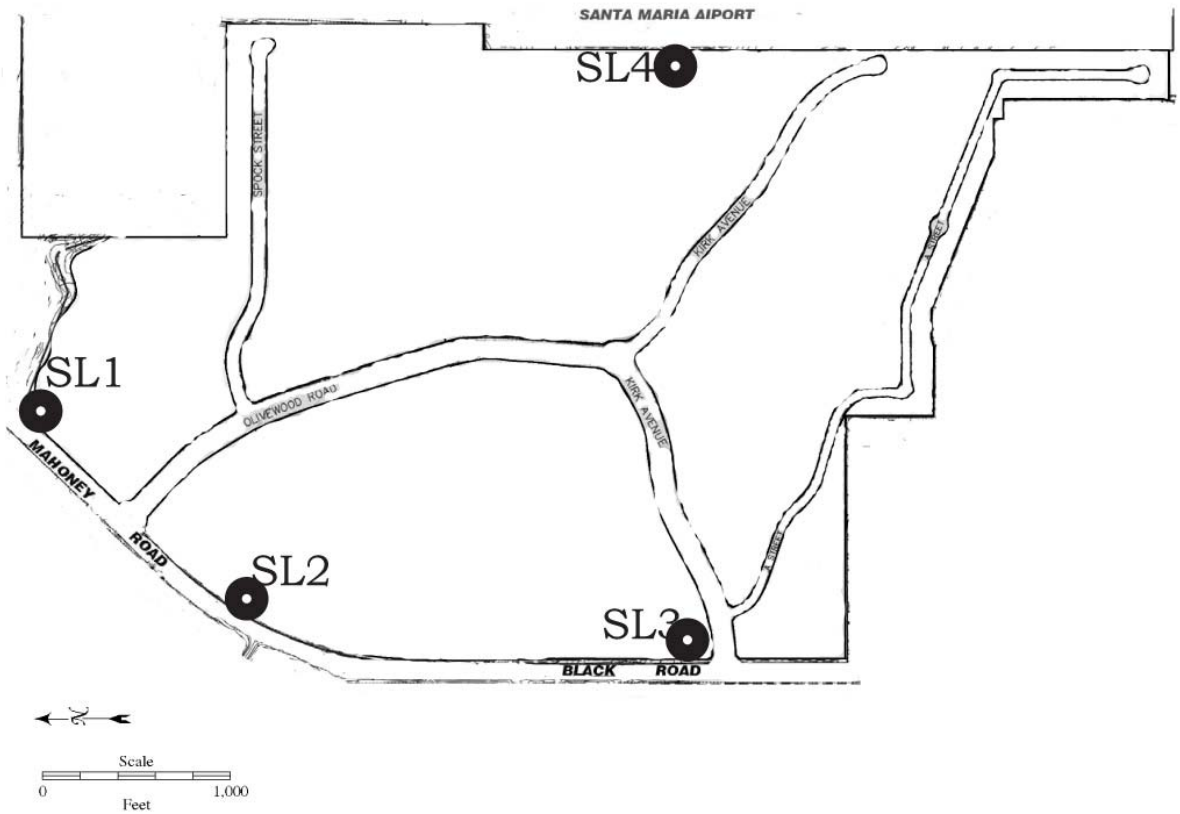
Data from four long-term sound level measurements

On the following pages are the recorded sound level data from four long-term, 24-hour measurements taken around the project site.

The location of the measurements is shown in Figure 1.

Data from two locations along Mahoney Road are shown in Figure 2.

Data from Black Road and Site North Boundary are shown in Figure 3.

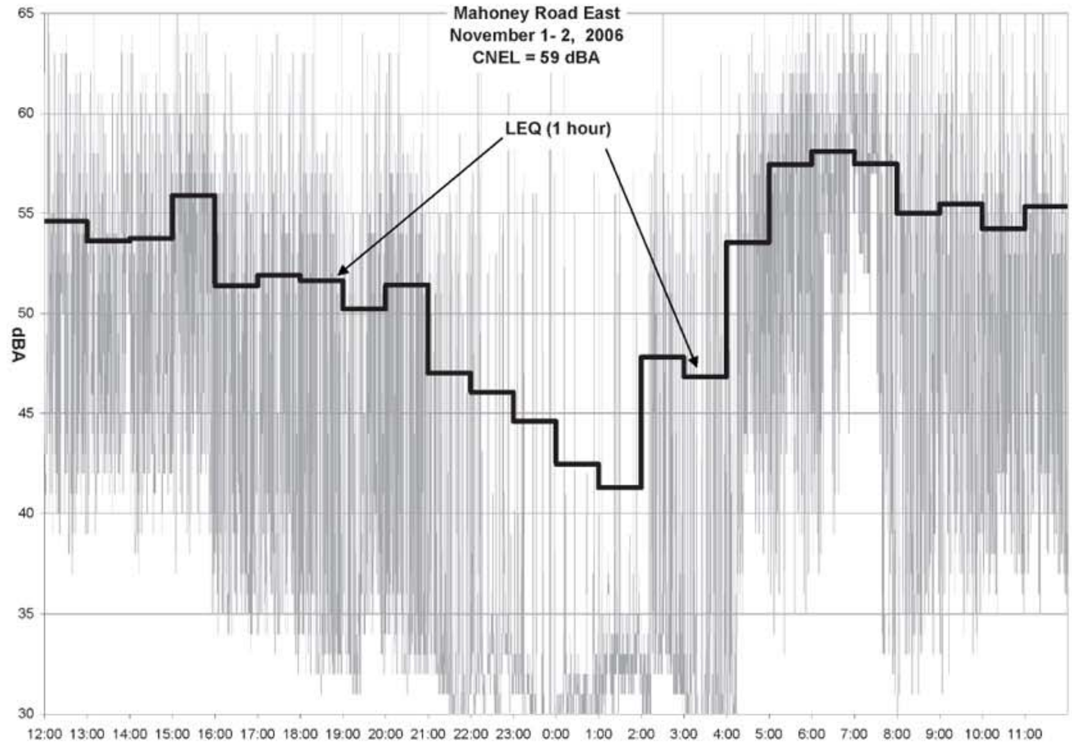


Source: Cannon 2006

Noise Contour Map
dBA =CNEL

● **24-hour Measurement**

FIGURE 1. Location of sound level measurements



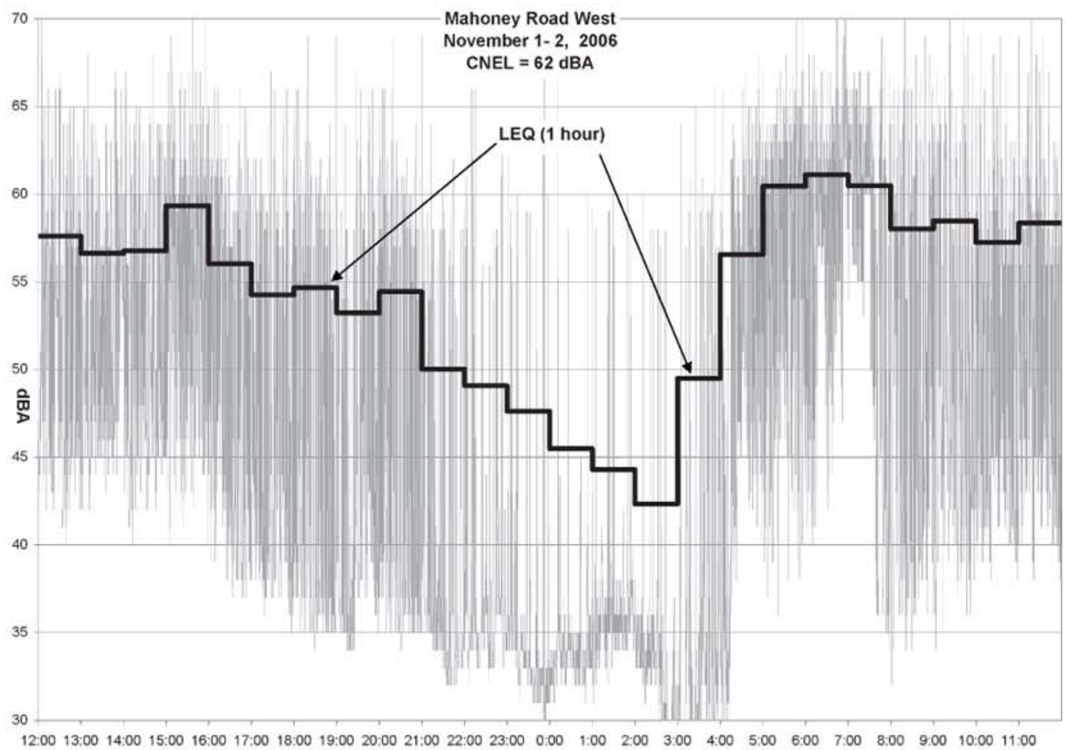


Figure 2. Continuous, 24-hour sound level measurement with hourly LEQ

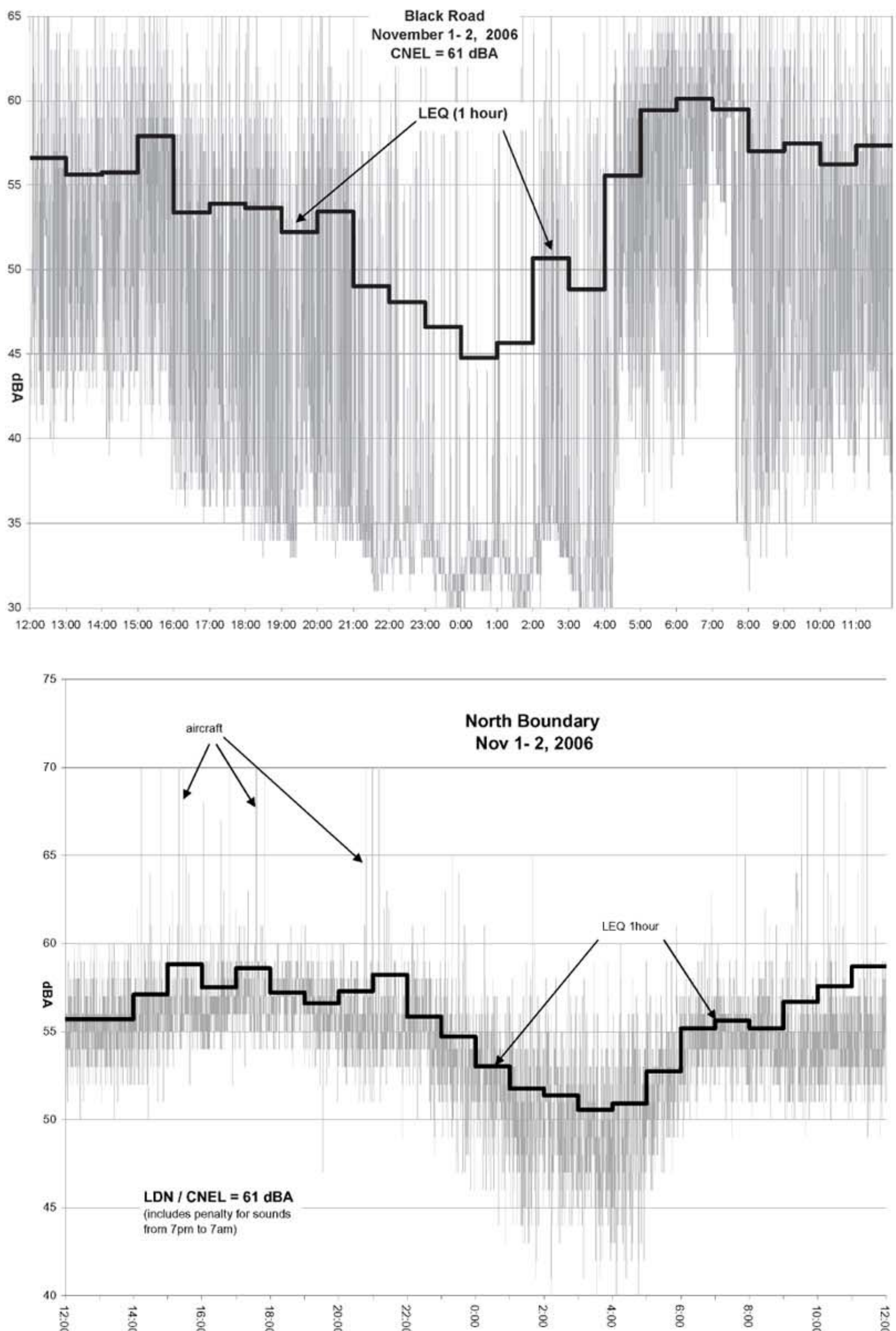


Figure 3. Continuous, 24-hour sound level measurement with hourly LEQ

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