# ENVIRONMENTAL NOISE ANALYSIS/ CALTRANS PROTOCOL TECHNICAL ANALYSIS FOR THE PROPOSED ROUTE 68 (HOLMAN HIGHWAY) WIDENING PROJECT 05-MON-068-KP 6.1/7.1 (PM 3.8/4.4) IN THE CITY OF MONTEREY, MONTEREY COUNTY, CALIFORNIA EA 05-448000 FINAL REPORT

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*Revised May 24, 2004*

**Environmental Noise Analysis/Caltrans Protocol Technical Analysis**

# SR 68/SR 1 Widening and Interchange Project

Project # 2002-132

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This Environmental Noise Analysis will focus on the change in traffic noise levels, and noise levels due to construction activities associated with the SR 68 and the SR 68/SR 1 interchange roadway improvements.

## B. Description of Project

The project consists of four alternatives: No-Build; Build Alternative 1; Build Alternative 2; and Build Alternative 3. There are common design features for all three build alternatives. These common features are as follows:

- SR 68 would be widened from approximately 0.2 km (0.1 mile) west of the CHOMP entrance to the SR 68/SR 1 southbound ramp intersection;
- The proposed retaining walls would be constructed at the edge of right-of-way;
- The 17-Mile Scenic Drive overcrossing would be replaced with a new bridge;
- The Beverly Manor entrance would be maintained with potential for a new signal system;
- SR 1 southbound off- and onramps would require a retaining wall;
- The Pebble Beach Main Gate entrance would be modified;
- Two retaining walls located along the north and south sides of SR 68 between 17-Mile Scenic Drive and Beverly Manor entrance would receive aesthetic treatment; and
- Traffic signals at the SR 68/SR 1 southbound ramp and at the SR 68/CHOMP intersections would be modified.

## C. Existing Land Use

The land uses adjacent to the project site include the Community Hospital of the Monterey Peninsula (CHOMP) to the north, and residential uses to the south. The CHOMP is located within the City of Monterey, and the residential uses are located within the unincorporated portion of Monterey County.

## D. Existing Noise Levels

Existing noise levels in the project vicinity are dominated by traffic on SR 1 and SR 68. Existing peak hour traffic noise levels at the identified noise-sensitive receivers range between 55 dB and 65 dB Leq.

## E. Future Predicted Noise Levels

Future predicted peak hour traffic noise levels at the identified noise-sensitive receivers range between 55 dB and 66 dB Leq without the proposed project. The future predicted peak hour traffic noise levels at the identified noise-sensitive receivers range between 55 dB and 66 dB Leq with each of the proposed project alternatives. This does not account for the installation of sound walls or barriers.

### F. Noise Abatement

Based upon determination of reasonableness which is discussed in this report, barriers in the 2.4 meter (8-foot) range are required to reduce traffic noise levels to less than 66 dB Leq, and provide a minimum 5 dB reduction in noise levels

## II. NOISE IMPACT TECHNICAL REPORT

### A. Introduction

#### 1. Purpose:

This Environmental Noise Analysis will focus on the change in traffic noise levels, and noise levels due to construction activities associated with the SR 68 roadway improvements and the SR 68/SR 1 interchange improvements. For the purposes of this analysis the Existing and Future Year 2030 noise environments have been evaluated for each of the alternatives. Predicted noise levels are compared to the applicable Caltrans/Federal Highway Administration (FHWA) noise level criteria. This analysis has been prepared in accordance with the guidelines of the Caltrans Traffic Noise Analysis Protocol and CFR 772 which is incorporated by reference into the Traffic Noise Analysis Protocol.

#### 2. Background:

The City of Monterey proposes to widen and upgrade SR 68 (Holman Highway) in Monterey County from approximately 177 m (582 feet) west of the CHOMP entrance, post mile (PM) 3.8, east to the SR 68/SR 1 interchange. Improvements to SR 1 southbound off- and onramps are also included in the proposed project. This project is intended to reduce congestion on SR 68 and the SR 68/SR 1 interchange by providing the following improvements which are common for each of the alternatives.

- SR 68 would be widened from approximately 0.2 km (0.1 mile) west of the CHOMP entrance to the SR 68/SR 1 southbound ramp intersection;
- The proposed retaining walls would be constructed at the edge of right-of-way;
- The 17-Mile Scenic Drive overcrossing would be replaced with a new bridge;
- The Beverly Manor entrance would be maintained with potential for a new signal system;

- SR 1 southbound off- and on ramps would require a retaining wall;
- The Pebble Beach Main Gate entrance would be modified;
- Two retaining walls located along the north and south sides of SR 68 between 17-Mile Scenic Drive and Beverly Manor entrance would receive aesthetic treatment; and
- Traffic signals at the SR 68/SR 1 southbound ramp and at the SR 68/CHOMP intersections would be modified.

## B. Project Description

### 1. Description of Project Alternatives

The following provides a detailed description of each of the alternatives:

**No Build Alternative** - This alternative would maintain the existing facility. There would continue to be deficient operations on SR 68, at the SR 68/SR 1 interchange, and on the southbound offramp where traffic is known to back up onto the SR 1 mainline.

**Build Alternative 1, Three Lane Facility** – Build Alternative 1 is characterized by widening SR 68 from two lanes to three lanes. Widening would consist of the addition of one lane in the eastbound direction from 0.2 km (0.1 mile) west of the CHOMP entrance, east to the SR 68/SR 1 southbound ramp intersection. This added eastbound lane would terminate as a mandatory right-turn lane to the Pebble Beach Main Gate/SR 1 southbound onramp.

**Build Alternative 2, Three Lane Facility** - Build Alternative 2 would widen SR 68 from two lanes to three lanes and is characterized by the addition of one lane in the westbound direction from the CHOMP entrance east to the SR 68/SR 1 southbound ramp intersection. This added westbound lane would terminate as a mandatory right-turn lane to CHOMP.

**Build Alternative 3, Four Lane Facility** - Build Alternative 3 would widen SR 68 from two lanes to four lanes and is characterized by the addition of one additional lane in each direction. In the westbound direction, two lanes would be carried past the CHOMP entrance and then merge to the existing one-lane approximately 183 m (600 feet) west of the CHOMP entrance. In the eastbound direction, the right lane would terminate as a mandatory right-turn lane to the Pebble Beach Main Gate entrance.

**2. Ramp Configurations** There are three design variations, or combinations thereof, that could be incorporated as part of this proposed project. These design options address the treatment of the SR 68/SR 1 southbound ramp intersection.

**Ramp Variation 1, Five Legged Intersection** - This ramp variation is characterized as a five-legged intersection option. It would result in all traffic movements to be brought together at the SR 68/SR 1 southbound ramp intersection. This intersection would be signalized.

**Ramp Variation 2, Roundabout** - This ramp variation is characterized as a traffic circle. It would result in one-way circular traffic flow at the intersection of SR 68 and the SR 1 on- and offramps (see Appendix A, Figures 2-4 through 2-6). Traffic would enter this circle in a free-flowing movement with yield at the point of entry into the circle. The southbound offramp right-turn movement would bypass the roundabout.

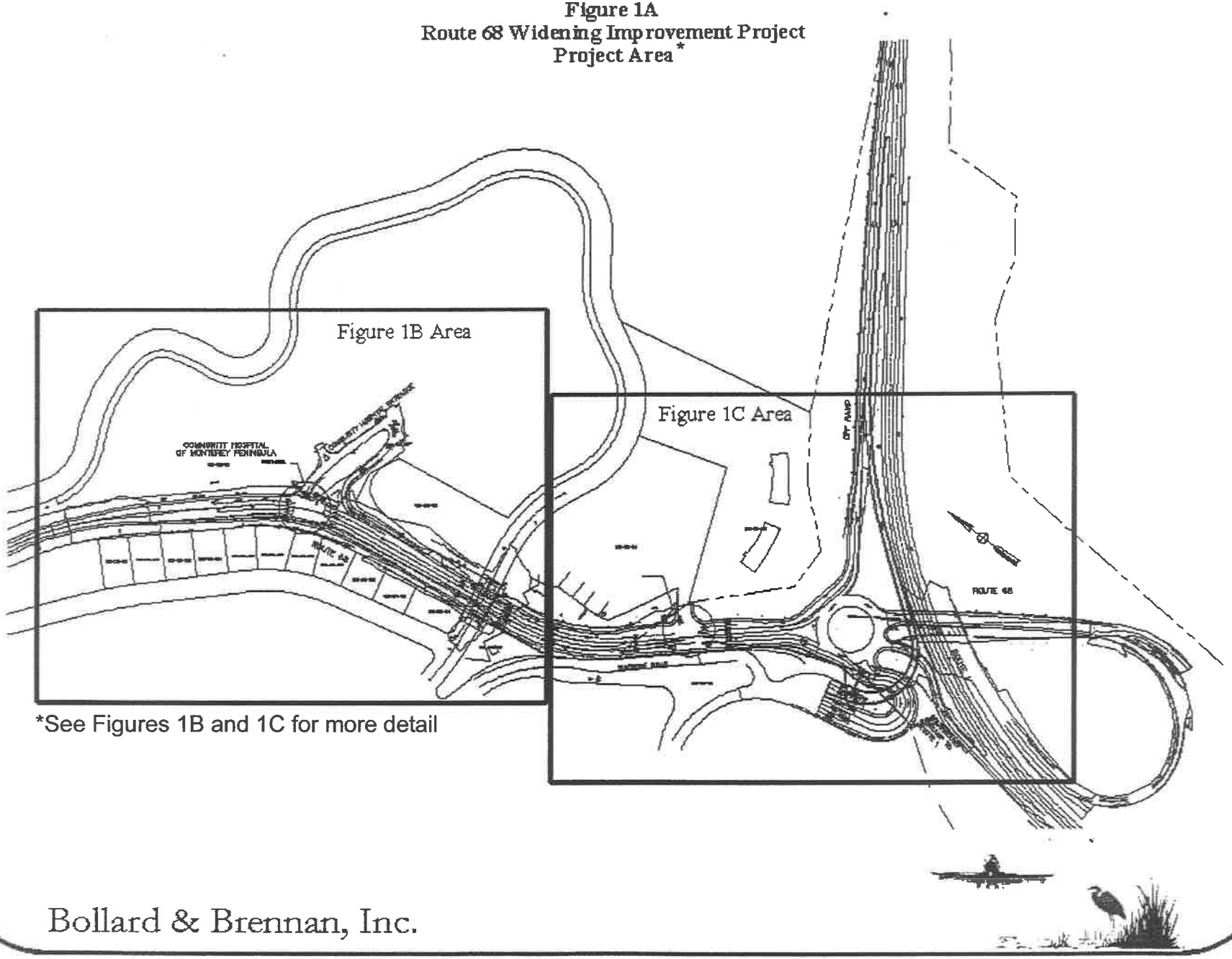
**Ramp Variation 3, Collector/Distributor Road** - This ramp variation is characterized as a SR 1 Distributor/Collector option that would result in a new SR 1 exit lane dedicated solely to access the Pebble Beach Main Gate. The Distributor/Collector lane would originate at the SR 1 southbound auxiliary lane near the beginning of the exit ramp, and continue under the SR 68 overcrossing, and conform at the Pebble Beach Main Gate entrance. This design variation allows direct, unrestricted access to the Pebble Beach Main Gate entrance from the SR 1 southbound off-ramp and reduces the volume of traffic traveling through the SR 68/SR 1 southbound ramp intersection.

## C. Fundamentals of Traffic Noise

### 1. Decibels and Frequency

Noise is often defined simply as unwanted sound, and thus is a subjective reaction to characteristics of a physical phenomenon. Researchers have generally agreed that A-weighted sound pressure levels (sound levels) are very well correlated with community reaction to noise. The unit of sound level measurement is the decibel (dB), sometimes expressed as dBA. Variations in sound levels over time are represented by statistical descriptors, and by time-weighted composite noise metrics such as the Average Level (Leq) and the Day-Night Average Level (Ldn). The Leq is the steady state equivalent of the time varying sound energy over a period of measurement. The Ldn is the energy averaged over a 24-hour period with a 10 dB penalty applied between the hours of 10:00 p.m. and 7:00 a.m. The Leq is the foundation for determining the overall Ldn value. Throughout this analysis, A-weighted sound pressure levels will be used to describe community noise unless otherwise indicated. Table 1 provides examples of maximum sound levels associated with common noise sources. The decibel notation used for sound levels describes a logarithmic relationship of acoustical energy, so that sound levels cannot be added or subtracted in the conventional arithmetic manner. For example, a doubling of acoustical energy results in an increase of 3 decibels (dB), which is usually considered to be barely perceptible. A 10-fold increase in acoustical energy yields a 10 decibel change, which is subjectively like a doubling of loudness.

**Figure 1A**
**Route 68 Widening Improvement Project**
**Project Area***




*See Figures 1B and 1C for more detail

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**Figure 1B**
**Route 68 Widening Improvement Project**
**Noise Measurement Locations, Modeled Receiver Locations, and Noise Barrier Locations**

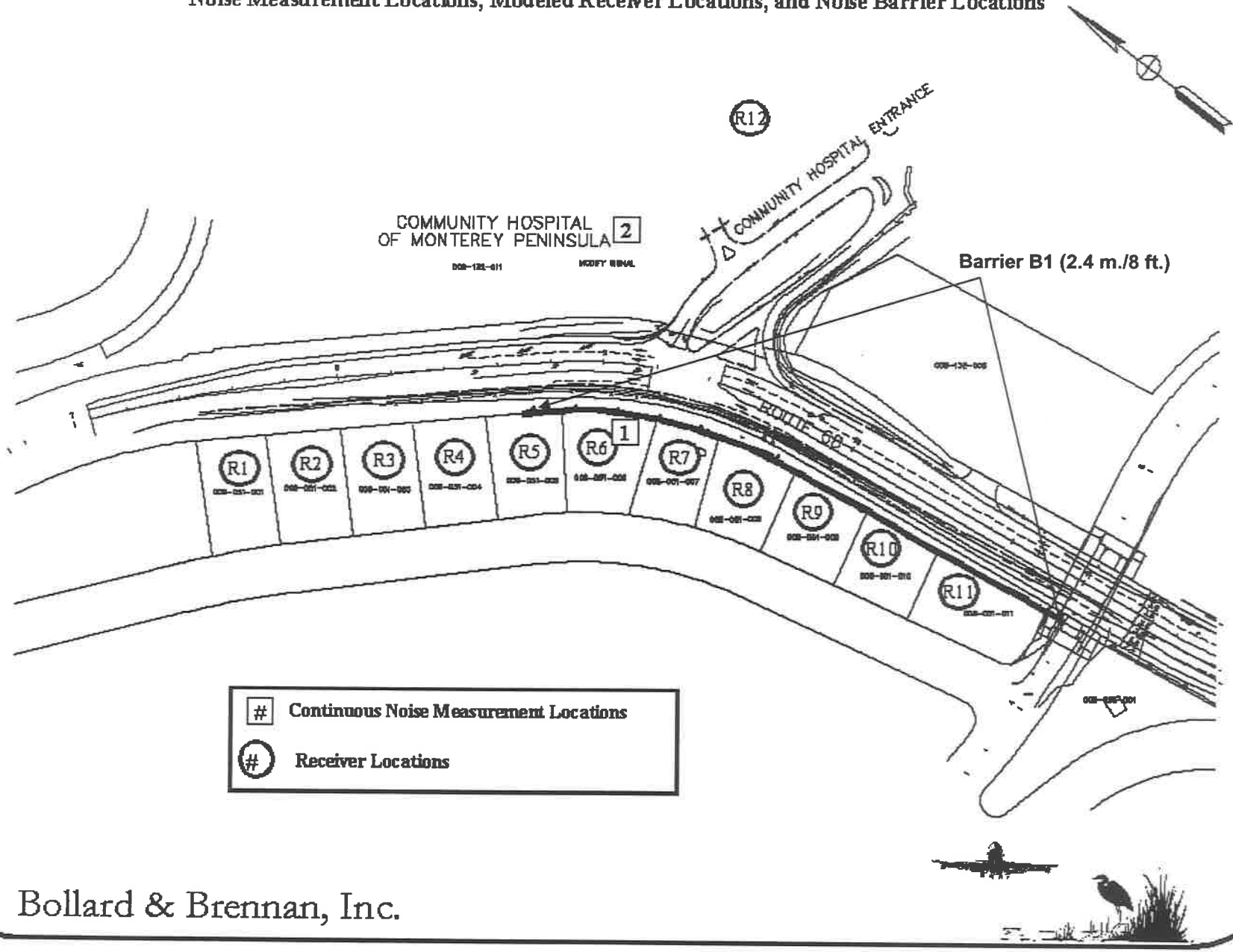


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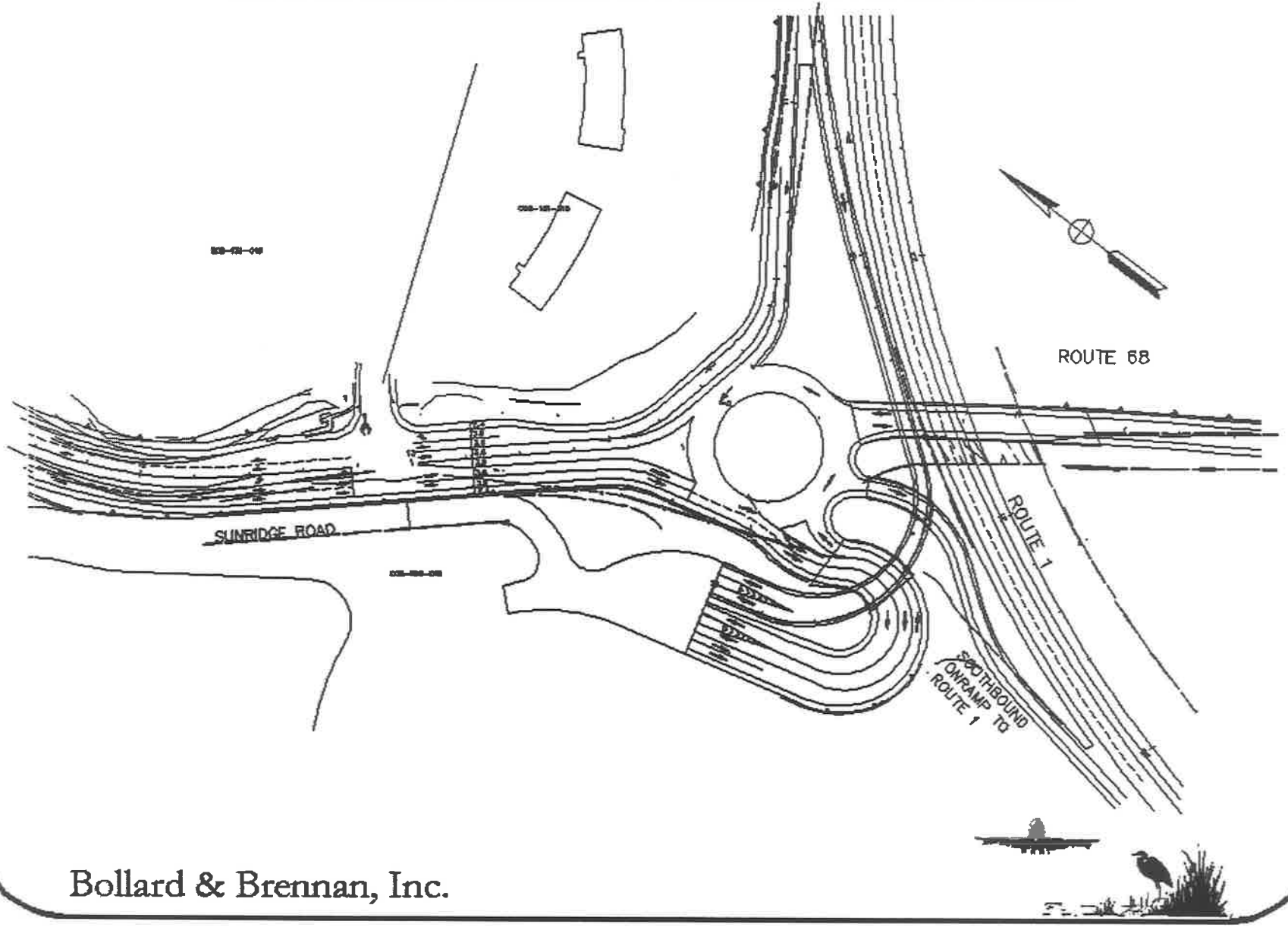
**Figure 1C**
**Route 68 Widening Improvement Project**
**Noise Measurement Locations, Modeled Receiver Locations, and Noise Barrier Locations**

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| Table 1<br>Typical A-Weighted Maximum Sound Levels of Common Noise Sources | |
|---|---|
| Decibels | Description |
| 130 | Threshold of pain |
| 120 | Jet aircraft take-off at 100 feet |
| 110 | Riveting machine at operators position |
| 100 | Shot-gun at 200 feet |
| 90 | Bulldozer at 50 feet |
| 80 | Diesel locomotive at 300 feet |
| 70 | Commercial jet aircraft interior during flight |
| 60 | Normal conversation speech at 5-10 feet |
| 50 | Open office background level |
| 40 | Background level within a residence |
| 30 | soft whisper at 2 feet |
| 20 | Interior of recording studio |

## 2. Noise Source Characteristics (Vehicles & Roadways)

Roadway and vehicle noise levels are calculated and based upon the Calveno Noise Emission Factors, which account for the vehicle type, travel speed, and spectra or frequency of the noise source in California settings. In addition, the pavement type and condition, as well as roadway grades and source heights are all included in the calculations of vehicle noise levels.

## 3. Noise Source Propagation

Sound propagating outdoors through the atmosphere generally decreases in level with increasing distance between source and receiver. The decrease in sound level is referred to as noise attenuation. This attenuation is the result of several mechanisms, principally geometrical spreading from the sound source, absorption of acoustic energy by the air through which the sound waves propagate, and the effects of propagation close to different ground surfaces. In addition atmospheric conditions such as wind and temperature have major effects on the propagation of sound over distances greater than 300 feet.

Generally traffic noise attenuates at a rate of approximately 3 dB to 4.5 dB per doubling of distance. These attenuation rates are typical for a line-source and a moving point source, respectively.

#### 4. Perception of Noise at the Receiver (A-weighting)

As described earlier in this report, the noise levels (dB) are sometimes described as dBA. The dBA frequency response is intended to correlate with how the human ear perceives a given sound level. Since the human detects the full amplitude of a sound differently at the lower and higher frequencies, the A-weighted sound level basically corrects for the sound levels in the lower and higher frequencies. As an example, no corrections are made for sound levels at 1,000 Hz. Therefore, this is a flat response. However, a -19.1 dB correction is included for sound levels at 100 Hz, a +1.2 dB correction is included for sound levels at 2,000 Hz, and a – 2.5 dB correction is included for sound levels at 10,000 Hz.

### D. Federal & State Policies and Procedures

#### 1. Traffic Noise Analysis Protocol

The criteria for evaluating noise impacts that are used by the FHWA and Caltrans are contained in the Caltrans Traffic Noise Analysis Protocol (The Protocol). Based upon The Protocol, the proposed project is considered a Type 1 project. The project has also been determined to pass the screening procedures for determining the need for a Traffic Noise Impact Analysis, and is therefore required to include a Traffic Noise Impact Analysis.

The Protocol establishes Noise Abatement Criteria (NAC) for various land uses which have been categorized based upon activity. Land uses in these documents are categorized on the basis of their sensitivity to noise. The Category B criterion applies to residences, hotels, motels, churches, schools, recreation areas, active sport areas, and parks, and is an hourly exterior sound level that approaches (within 1 dB) or exceeds the hourly NAC of 67 dBA, Leq. The Category C criterion applies to commercially developed land uses, and is an hourly exterior sound level that approaches or exceeds 72 dB Leq. The Category E criterion applies to residences, motels, hotels, schools, hospitals, and similar uses, and is an hourly interior sound level of 52 dB Leq. The interior sound level criterion only applies in those situations where there are no exterior activities to be affected by the traffic noise. The Protocol also goes on to state that a noise increase is considered substantial when the predicted noise levels with the project exceed existing noise levels by 12 dBA, Leq.

Under The Protocol, traffic noise abatement must be considered when the predicted noise levels "approach or exceed" the NAC or when the predicted noise levels substantially exceed existing noise levels and it is reasonable and feasible

to provide noise attenuation. A minimum 5 dBA noise reduction must be achievable for a project to be considered feasible. However, feasibility may also be restricted by topography, access requirements, presence of local cross streets, other noise sources in the area and safety considerations.

Noise abatement reasonableness is stated within The Protocol as being more subjective in nature than the feasibility determination. The Protocol states that the reasonableness of noise abatement considers the cost of the abatement, absolute noise levels, changes in noise levels, noise abatement benefits, development along the highway, life cycle of the proposed noise abatement, environmental impacts of the proposed noise abatement, opinions of impacted residents, input from the reviewing public agencies and the social, economic, environmental, legal and technological factors. The Protocol provides procedures for determining preliminary reasonableness for residential areas in Land Use Category B. This procedure will be described in this report if noise abatement is considered.

### 2. Technical Noise Supplement

The Technical Noise Supplement, also referred to as the "TENS", is the technical supplement to the Protocol. The intent of the TENS is to provide a detailed technical guidance in the Measurement and Instrumentation which may be used for the analysis, Traffic Noise Impact Screening, the Detailed Traffic Noise Impact Analysis, Barrier Design Considerations, Study Report preparation, Special Considerations which may need to be used when encountering complex situation.

The TENS is used throughout the preparation of this Technical Noise Analysis.

## E. City and County of Monterey Procedures

### 1. City of Monterey Noise Element Criteria

The City of Monterey Noise Element for the General Plan establishes Land Use and Noise Compatibility Standards. For residential uses, the Noise Element establishes "Normally Acceptable" exterior noise level criteria of 60 dB Ldn for single family residential uses, and 70 dB Ldn for Hospital uses. The Noise Element also establishes "Conditionally Acceptable" exterior noise level criteria of 70 dB Ldn for each of those land uses. It should be noted that the City of Monterey is currently updating the General Plan. However, it is not yet adopted.

### 2. County of Monterey Noise Element Criteria

The County of Monterey Noise Element establishes a 'Normally Acceptable" range of noise levels for residential uses between 50 dB and 55 dB Ldn. The County has a "Conditionally Acceptable" range of noise levels for residential uses between 55 dB and 70 dB Ldn.

## F. Study Methods and Procedures

### 1. Selection of Receivers

For the purposes of this analysis, twelve (12) receiver sites areas were selected for evaluating potential noise impacts. Eleven (11) of the receiver sites were single family residential uses, one of the receiver sites is the CHOMP hospital. The receiver sites were selected to evaluate potential traffic noise impacts at all noise-sensitive receivers (Category B of the Protocol) within the area of potential affect.

### 2. Field Review and Noise Measurement Procedures

A detailed site review was conducted on November 18-19, 2003. Noise measurements consisted of continuous hourly noise measurements at two locations for a period of 24-hours.

The continuous 24-hour noise level measurements were conducted at two locations to represent noise-sensitive land uses. The measurements were conducted to determine the relationship between the measured 24-hour Ldn traffic noise level and the peak hour Leq noise levels, and for comparison to the Sound 32 model. Figure 1B shows the locations of the noise measurement sites. Appendices B1 and B2 graphically show the results of the continuous hourly noise level measurements.

Sound measurement equipment consisted of Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters. The measurement equipment was calibrated immediately before and after use, and meets the pertinent specifications of the American National Standards Institute (ANSI) and the International Electrotechnical Institute (IEC) for Type 1 precision sound measurement systems.

### 3. Noise Prediction Methodology

To describe existing and projected peak hour noise levels due to traffic, Bollard & Brennan, Inc. used the Sound-32 traffic noise prediction model. The Sound 32 model was developed to predict hourly Leq values for free-flowing traffic conditions, and is considered to be accurate within 1.5 dB.

The Sound-32 Model is the Caltrans-coded version of the Federal Highway Administration's Stamina 2.0 and Optima traffic noise prediction programs. The

current version of Sound-32 reports noise levels in Leq. The Sound-32 Model was used for comparison to the FHWA and Caltrans noise level criteria.

Traffic volumes that were used as direct inputs to the Sound-32 model were provided by the project traffic consultant. Speeds along the route were based upon observed travel speeds in the field, and truck mix percentages were based upon Caltrans truck count data for SR 68 and SR 1.

Based upon the noise measurement results, it can be expected that the 24-hour Ldn value, due to traffic, is approximately 1 dB below the peak hour traffic noise levels.

## G. Existing Noise Environment

### Noise Sensitive Land Uses in the Vicinity of the Project Site

The land uses adjacent to the project site include mixed land uses, which include residential, motel, church, commercial and light industrial uses. All identified noise-sensitive uses are shown on Figures 1A through 1C, and are summarized in Table 2.

**Table 2**
**Noise Sensitive Land Uses Adjacent to SR 68 Improvement Project**

| Receiver # | Land Use | Assessors Parcel Number |
|---|---|---|
| R1 | Single Family Residential | 008-051-001 |
| R2 | Single Family Residential | 008-051-002 |
| R3 | Single Family Residential | 008-051-003 |
| R4 | Single Family Residential | 008-051-004 |
| R5 | Single Family Residential | 008-051-005 |
| R6 | Single Family Residential | 008-051-006 |
| R7 | Single Family Residential | 008-051-007 |
| R8 | Single Family Residential | 008-051-008 |
| R9 | Single Family Residential | 008-051-009 |
| R10 | Single Family Residential | 008-051-010 |
| R11 | Single Family Residential | 008-051-011 |
| R12 | Community Hospital of Monterey Peninsula (CHOMP) | 008-132-011 |

### 2. Figures Depicting Locations of Receivers

Figures 1A through 1C show the locations of noise-sensitive receivers.

### 3. Exiting Noise Levels at Noise Sensitive Receivers

Based upon the results of the Sound-32 Model, Table 3 shows the existing traffic noise levels at each of the noise-sensitive receivers. The predicted existing background traffic noise levels at the identified noise-sensitive receivers range

between 55 dB and 65 dB Leq. The results indicate that none of the noise-sensitive receivers approach or exceed the Caltrans/FHWA NAC criterion of 67 dB Leq.

**Table 3**
**Predicted Existing (Year 2003) Traffic Noise Levels**
**At Noise Sensitive Land Uses Adjacent to SR 68 Improvement Project**

| Receiver # | Land Use | Assessors Parcel Number | Predicted $L_{eq}$ |
|---|---|---|---|
| R1 | Single Family Residential | 008-051-001 | 62 dB |
| R2 | Single Family Residential | 008-051-002 | 62 dB |
| R3 | Single Family Residential | 008-051-003 | 62 dB |
| R4 | Single Family Residential | 008-051-004 | 62 dB |
| R5 | Single Family Residential | 008-051-005 | 62 dB |
| R6 | Single Family Residential | 008-051-006 | 63 dB |
| R7 | Single Family Residential | 008-051-007 | 63 dB |
| R8 | Single Family Residential | 008-051-008 | 64 dB |
| R9 | Single Family Residential | 008-051-009 | 64 dB |
| R10 | Single Family Residential | 008-051-010 | 64 dB |
| R11 | Single Family Residential | 008-051-011 | 65 dB |
| R12 | Community Hospital of Monterey Peninsula | 008-132-011 | 55 dB |

Source: Bollard & Brennan, Inc., 2004

Based upon the 24-hour continuous noise measurement survey, the predicted Ldn values are expected to be approximately 1 dB less than the predicted Leq values shown in Table 3. For comparison to the City of Monterey noise level criteria, the predicted Ldn values range between 54 dB and 63 dB. Therefore, the traffic noise levels would exceed the City of Monterey normally acceptable exterior noise level criterion of 60 dB Ldn at the residential uses. However, they would not exceed the conditionally acceptable exterior noise level criterion of 70 dB Ldn. They would not exceed the normally acceptable exterior noise level criterion of 70 dB Ldn at the CHOMP.

## H. Future Noise Environment, Impacts, and Considered Abatement/Mitigation

### 1. Future Traffic Data Assumptions and Site Geometry

Future traffic data which was used as direct inputs to the Sound-32 were provided by the project traffic consultant. Speeds along the route were based upon observed travel speeds in the field, and truck mix percentages were based upon Caltrans truck count data for SR 68 and SR 1. Changes in geometry along the project route, based upon proposed improvements to the corridor and interchange were provided by Mark Thomas & Company. Changes in the geometry include additional travel lanes, turn lanes and slight shifting of the roadway centerline. This analysis was performed for each of the four (4) alternatives, including the No Project Alternative and the three (3) Build Alternatives.

## 2. Predicted Future Traffic Noise Levels, and Identified Traffic Noise Impacts

Once again, the Sound-32 model was employed to evaluate future traffic noise levels, both with and without the proposed project alternatives. Table 4 shows the predicted future traffic noise levels without the project. Table 5 shows the predicted noise levels with the project alternatives, without inclusion of a proposed sound wall.

Future No Project

The analysis in Table 4 indicates that the predicted Future No Project traffic noise levels ranged between 55 dB and 66 dB Leq. Only one receiver (R-11) which is a single family residence approached the Protocol NAC of 67 dB Leq. All other noise-sensitive receivers did not approach or exceed the 67 dB Leq Protocol NAC.

**Table 4**
**Predicted Future (Year 2030) No Project Traffic Noise Levels**
**At Noise Sensitive Land Uses Adjacent to SR 68 Improvement Project**

| Receiver # | Land Use | Assessors Parcel Number | Predicted $L_{eq}$ |
|---|---|---|---|
| R1 | Single Family Residential | 008-051-001 | 63 dB |
| R2 | Single Family Residential | 008-051-002 | 63 dB |
| R3 | Single Family Residential | 008-051-003 | 63 dB |
| R4 | Single Family Residential | 008-051-004 | 63 dB |
| R5 | Single Family Residential | 008-051-005 | 63 dB |
| R6 | Single Family Residential | 008-051-006 | 64 dB |
| R7 | Single Family Residential | 008-051-007 | 64 dB |
| R8 | Single Family Residential | 008-051-008 | 64 dB |
| R9 | Single Family Residential | 008-051-009 | 65 dB |
| R10 | Single Family Residential | 008-051-010 | 65 dB |
| R11 | Single Family Residential | 008-051-011 | **66 dB** |
| R12 | Community Hospital of Monterey Peninsula | 008-132-011 | 55 dB |

**Bold** = Indicates the noise levels approaches the NAC of 67 dB $L_{eq}$
Source: Bollard & Brennan, Inc., 2004

Based upon the 24-hour continuous noise measurement survey, the predicted Ldn values are expected to be approximately 1 dB less than the predicted Leq values shown in Table 4. For comparison to the City and County of Monterey noise level criteria, the predicted Ldn values range between 54 dB and 65 dB. The traffic noise levels would exceed the City of Monterey normally acceptable exterior noise level criterion of 60 dB Ldn at the residential uses. However, they would not exceed the conditionally acceptable exterior noise level criterion of 70 dB Ldn. They would not exceed the City of Monterey normally acceptable exterior noise level criterion of 70 dB Ldn at the CHOMP. The traffic noise levels would exceed the County of Monterey normally acceptable exterior noise

level criteria of 50 dB to 55 dB Ldn at the residential uses. However, they would not exceed the conditionally acceptable exterior noise level criteria of 55 dB to 70 dB Ldn.

Future With Project Build Alternatives

The analysis in Table 5 indicates that the predicted future traffic noise levels ranged between 55 dB and 66 dB Leq. Only one receiver (R-11) which is a single family residence approached the Protocol NAC of 67 dB Leq. All other noise-sensitive receivers did not approach or exceed the 67 dB Leq Protocol NAC. There are no future increases in traffic noise levels due to the project Alternatives.

The noise levels reported in Table 5 are in whole numbers. The reported noise levels for each of the Build Alternatives do not change. However, the results of the modeling did reveal subtle differences in the predicted noise levels. However, they were less than 0.5 dB, and were not significant.

Based upon the 24-hour continuous noise measurement survey, the predicted Ldn values are expected to be approximately 1 dB less than the predicted Leq values shown in Table 5. For comparison to the City and County of Monterey noise level criteria, the predicted Ldn values range between 54 dB and 65 dB.

The traffic noise levels would exceed the City of Monterey normally acceptable exterior noise level criterion of 60 dB Ldn at the residential uses. However, they would not exceed the conditionally acceptable exterior noise level criterion of 70 dB Ldn. They would not exceed the City of Monterey normally acceptable exterior noise level criterion of 70 dB Ldn at the CHOMP. The traffic noise levels would exceed the County of Monterey normally acceptable exterior noise level criteria of 50 dB to 55 dB Ldn at the residential uses. However, they would not exceed the conditionally acceptable exterior noise level criteria of 55 dB to 70 dB Ldn.

The relatively small change in traffic noise levels between 2003 and 2030 is not surprising, considering that the current peak hour traffic volumes along S.R. 68 have only increased by approximately 50 vehicles since 1985.

**Table 5**
**Predicted Future (Year 2030) No Project and Alternatives 3A, 3AC, and 3BC Future (Year 2030) Traffic Noise Levels At Noise Sensitive Land Uses Adjacent to SR 68 Improvement Project**

| Receivers | Land Use | Assessors Parcel Number | No Project | Alt 3A | | Alt 3AC | | Alt 3BC | |
|---|---|---|---|---|---|---|---|---|---|
| | | | $L_{eq}$ | $L_{eq}$ | Change | $L_{eq}$ | Change | $L_{eq}$ | Change |
| R1 | Single Family Residential | 008-051-001 | 63 dB | 63 dB | <1 dB | 63 dB | <1 dB | 63 dB | <1 dB |
| R2 | Single Family Residential | 008-051-002 | 63 dB | 63 dB | <1 dB | 63 dB | <1 dB | 63 dB | <1 dB |
| R3 | Single Family Residential | 008-051-003 | 63 dB | 63 dB | <1 dB | 63 dB | <1 dB | 63 dB | <1 dB |
| R4 | Single Family Residential | 008-051-004 | 63 dB | 63 dB | <1 dB | 63 dB | <1 dB | 63 dB | <1 dB |
| R5 | Single Family Residential | 008-051-005 | 63 dB | 63 dB | <1 dB | 63 dB | <1 dB | 63 dB | <1 dB |
| R6 | Single Family Residential | 008-051-006 | 64 dB | 64 dB | <1 dB | 64 dB | <1 dB | 64 dB | <1 dB |
| R7 | Single Family Residential | 008-051-007 | 64 dB | 64 dB | <1 dB | 64 dB | <1 dB | 64 dB | <1 dB |
| R8 | Single Family Residential | 008-051-008 | 64 dB | 65 dB | <1 dB | 65 dB | <1 dB | 65 dB | <1 dB |
| R9 | Single Family Residential | 008-051-009 | 65 dB | 65 dB | <1 dB | 65 dB | <1 dB | 65 dB | <1 dB |
| R10 | Single Family Residential | 008-051-010 | 65 dB | 65 dB | <1 dB | 65 dB | <1 dB | 65 dB | <1 dB |
| R11 | Single Family Residential | 008-051-011 | **66** dB | **66** dB | <1 dB | **66** dB | <1 dB | **66** dB | <1 dB |
| R12 | Community Hospital of Monterey Peninsula | 008-132-011 | 55 dB | 55 dB | <1 dB | 55 dB | <1 dB | 55 dB | <1 dB |

**Bold** = Approach or exceed Caltrans/FHWA exterior noise level criterion of 67 dB $L_{eq}$ for residential land uses.
Source: Bollard & Brennan, Inc., 2004

## 3. Discussion of Noise Abatement Options

Any noise problem may be considered as being composed of three basic elements: the noise source, a transmission path, and a receiver. The appropriate acoustical treatment for a given project should consider the nature of the noise source and the sensitivity of the receiver. Noise control techniques should be selected to provide an acceptable noise environment for the receiving property while remaining consistent with local aesthetic standards and practical structural and economic limits.

Shielding by barriers can be obtained by placing walls or berms 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 increases in 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. In addition, barriers are generally rendered ineffective when there are openings or gaps, or when they are not of sufficient length to prevent sound from flanking around the ends of the barriers.

The Protocol provides guidance in determining Noise Abatement Feasibility and Reasonableness. The Protocol states that:

***Protocol Feasibility Discussion:*** *Feasibility is defined as an engineering consideration. A minimum of 5 dBA noise reduction must be achieved at the impacted receivers in order for the proposed noise abatement measure to be considered feasible. The feasibility criterion is not necessarily a noise abatement deisgn goal. Greater noise reductions are encouraged if they can be reasonably achieved. Feasibility may be restricted by: (1) topography; (2) access requirements for driveways, ramps, etc.; (3) the presence of local cross streets, (4) other noise sources in the area, and (5) safety considerations.*

***Protocol Noise Abatement Reasonableness Discussion:*** *The determination of reasonableness of noise abatement is more subjective than the determination of its feasibility. It implies that common sense and good judgment have been applied in arriving at a decision. There will be instances where noise abatement may be found reasonable even though it is outside the established bounds of reasonableness. The individual circumstances of each project and consideration of borderline cases should be part of the overall decision making process.*

*The overall reasonableness of noise abatement is determined by considering a multitude of factors including but not necessarily limited to the following:*

a. *Cost of the abatement;*
b. *Absolute noise levels;*
c. *Change in noise levels;*
d. *Noise abatement benefits;*
e. *Date of development along the highway;*
f. *Life cycle of abatement measures;*
g. *Environmental impacts of abatement construction;*
h. *Views (opinions) of impacted residents;*
i. *Input from the public and local agencies;*
j. *Social, economic, environmental, legal, and technological factors.*

In the case of the SR 68 project, there is one residence (Receiver R11) which is predicted to experience future traffic noise levels which approach the Caltrans/FHWA NAC of 67 dB Leq. The predicted traffic noise level is 66 dB Leq.

Each of the Residences, which are represented by Receptors 1 – 11, are expected to be exposed to future traffic noise levels which exceed the City of Monterey Normally Acceptable exterior noise level criterion of 60 dB Ldn. However, none of the residences will be exposed to future traffic noise levels which exceed the City of Monterey Conditionally Acceptable exterior noise level criterion of 70 dB Ldn.

Based upon topography, the project engineer has determined that the feasibility of barriers extends from the east end of APN# 008-051-011 to the midpoint of APN# 008-051-005. The length of the barrier is approximately 220 meters (721 feet).

Bollard & Brennan, Inc. used the Sound-32 Model to determine appropriate barrier heights and barrier configurations that would abate traffic noise levels. Based upon the Sound-32 analysis, barrier heights and configurations were determined. Table 6 provides the results of the analysis of barriers. It was determined that a barrier, as described on the project plans, 2.4 meters (8-feet) in height would be sufficient to reduce traffic noise levels by 5 dB at receivers R6 through R11. The barrier would provide 3 dB reduction in noise levels for receiver R5 and 1 dB of reduction for receiver R4. Noise shielding effects would be experienced for receivers R1 through R3. No mitigation is required, based upon the Protocol for residential receivers R1 through R10 and R12 (CHOMP).

**Table 6**
**Predicted Future (Year 2030) Traffic Noise Levels (Including 2.4 meter/ 8' Wall)**
**At Noise Sensitive Land Uses Adjacent to SR 68 Improvement Project**

| Receivers | Land Use | Assessors Parcel Number | No Project | Alt 3A[1] | | Alt 3AC[1] | | Alt 3BC[1] | |
|---|---|---|---|---|---|---|---|---|---|
| | | | $L_{eq}$ | $L_{eq}$ | Barrier Attenuation | $L_{eq}$ | Barrier Attenuation | $L_{eq}$ | Barrier Attenuation |
| R1 | Single Family Residential | 008-051-001 | 63 dB | 63 dB | NA | 63 dB | NA | 63 dB | NA |
| R2 | Single Family Residential | 008-051-002 | 63 dB | 63 dB | NA | 63 dB | NA | 63 dB | NA |
| R3 | Single Family Residential | 008-051-003 | 63 dB | 63 dB | NA | 63 dB | NA | 63 dB | NA |
| R4 | Single Family Residential | 008-051-004 | 63 dB | 62 dB | -1 dB | 62 dB | -1 dB | 62 dB | -1 dB |
| R5 | Single Family Residential | 008-051-005 | 63 dB | 60 dB | -3 dB | 60 dB | -3 dB | 60 dB | -3 dB |
| R6 | Single Family Residential | 008-051-006 | 64 dB | 56 dB | -8 dB | 56 dB | -8 dB | 56 dB | -8 dB |
| R7 | Single Family Residential | 008-051-007 | 64 dB | 54 dB | -10 dB | 54 dB | -10 dB | 54 dB | -10 dB |
| R8 | Single Family Residential | 008-051-008 | 64 dB | 53 dB | -11 dB | 53 dB | -11 dB | 53 dB | -11 dB |
| R9 | Single Family Residential | 008-051-009 | 65 dB | 57 dB | -8 dB | 57 dB | -8 dB | 57 dB | -8 dB |
| R10 | Single Family Residential | 008-051-010 | 65 dB | 59 dB | -7 dB | 59 dB | -7 dB | 59 dB | -7 dB |
| R11 | Single Family Residential | 008-051-011 | **66** dB | 61 dB | -5 dB | 61 dB | -5 dB | 61 dB | -5 dB |
| R12 | Community Hospital of Monterey Peninsula (CHOMP) | 008-132-011 | 55 dB | 55 dB | NA | 55 dB | NA | 55 dB | NA |

**Bold** = Approach or exceed Caltrans/FHWA exterior noise level criterion of 67 dB $L_{eq}$ for residential land uses.
[1]Noise levels at receivers R4-R11 include shielding effects from the proposed Wall/noise barrier.
Source: Bollard & Brennan, Inc., 2004

With mitigation, the proposed sound wall would result in traffic noise levels ranging between 52 dB Ldn and 62 dB Ldn at all residential receivers. Therefore, four residences would continue to exceed the City and County of Monterey Normally Acceptable exterior noise level criteria. However, no residential receivers would exceed the Conditionally Acceptable exterior noise level criterion of 70 dB Ldn.

The Protocol provides worksheets for arriving at a "preliminary determination of reasonableness" for providing a barrier. Bollard & Brennan, Inc. utilized the methodology provided in the Protocol for a preliminary determination of reasonableness for a barrier at this location.

The analysis indicates that barrier located at the property line would be required to be 2.4 meters (8-feet) in height to reduce noise levels at the Critical Design Receiver by more than 5 dB and break line of sight to the primary noise sources, which are some of the criteria required by Caltrans for determining if a barrier is feasible. The average noise reduction for receivers R6 through R11 is 8 dBA.

The barrier was evaluated using the worksheets for determining a "preliminary determination of reasonableness". Based upon the Protocol worksheets, the reasonable allowance per benefitted residence is $24,000. It is assumed in this analysis that the receiver R11 is the only benefiting residence.

The total length of the barrier is 220 meters (721 feet). The required height is 2.4 meters (8-feet). If the barrier can be constructed for a total cost of $24,000, it would be considered to be reasonable. Based upon a cost of $30/square foot, it is expected that the barrier cost will be $173,040. Therefore, it is not likely that the barrier cost will be considered reasonable.

**H. Construction Noise**

During the construction phases of the project, noise from construction activities would dominate the noise environment in the immediate area. Activities involved in construction would generate noise levels, as indicated in Table 7, ranging from 70 to 90 dB at a distance of 50 feet. Construction activities would be temporary in nature, typically occurring during normal working hours. Construction noise impacts could be significant, as nighttime operations or use of unusually noisy equipment could result in annoyance or sleep disruption for nearby residences. The project anticipates that some nighttime construction could occur.

Construction noise is regulated by Caltrans standard specifications Section 7-1.01I "Sound Control Requirements". These requirements state that noise levels generated during construction shall comply with applicable local, state, and federal regulations, and that all equipment shall be fitted with adequate mufflers according to the manufacturer's specifications.

During construction, traffic noise generated by approaching traffic would be reduced due to a reduction in speed required by working road crews. Conversely, traffic noise levels of vehicles leaving the construction area would be slightly higher than normal due to acceleration. The net effect of the accelerating and decelerating traffic upon noise would not be appreciable. The most important project-generated noise source would be truck traffic associated with transport of heavy materials and equipment and construction equipment.

It is expected that the construction noise during the nighttime periods could result in a significant noise impact. It is recommended that pneumatic tools and demolition equipment operations are limited to the daytime hours. It is also recommended that residents are notified in advance of nighttime construction activities. To the extent possible, the nighttime construction work should be limited to the portion of the project site furthest from the residences.

**Table 7**
**Construction Equipment Noise**

| Type of Equipment | Maximum Level, dBA at 50 feet |
|---|---|
| Scrapers | 88 |
| Bulldozers | 87 |
| Heavy Trucks | 88 |
| Backhoe | 85 |
| Pneumatic Tools | 85 |

Source: Environmental Noise Pollution, Patrick R. Cunniff, 1977.

## I. References


1. **2003 Traffic Volumes on the California State Highway System,** Business, Transportation and Housing Agency, Department of Transportation, Division of Traffic Operation, State of California, June 2003.

2. **Sound 32 (Caltrans Version of Stamina2/Optima**, Office of Transportation Laboratory, California, Department of Transportation, Sacramento, California, July 1991.

3. R.W. Hendriks, **California Vehicle Noise Emissions Levels,** FHWA/CA/TL-87/03, Office of Transportation Laboratory, California, Department of Transportation, Sacramento, California, January 1987.

4. **Traffic Operations Analysis, Route 68 (Holman Way)**, Fehr & Peers Transportation Consultants, March 2004.

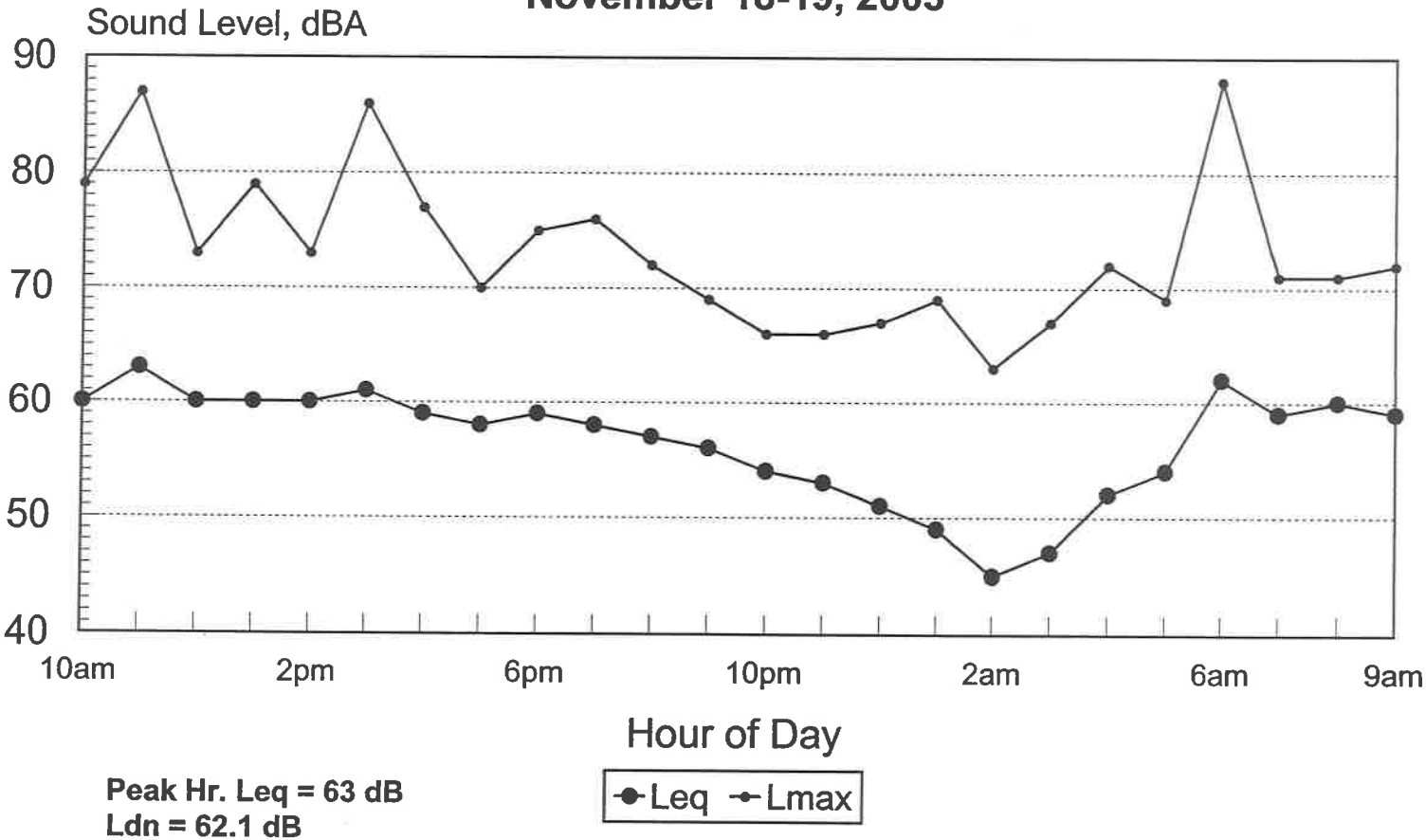
5. **Traffic Noise Analysis Protocol For New Highway and Reconstruction Projects**, California Department of Transportation, Environmental Program, Environmental Engineering, October 1998.

6. **Technical Noise Supplement TENS,** A Technical Supplement to the Traffic Noise Analysis Protocol, California Department of Transportation, Environmental Program, Environmental Engineering, October 1998.

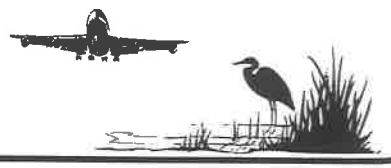
## Appendix A
## Acoustic Terminology

| | |
|---|---|
| **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, defined as one-tenth of the logarithm of the ratio of the sound pressure squared over the reference pressure squared. |
| **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. |
| **Loudness** | A subjective term for the sensation of the magnitude of sound. |
| **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. |
| **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. |
| **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 B1**
**Continuous Measured Hourly Noise Levels**
**Site 1 - Crest Road**
**November 18-19, 2003**

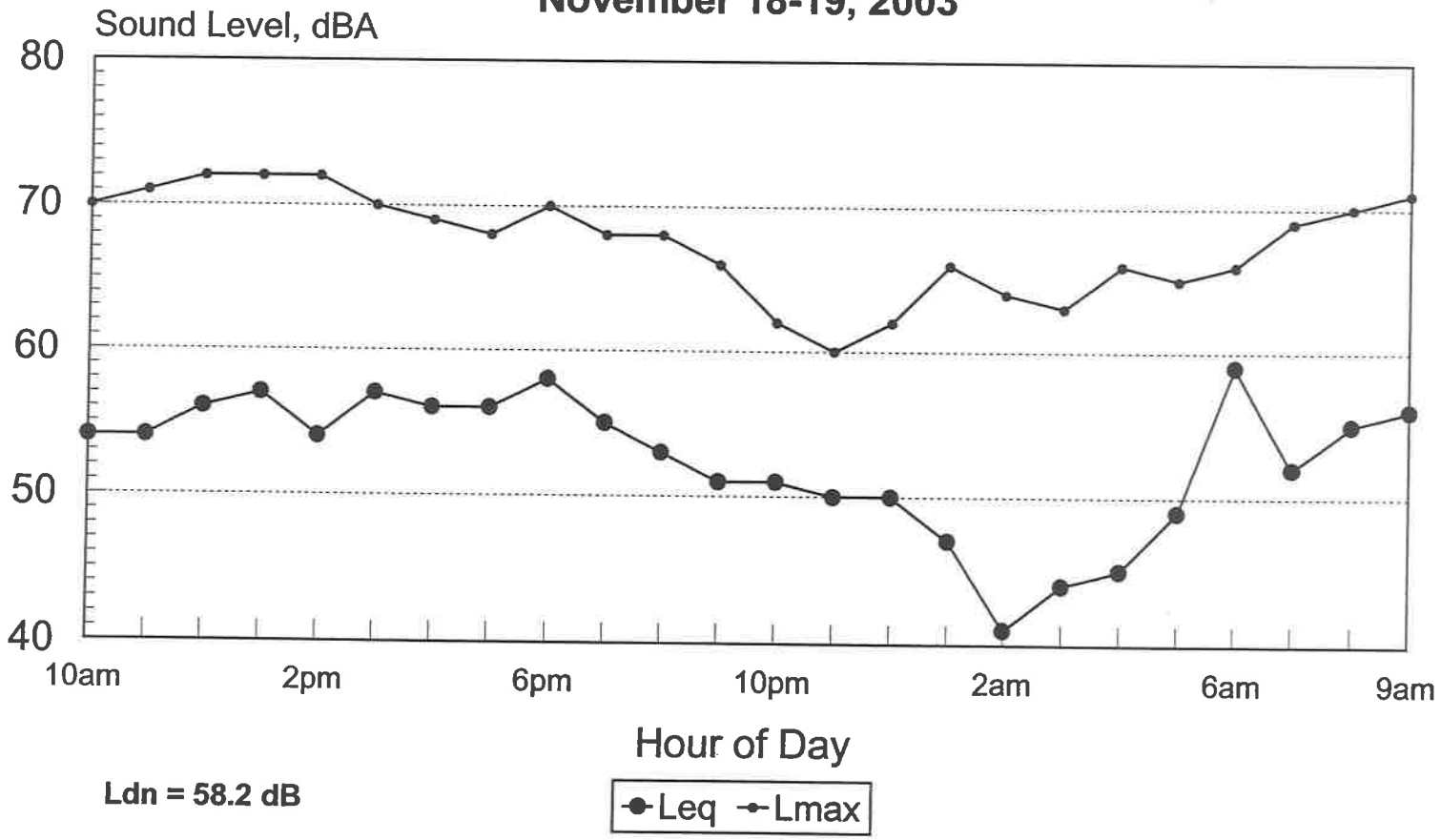



**Peak Hr. Leq = 63 dB**
**Ldn = 62.1 dB**



Bollard & Brennan, Inc.

## Appendix B2
## Continuous Measured Hourly Noise Levels
## Site 2 - CHOMP Facility
## November 18-19, 2003




**Ldn = 58.2 dB**

Bollard & Brennan, Inc.

# WORKSHEET "A" FOR CALCULATING REASONABLE ALLOWANCE PER RESIDENCE

| | | | |
|---|---|---|---|
| PROJECT: Co. Rte. PM. EA: | PROJECT LOCATION: S.R. 68 - MONTEREY | | Page / of |
| NOISE BARRIER I.D. & LOCATION: B1 | | | |
| PROJECT ENGINEER: VCB | | | Date: 3-31-04 |
| Base Allowance (1998 Dollars) Update for year 2004 | | | $ 15,000 ~$ 5,000 |
| 1) Absolute Noise Levels (Choose One) | | Check | |
| 69 dBA or less: | Add $ 2,000 | ✓ | $ 2,000 |
| 70-74 dBA: | Add $ 4,000 | | |
| 75-78 dBA: | Add $ 6,000 | | |
| More than 78 dBA: | Add $ 8,000 | | |
| 2) "Build" VS Existing Noise Levels (Choose One) | | Check | |
| Less than 3 dBA: | Add $ 0 | ✓ | 0 |
| 3-7 dBA: | Add $ 2,000 | | |
| 8-11 dBA: | Add $ 4,000 | | |
| 12 dBA or more: | Add $ 6,000 | | |
| 3) Achievable Noise Reduction (Choose One) | | Check | |
| Less than 6 dBA: | Add $ 0 | | |
| 6-8 dBA: | Add $ 2,000 | ✓ | $ 2000 |
| 9-11 dBA: | Add $ 4,000 | | |
| 12 dBA or more: | Add $ 6,000 | | |
| 4) Either New Construction Or Pre-date 1978? (Choose Yes or No) | | Check | |
| YES on either one: | Add $10,000 | | |
| NO on both: | Add $ 0 | ✓ | |
| Unmodified Reasonable Allowance Per Residence | | | $ 24,000 |
| Continued on Worksheet B | | | |

Appendix D

2002-132 Existing Output
SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
ROUTE 68 WIDENING PROJECT - EXISTING

BASED ON FHWA-RD-108 AND
CALIFORNIA REFERENCE ENERGY MEAN EMISSION LEVELS

| RECEIVER | LEQ |
|---|---|
| REC 1 | 62.4 |
| REC 2 | 62.2 |
| REC 3 | 62.4 |
| REC 4 | 62.4 |
| REC 5 | 62.6 |
| REC 6 | 63.1 |
| REC 7 | 63.4 |
| REC 8 | 63.8 |
| REC 9 | 64.1 |
| REC 10 | 64.2 |
| REC 11 | 65.1 |
| REC 12 | 54.9 |

4.2

SOUND32 - RELEASE 07/30/91, 2002-132 Cumulative Output MODIFIED 04/22/00

TITLE:
ROUTE 68 WIDENING PROJECT - CUMULATIVE (2030)

BASED ON FHWA-RD-108 AND
CALIFORNIA REFERENCE ENERGY MEAN EMISSION LEVELS

| RECEIVER | LEQ |
|---|---|
| REC 1 | 62.9 |
| REC 2 | 62.8 |
| REC 3 | 62.9 |
| REC 4 | 63.0 |
| REC 5 | 63.1 |
| REC 6 | 63.6 |
| REC 7 | 63.9 |
| REC 8 | 64.3 |
| REC 9 | 64.6 |
| REC 10 | 64.7 |
| REC 11 | 65.6 |
| REC 12 | 55.2 |

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

2002-132 3A Project Output

TITLE:
ROUTE 68 WIDENING PROJECT - CUMUALTIVE + 3A PROJECT

No Wall

BASED ON FHWA-RD-108 AND
CALIFORNIA REFERENCE ENERGY MEAN EMISSION LEVELS

| RECEIVER | LEQ |
|---|---|
| REC 1 | 62.9 |
| REC 2 | 62.6 |
| REC 3 | 62.8 |
| REC 4 | 62.9 |
| REC 5 | 63.1 |
| REC 6 | 63.7 |
| REC 7 | 64.1 |
| REC 8 | 64.6 |
| REC 9 | 65.1 |
| REC 10 | 65.3 |
| REC 11 | 66.3 |
| REC 12 | 55.1 |

2002-132 3AC Project Output

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
ROUTE 68 WIDENING PROJECT - CUMUALTIVE + 3AC PROJECT No Wall

BASED ON FHWA-RD-108 AND
CALIFORNIA REFERENCE ENERGY MEAN EMISSION LEVELS

| RECEIVER | LEQ |
|---|---|
| REC 1 | 62.9 |
| REC 2 | 62.6 |
| REC 3 | 62.8 |
| REC 4 | 62.9 |
| REC 5 | 63.1 |
| REC 6 | 63.7 |
| REC 7 | 64.1 |
| REC 8 | 64.6 |
| REC 9 | 65.1 |
| REC 10 | 65.3 |
| REC 11 | 66.3 |
| REC 12 | 55.1 |

2002-132 3BC Project Output

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
ROUTE 68 WIDENING PROJECT - CUMUALTIVE + 3BC PROJECT No Wall

BASED ON FHWA-RD-108 AND
CALIFORNIA REFERENCE ENERGY MEAN EMISSION LEVELS

| RECEIVER | LEQ |
|---|---|
| REC 1 | 62.9 |
| REC 2 | 62.6 |
| REC 3 | 62.8 |
| REC 4 | 62.9 |
| REC 5 | 63.1 |
| REC 6 | 63.7 |
| REC 7 | 64.1 |
| REC 8 | 64.6 |
| REC 9 | 65.1 |
| REC 10 | 65.3 |
| REC 11 | 66.3 |
| REC 12 | 55.1 |

2002-132 3A Project Output

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
ROUTE 68 WIDENING PROJECT - CUMUALTIVE + 3A PROJECT With Living Wall (8')

1

BARRIER DATA
**********

| BAR ELE | 0 | 1 | BARRIER HEIGHTS 2 | 3 | 4 | 5 | 6 | 7 | BAR ID | LENGTH | TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | 8.* | | | | | | | B1 P1 | 75.2 | |
| 2 | - | 8.* | | | | | | | B1 P2 | 89.8 | |
| 3 | - | 8.* | | | | | | | B1 P3 | 77.0 | |
| 4 | - | 8.* | | | | | | | B1 P4 | 181.8 | |
| 5 | - | 8.* | | | | | | | B1 P5 | 278.5 | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | |

1

| REC | REC ID | DNL | PEOPLE | LEQ(CAL) | |
|---|---|---|---|---|---|
| 1 | REC 1 | 67. | 500. | 62.8 | 0-1 |
| 2 | REC 2 | 67. | 500. | 62.5 | 0.1 |
| 3 | REC 3 | 67. | 500. | 62.6 | 0.3 |
| 4 | REC 4 | 67. | 500. | 62.3 | 3.9 |
| 5 | REC 5 | 67. | 500. | 60.0 | |
| 6 | REC 6 | 67. | 500. | 55.7 | 8.0 |
| 7 | REC 7 | 67. | 500. | 53.9 | 10.2 |
| 8 | REC 8 | 67. | 500. | 53.2 | 11.4 |
| 9 | REC 9 | 67. | 500. | 57.2 | 7.9 |
| 10 | REC 10 | 67. | 500. | 58.6 | 6.1 |
| 11 | REC 11 | 67. | 500. | 60.7 | 5.6 |
| 12 | REC 12 | 67. | 500. | 55.1 | |

BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
1 1 1 1 1
CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
8. 8. 8. 8. 8.

2002-132 3AC Project + 8' Barrier Output
SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
ROUTE 68 WIDENING PROJECT - CUMUALTIVE + 3AC PROJECT With Living Wall (8')

1

BARRIER DATA
**********

| BAR ELE | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | BAR ID | LENGTH | TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | 8.* | | | | | | | B1 P1 | 75.2 | |
| 2 | - | 8.* | | | | | | | B1 P2 | 89.8 | |
| 3 | - | 8.* | | | | | | | B1 P3 | 77.0 | |
| 4 | - | 8.* | | | | | | | B1 P4 | 181.8 | |
| 5 | - | 8.* | | | | | | | B1 P5 | 278.5 | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | |

1

| REC | REC ID | DNL | PEOPLE | LEQ(CAL) |
|---|---|---|---|---|
| 1 | REC 1 | 67. | 500. | 62.8 |
| 2 | REC 2 | 67. | 500. | 62.5 |
| 3 | REC 3 | 67. | 500. | 62.6 |
| 4 | REC 4 | 67. | 500. | 62.3 |
| 5 | REC 5 | 67. | 500. | 60.0 |
| 6 | REC 6 | 67. | 500. | 55.7 |
| 7 | REC 7 | 67. | 500. | 53.9 |
| 8 | REC 8 | 67. | 500. | 53.2 |
| 9 | REC 9 | 67. | 500. | 57.2 |
| 10 | REC 10 | 67. | 500. | 58.6 |
| 11 | REC 11 | 67. | 500. | 60.7 |
| 12 | REC 12 | 67. | 500. | 55.1 |

BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
1 1 1 1 1
CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
8. 8. 8. 8. 8.

2002-132 3BC Project + 8' Barrier Output

SOUND32 - RELEASE 07/30/91, MODIFIED 04/22/00

TITLE:
ROUTE 68 WIDENING PROJECT - CUMUALTIVE + 3BC PROJECT With Living Wall (8')

1

BARRIER DATA
**********

| BAR ELE | 0 | 1 | BARRIER HEIGHTS 2 | 3 | 4 | 5 | 6 | 7 | BAR ID | LENGTH | TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | - | 8.* | | | | | | | B1 P1 | 75.2 | |
| 2 | - | 8.* | | | | | | | B1 P2 | 89.8 | |
| 3 | - | 8.* | | | | | | | B1 P3 | 77.0 | |
| 4 | - | 8.* | | | | | | | B1 P4 | 181.8 | |
| 5 | - | 8.* | | | | | | | B1 P5 | 278.5 | |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | |

1

| REC | REC ID | DNL | PEOPLE | LEQ(CAL) |
|---|---|---|---|---|
| 1 | REC 1 | 67. | 500. | 62.8 |
| 2 | REC 2 | 67. | 500. | 62.5 |
| 3 | REC 3 | 67. | 500. | 62.6 |
| 4 | REC 4 | 67. | 500. | 62.3 |
| 5 | REC 5 | 67. | 500. | 60.0 |
| 6 | REC 6 | 67. | 500. | 55.7 |
| 7 | REC 7 | 67. | 500. | 53.9 |
| 8 | REC 8 | 67. | 500. | 53.2 |
| 9 | REC 9 | 67. | 500. | 57.2 |
| 10 | REC 10 | 67. | 500. | 58.6 |
| 11 | REC 11 | 67. | 500. | 60.7 |
| 12 | REC 12 | 67. | 500. | 55.1 |

BARRIER HEIGHT INDEX FOR EACH BARRIER SECTION
1 1 1 1 1
CORRESPONDING BARRIER HEIGHTS FOR EACH SECTION
8. 8. 8. 8. 8.

CITY OF MONTEREY

DEPARTMENT OF PUBLIC WORKS

September 1, 2006

**RE: Holman Highway 68 Widening - Additional Noise Analysis**

Dear Meeting Attendee,

This letter responds to the noise questions raised at the public information meeting held for the Holman Highway 68 Widening Project at the City of Monterey Library on April 17, 2006. During that meeting, Pebble Beach residents on Crest Road, whose homes have back yards that are adjacent to Holman Highway 68, requested additional noise measurements to be taken in their back yards. The City of Monterey initiated additional noise analysis in July 2006 to validate the existing noise levels and the accuracy of the noise level prediction model. The results of these additional noise measurements showed that the existing noise levels are accurately depicted in the noise level prediction model. These noise measurements further affirm the results of the noise study, which showed that the increase in noise levels between the existing conditions and the future conditions with or without the roadway improvement project is one decibel. An increase in noise level of one decibel is not considered a significant noise impact.

On July 5-6, 2006, the acoustical specialists, J.C. Brennan & Associates, gathered two sets of 24-hour traffic noise level measurements at the backyards of 4169 and 4157 Crest Road. The 24-hour noise level measurements determine the overall and peak-hour traffic noise levels at these locations. The 24-hour noise level measurements were nearly identical to the noise levels observed at the original measurement location in 2003.

Two sets of short-term noise level measurements and concurrent traffic counts at the backyards of 4193 and 4165 Crest Road were also collected. These short-term traffic noise level measurements and traffic counts verify the accuracy of the model used to predict future noise levels. The noise prediction model accurately predicts the traffic noise levels along Highway 68 and shows that the increase in noise levels between the existing conditions and the future conditions (with or without the roadway improvement project) is one decibel[1].

[1] A decibel is the fundamental unit of sound.

It is our understanding that the attending residents back-up to Highway 68 and are subject to noise from the nearby hospital, the associated sirens, and the roadway. The concerns regarding noise levels, truck braking sounds, and sirens were conveyed at the April 17, 2006 public information meeting. During the recent noise sampling times, no Jake brakes[2] were observed. Even though these are nuisances, they are considered "instantaneous" noise and are not included in a noise prediction model. This project will not increase the amount of these instantaneous noise elements; however, it will help to alleviate the traffic back-ups that occur in the area, thus reducing the amount of time it takes for an individual vehicle to travel along Highway 68. We anticipate it will reduce the amount of time it takes an emergency vehicle with sirens to pass the area. We are hopeful this improvement on traffic flow will help to decrease the acceleration and deceleration noises that occur, especially during peak-hours.

You may recall from our meeting that an Environmental Impact Report (EIR) is being prepared for the Highway 68 Road Widening Project. This report will discuss impacts associated with several environmental issues, including, but not limited to, noise, light and glare, air quality, traffic, biology, cultural resources, and aesthetics. This report will be available for your review this fall and will include the letter report verifying the future noise level prediction model. When the EIR is available, we welcome your comments.

Please do not hesitate to contact me if you have any further questions.

Sincerely,

Richard Deal, CE, TE, PTOE
City Traffic Engineer

Attachment: Figure 1 - Noise Measurement Locations

cc: Director of Plans, Engineering & Environmental Compliance
Senior Planner Cole
Richard Tanaka, Mark Thomas & Company, San Jose
James Gary Maniery, PAR

[2] A Jake brake refers to an engine brake, a braking system used on large vehicles which modifies engine operations by using engine compression to slow the vehicle.