

NOISE IMPACT ANALYSIS

SR-68/CORRAL DE TIERRA ROAD INTERSECTION IMPROVEMENT PROJECT MONTEREY COUNTY, CALIFORNIA

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Prepared for:

State of California
Department of Transportation, District 5
50 Higuera Street
San Luis Obispo, California 93401
(805) 549-3016

and

County of Monterey
Department of Public Works
312 East Alisal Street
Salinas, California 93901
(831) 755-8970

Under contract to:

Wood Rodgers, Inc.
3301 C Street, Building 100-B
Sacramento, CA 95816
(916) 440-9519

Prepared by:

LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, California 92614-4731
(949) 553-0666

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I. EXECUTIVE SUMMARY

The Monterey County Department of Public Works, in cooperation with the California Department of Transportation (Caltrans) proposes to improve the intersection of State Route 68 (SR-68) and Corral de Tierra Road.

Caltrans District 5 will be the Lead Agency for California Environmental Quality Act (CEQA) compliance. The County of Monterey (County) Public Works Department will be a Responsible Agency under CEQA. Current funding for the project is local, and it is not anticipated that federal funds will be utilized.

FHWA regulation 23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. Under 23 CFR 772.7, projects are categorized as Type I, Type II, or Type III projects. FHWA defines a Type I project as a proposed federal or federal-aid highway project for the construction of a highway on a new location, or the physical alteration of an existing highway that significantly changes either the horizontal or the vertical alignment, or increases the number of through-traffic lanes. A Type II project is a noise barrier retrofit project that involves no changes to highway capacity or alignment. A Type III project is a project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis. As the proposed project does not significantly alter the horizontal or vertical alignment of SR-68 or Corral de Tierra Road and does not increase the capacity, the proposed project is considered to be a Type III project. Type III projects are not expected to substantially alter the long-term traffic noise levels in the project area. Therefore, no long-term abatement measures are required.

Construction of the proposed project would result in potentially high short-term, intermittent noise levels reaching 91 dBA L_{max} at existing residences immediately adjacent to the proposed project. Limiting construction activities to the hours between 7:00 a.m. and 6:00 p.m. on weekdays would reduce the exposure to construction noise impacts.

II. NOISE IMPACT TECHNICAL REPORT

A. INTRODUCTION

The SR-68/Corral de Tierra Road Intersection Improvement project (proposed project) addresses operational improvements at the SR-68/Corral de Tierra Road intersection, located in the unincorporated area of Monterey County approximately 13 miles (mi) east of the City of Monterey and approximately 9 mi west of the City of Salinas. Figure 1 shows the regional location of the project and the project vicinity. The operational improvements will widen the SR-68/Corral de Tierra Road intersection to accommodate the construction of a second left-turn lane from westbound SR-68 to southbound Corral de Tierra Road and the construction of a second receiving lane on Corral de Tierra Road.

Caltrans District 5 will be the Lead Agency for California Environmental Quality Act (CEQA) compliance. The County of Monterey (County) Public Works Department will be a Responsible Agency under CEQA. Current funding for the project is State and local, and it is not anticipated that federal funds will be utilized.

B. PROJECT DESCRIPTION

One Build Alternative (as described below) and the No-Build Alternative are being considered for improving the SR-68/Corral de Tierra Road intersection.

No-Build Alternative

The No-Build Alternative assumes that no new improvements would be constructed, other than projects already approved in the area. Under the No-Build Alternative, the roadway's operational conditions will remain at or above the standard of Level of Service D (refer to Traffic Operations Technical Memorandum). Projections indicated that the unimproved intersection would operate at a Level of Service of E in the a.m. peak hour and a Level of Service of F in the p.m. peak hour by 2024, and therefore, the No-Build Alternative fails to meet the purpose and need of this project.

Build Alternative: Operational Improvements

The proposed project would widen the SR-68/Corral de Tierra intersection to the north of the existing alignment to accommodate the construction of a second (additional) left turn lane from westbound SR-68 onto southbound Corral de Tierra Road. Both of the left turn lanes (in the median of State Route 68) would have sufficient length to accommodate deceleration from 53 miles per hour. An additional receiving lane would also be constructed on southbound Corral de Tierra Road. The paved shoulders of Corral de Tierra Road within the project area would be widened to 8 feet (ft) to better accommodate pedestrians and facilitate the future addition of Class II bicycle lanes to Corral de Tierra Road.

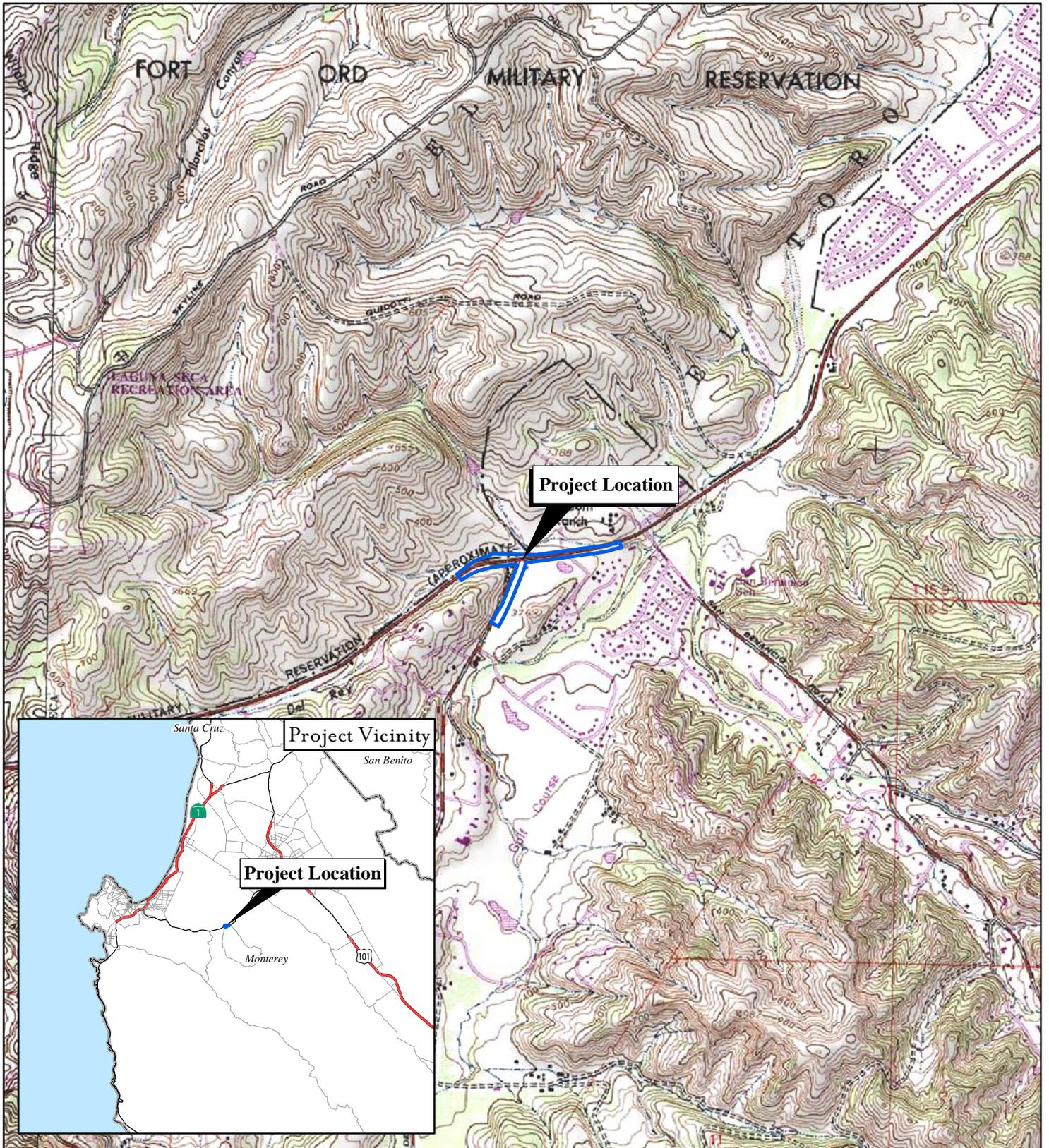


FIGURE 1

SR 68 / Corral de Tierra Road
 Intersection Improvement Project
 Project Location Map

About 520 ft of Steel Crib retaining wall (or equivalent) would be constructed west of Corral de Tierra Road along the north embankment of SR-68. The retaining wall would lie below the existing road grade and therefore would not be visible from SR-68. The retaining wall would minimize the footprint of the embankment needed to accommodate the widened road section.

A left turn lane would also be constructed from westbound SR-68 into the Corral de Tierra Country Club driveway. The Corral de Tierra County Club driveway is located east of Corral de Tierra Road on the south side of SR-68.

No provisions for left turns to or from the residential driveway on the north side of SR-68 would be made. As part of the proposed project, a painted median island would be created in front of the residential driveway restricting drivers to right-in, right-out access. Drivers needing to make left-in, left-out movements would need to make a U-turn at the traffic signal at either San Benancio Road or at Corral de Tierra Road. U-turn movements at these signalized intersections are both legal and safe.

Construction of the retaining wall would require removal of any landscape vegetation present (including one young oak tree) along the north embankment of SR-68. The landscape vegetation is not visible to motorist traveling along SR-68 and does not provide any habitat value. As part of the proposed project native vegetation would be planted within the project limits. Additionally, the proposed project would relocate and replace the existing guardrails along the north side of SR-68 and west of the intersection of Corral de Tierra Road. If new or relocated guardrails are erected with metal posts, the posts would be darkened to reduce glare and reflectivity.

All of the work would be constructed within existing State and County rights-of-way, except for a small area of new State right-of-way that would be acquired on the north side of SR-68 just east of the intersection to accommodate relocation of a bus stop, widening and grading. Also, a temporary construction easements would be acquired along the east side of Corral de Tierra Road to accommodate grading near the edge of the County right-of-way (refer to Figure 1-3: Build Alternative Design Plan). Temporary staging areas for construction equipment and materials would be located in those areas of the existing State and County rights-of-way that are not designated as environmentally sensitive areas. Construction is expected to be completed in a single season.

C. FUNDAMENTALS OF TRAFFIC NOISE

The following is a brief discussion of fundamental traffic noise concepts. For a detailed discussion, refer to the Caltrans Technical Noise Supplement (California Department of Transportation 1998), which is available on the Caltrans Web site at www.dot.ca.gov/hq/env/noise.

Sound, Noise, and Acoustics

Sound is a disturbance created by a moving or vibrating source in a gaseous or liquid medium or the elastic stage of a solid and is capable of being detected by the hearing organs. Sound may be thought of as the mechanical energy of a vibrating object transmitted by pressure waves through a medium to a hearing organ, such as a human ear. For traffic sound, the medium of concern is air. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired. Sound is actually a process that consists of three components: the sound source, the sound path, and the sound receiver. All three

components must be present for sound to exist. Without a source to produce sound, there is no sound. Likewise, without a medium to transmit sound pressure waves, there is no sound. Finally, sound must be received; a hearing organ, sensor, or object must be present to perceive, register, or be affected by sound or noise. In most situations, there are many different sound sources, paths, and receptors rather than just one of each. Acoustics is the field of science that deals with the production, propagation, reception, effects, and control of sound.

Frequency and Hertz

A continuous sound can be described by its frequency (pitch) and its amplitude (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch, like the low notes on a piano, whereas high-frequency sounds are high in pitch, like the high notes on a piano. Frequency is expressed in terms of oscillations, or cycles, per second. Cycles per second are commonly referred to as Hertz (Hz). A frequency of 250 cycles per second is referred to as 250 Hz. High frequencies are sometimes more conveniently expressed in units of kilo-Hertz (kHz), or thousands of Hertz. The extreme range of frequencies that can be heard by the healthiest human ear spans 16–20 Hz on the low end to about 20,000 Hz (or 20 kHz) on the high end.

Sound Pressure Levels and Decibels

The amplitude of a sound determines its loudness. Loudness of sound increases and decreases with increasing and decreasing amplitude. Sound pressure amplitude is measured in units of micro-Newton per square meter (N/m^2), also called micro-Pascal (μPa). One μPa is approximately one hundred billionth (0.0000000001) of normal atmospheric pressure. The pressure of a very loud sound may be 200 million μPa , or 10 million times the pressure of the weakest audible sound (20 μPa). Because expressing sound levels in terms of μPa would be cumbersome, sound pressure level (SPL) is used instead to describe in logarithmic units the ratio of actual sound pressures to a reference pressure squared. These units are called bels, named after Alexander Graham Bell. To provide a finer resolution, a bel is subdivided into 10 decibels, abbreviated dB.

Addition of Decibels

Because decibels are logarithmic units, SPL cannot be added or subtracted by ordinary arithmetic means. For example, if one automobile produces an SPL of 70 dB as it passes an observer, two cars passing simultaneously would not produce 140 dB; they would, in fact, combine to produce 73 dB. When two sounds of equal SPL are combined, they will produce a combined SPL 3 dB greater than the original individual SPL. In other words, sound energy must be doubled to produce a 3 dB increase. If two sound levels differ by 10 dB or more, the combined SPL is equal to the higher SPL; in other words, the lower sound level does not increase the higher sound level.

A-Weighted Decibels

SPL alone is not a reliable indicator of loudness. The frequency, or pitch, of a sound also has a substantial effect on how humans will respond. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited not only in the range of audible frequencies but also in the way it perceives the SPL in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, and it perceives a sound within that range as being more intense than a sound of higher or lower frequency with the same magnitude. To approximate the frequency response of the human ear, a series of SPL adjustments is usually applied to the sound measured by a sound level meter. The adjustments (referred to as a weighting network) are frequency dependent.

The A-scale weighting network approximates the frequency response of the average young ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special problems (e.g., B-scale, C-scale, D-scale), but these scales are rarely, if ever, used in conjunction with highway traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted dBs, referred to as dBAs. In environmental noise studies, A-weighted SPLs are commonly referred to as noise levels. Table A shows typical A-weighted noise levels.

Table A: Typical Noise Levels

Common Outdoor Activities	Noise Level dBA	Common Indoor Activities
	—110—	Rock Band
Jet Flyover at 1,000 ft	—100—	
Gas Lawn Mower at 3 ft	—90—	
Diesel Truck at 50 ft, at 50 mph	—80—	Food Blender at 3 ft Garbage Disposal at 3 ft
Noisy Urban Area, Daytime Gas Lawn Mower, 100 ft	—70—	Vacuum Cleaner at 10 ft
Heavy Traffic at 300 ft	—60—	Normal Speech at 3 ft
Quiet Urban, Daytime	—50—	Large Business Office Dishwasher Next Room
Quiet Urban, Nighttime	—40—	Theater, Large Conference Room (Background)
Quiet Suburban, Nighttime	—30—	Library
Quiet Rural Nighttime	—20—	Bedroom at Night, Concert Hall (Background)
	—10—	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	—0—	Lowest Threshold of Human Hearing

Source: Caltrans, Technical Noise Supplement, October 1998.

Human Response to Changes in Noise Levels

Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern changes in sound levels of 1 dB when exposed to steady, single-frequency signals in the midfrequency range. Outside such controlled conditions, the trained ear can detect changes of 2 dB in

normal environmental noise. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dB. A change of 5 dB is readily perceptible, and a change of 10 dB is perceived as being twice or half as loud. As discussed above, a doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g., doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

Noise Descriptors

Noise in the daily environment fluctuates over time. Some of the fluctuations are minor; some are substantial. Some noise levels occur in regular patterns; others are random. Some noise levels fluctuate rapidly, others slowly. Some noise levels vary widely; others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following is a list of the noise descriptors most commonly used in traffic noise analysis:

- **Equivalent Sound Level (L_{eq}):** L_{eq} represents an average of the sound energy occurring over a specified period. L_{eq} is, in effect, the steady-state sound level that, in a stated period, would contain the same acoustical energy as the time-varying sound that actually occurs during the same period. The one-hour A-weighted equivalent sound level, $L_{eq}(h)$, is the energy average of the A-weighted sound levels occurring during a one-hour period and is the basis for the NAC used by Caltrans and the Federal Highway Administration (FHWA).
- **Percentile-Exceeded Sound Level (L_x):** L_x represents the sound level exceeded for a given percentage of a specified period. For example, L_{10} is the sound level exceeded 10 percent of the time, and L_{90} is the sound level exceeded 90 percent of the time.
- **Maximum Sound Level (L_{max}):** L_{max} is the highest instantaneous sound level measured during a specified period.
- **Community Noise Equivalent Level (CNEL):** The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dBA to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dBA to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.

Sound Propagation

When sound propagates over a distance, it changes in both level and frequency content. The manner in which noise reduces with distance depends on the following factors.

Geometric Spreading. Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of 6 dBA for each doubling of distance. Highway noise is not a single, stationary point source of sound. The movement of the vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a line source) rather than a point. This line source results in cylindrical spreading rather than the spherical spreading that results from a point source. The change in sound level from a line source is 3 dBA per doubling of distance from the sound source to the receptor.

Ground Absorption. Most often, the noise path between the highway and the observer is very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the

attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is done for simplification only; for distances of less than 60 meters (200 ft), prediction results based on this scheme are sufficiently accurate. For acoustically hard sites (i.e., those sites with a reflective surface, such as a parking lot or a smooth body of water, between the source and the receiver), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, between the source and the receiver), an excess ground attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source and 7.5 dBA per doubling of distance for a point source.

Atmospheric Effects. Research by Caltrans and others has shown that atmospheric conditions can have a substantial effect on noise levels within 60 meters (200 ft) of a highway. Wind has been shown to be the most important meteorological factor within approximately 150 meters (500 ft) of the source, whereas vertical air temperature gradients are more important for greater distances. Other factors such as air temperature, humidity, and turbulence also have substantial effects. Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lower noise levels. Increased sound levels can also occur as a result of temperature inversion (i.e., increasing temperature with elevation).

Shielding by Natural and Human-Made Features. A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by this shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in at least 5 dBA of noise reduction.

D. FEDERAL AND STATE REGULATIONS, STANDARDS, AND POLICIES

FHWA Regulations

23 CFR 772 provides procedures for preparing operational and construction noise studies and evaluating noise abatement considered for federal and federal-aid highway projects. Under 23 CFR 772.7, projects are categorized as Type I, Type II, or Type III projects. FHWA defines a Type I project as a proposed federal or federal-aid highway project for the construction of a highway on a new location, or the physical alteration of an existing highway that significantly changes either the horizontal or the vertical alignment, or increases the number of through-traffic lanes. A Type II project is a noise barrier retrofit project that involves no changes to highway capacity or alignment. A Type III project is a project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis. As the proposed project does not significantly alter the horizontal or vertical alignment of SR-68 or Corral de Tierra Road and does not increase the capacity, the proposed project is considered to be a Type III project.

The following is a brief discussion of applicable federal and state regulations, standards, and policies.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) is a federal law that establishes environmental policy for the nation, provides an interdisciplinary framework for federal agencies to prevent environmental damage, and contains action-forcing procedures to ensure that federal agency decision makers take environmental factors into account. Under NEPA, impacts, avoidance minimization, and mitigation measures to mitigate adverse impacts must be identified, including the identification of impacts for which no mitigation or only partial mitigation is available. The FHWA regulations discussed above, 23 CFR 722, constitute the federal noise standard. Projects complying with this standard are also in compliance with the requirements of NEPA.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) is the foundation of environmental law and policy in California. The main objectives of CEQA are to disclose to decision makers and the public the significant environmental effects of proposed activities and to identify ways to avoid or reduce those effects by requiring implementation of feasible alternatives or mitigation measures. Under CEQA, a substantial noise increase may result in a significant adverse environmental effect; if so, the noise increase must be mitigated or identified as a noise impact for which it is likely that only partial (or no) mitigation measures are available. Specific economic, social, environmental, legal, and technological conditions may make noise mitigation measures infeasible.

California Streets and Highways Code, Section 216

Section 216 of the California Streets and Highways Code relates to the noise level produced by the traffic on, or by the construction of, a state freeway measured in the classrooms, libraries, multipurpose rooms, and spaces used for pupil personnel services of a public or private elementary or secondary school. The Code states that if the interior noise level produced by freeway traffic or the construction of a freeway exceeds 52 dBA L_{eq} , Caltrans shall undertake a noise abatement program in any such classroom, library, multipurpose room, or space used for pupil personnel services to reduce the freeway traffic noise level therein to 52 dBA L_{eq} or less by measures including, but not limited to, installing acoustical materials, eliminating windows, installing air conditioning, or constructing sound baffle structures.

County of Monterey Health and Safety Noise Control Ordinance

Chapter 10.60.030 prohibits the operation of “any machine, mechanism, device, or contrivance which produces a noise level exceeding 85 dBA [A-weighted decibels], measured 50 ft” from the noise source. This ordinance is only applicable to noise generated within 2,500 ft of any Occupied dwelling unit. For the purposes of this analysis, this standard is interpreted as applying to noise generated by construction equipment and activities

E. FUTURE NOISE ENVIRONMENT, IMPACTS, AND CONSIDERED ABATEMENT/MITIGATION

Traffic Noise Impact Assessment

As discussed in Section B above, the proposed project will not significantly alter the vertical or horizontal alignment, or increase the capacity, of SR-68 or Corral de Tierra Road. Therefore, the proposed project is not a Type I or Type II project. Non-Type I or II projects are not expected to substantially alter the long-term traffic noise levels in the project area.

Abatement Measures

As the proposed project will not alter future traffic noise levels in the area, no abatement measures, such as sound barriers, are required.

F. CONSTRUCTION NOISE

Two types of short-term noise impacts would occur during construction of the project. The first type would be from construction crew commutes and the transport of construction equipment and materials to the project site would incrementally raise noise levels on access roads leading to the site. The pieces of heavy equipment for grading and construction activities will be moved on site, will remain for the duration of each construction phase, and will not add to the daily traffic volume in the project vicinity. A high single-event noise exposure potential at a maximum level of 87 dBA L_{max} from trucks passing at 50 ft will exist. However, the projected construction traffic will be small when compared to existing traffic volumes on SR-68, Corral de Tierra Road, and other affected streets, and its associated long-term noise level change will not be perceptible. Therefore, short-term construction-related worker commutes and equipment transport noise impacts would not be substantial.

The second type of short-term noise impact is related to noise generated during excavation, grading, and road construction. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated and, therefore, the noise levels along the project alignment as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table B lists typical construction equipment noise levels (L_{max}) recommended for noise impact assessments, based on a distance of 50 ft between the equipment and a noise receptor.

Typical noise levels at 50 ft from an active construction area range up to 91 dBA L_{max} during the noisiest construction phases. The site preparation phase, which includes grading and paving, tends to generate the highest noise levels, because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backhoes, bulldozers, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three or four minutes at lower power settings.

Construction of the proposed project is expected to require the use of dozers, scrapers, backhoes, graders, water trucks, and dump trucks. Noise associated with the use of construction equipment is estimated between 79 and 89 dBA L_{max} at a distance of 50 ft from the active construction area for the grading phase. As seen in Table B, the maximum noise level generated by each scraper is assumed to be approximately 87 dBA L_{max} at 50 ft from the scraper in operation. Each dozer would also generate approximately 85 dBA L_{max} at 50 ft. The maximum noise level generated by water trucks and dump trucks is approximately 86 dBA L_{max} at 50 ft from these vehicles. Each doubling of the sound source with equal strength increases the noise level by 3 dBA. Each piece of construction equipment operates as an individual point source. The worst case composite noise level at the nearest noise-

sensitive receptor during this phase of construction would be 91 dBA L_{max} (at a distance of 50 ft) from an active construction area).

The closest residences are located within 50 ft of the project construction areas. Therefore, these receptor locations may be subject to short term noise reaching 91 dBA L_{max} or higher generated by construction activities along the project alignment. Construction noise is regulated by Caltrans' Standard Specifications in Section 14-8.02, "Noise Control." The noise levels from the Contractor's operations, between the hours of 9:00 p.m. and 6:00 a.m., shall not exceed 86 dBA at a distance of 50 ft. In addition, the Contractor shall equip all internal combustion engines with the manufacturer-recommended muffler and shall not operate any internal combustion engine on the job site without the appropriate muffler.

Abatement Measures

Initial construction has the potential to create noise impacts at the homes located along the project alignment. The following measures are recommended to reduce these impacts to the extent feasible.

- All construction equipment must conform to the provisions of Caltrans Standard Specifications, Section 14-8.02, "Noise Control." This section requires the contractor to comply with all local ordinances (i.e., County of Monterey) that apply to any work as part of the contract. The County of Monterey does not currently have restrictions on construction hours, therefore, the Caltrans standards of 86 dBA at a distance of 50 ft between the hours of 9:00 p.m. and 6:00 a.m. on weekdays will be used.
- Portable equipment shall be located as far as possible from the noise sensitive locations as is feasible.
- Construction vehicle staging areas and equipment maintenance areas shall be located as far as possible from sensitive receptors.
- All equipment shall have sound control devices no less effective than those provided on the original equipment. No equipment shall have an unmuffled exhaust.
- As directed by Caltrans, the contractor shall implement appropriate additional noise abatement measures including, but not limited to, shutting off idling equipment, rescheduling construction activities, notifying adjacent residents in advance of construction work, and utilizing construction equipment with tires, not tracks.

Table B: Typical Construction Equipment Noise Levels

Type of Equipment	Range of Maximum Sound Levels Measured (dBA at 50 feet)	Suggested Maximum Sound Levels for Analysis (dBA at 50 feet)
Pile Drivers, 12,000 to 18,000 ft-lb/blow	81-96	93
Rock Drills	83-99	96
Jackhammers	75-85	82
Pneumatic Tools	78-88	85
Pumps	74-84	80
Dozers	77-90	85
Scrapers	83-91	87
Haul Trucks	83-94	88
Cranes	79-86	82
Portable Generators	71-87	80
Rollers	75-82	80
Tractors	77-82	80
Front-End Loaders	77-90	86
Hydraulic Backhoe	81-90	86
Hydraulic Excavators	81-90	86
Graders	79-89	86
Air Compressors	76-89	86
Trucks	81-87	86

Source: Noise Control for Buildings and Manufacturing Plants, Bolt, Beranek & Newman 1987.

G. REFERENCES

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APPENDIX A

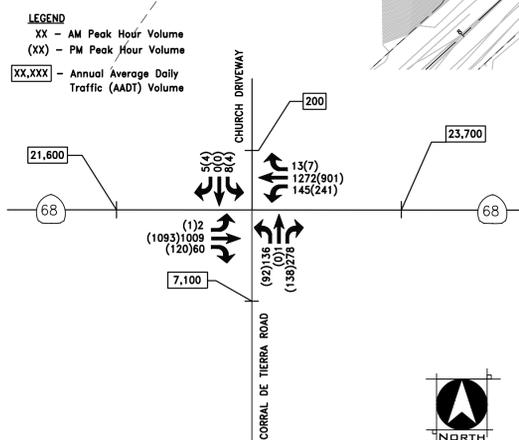
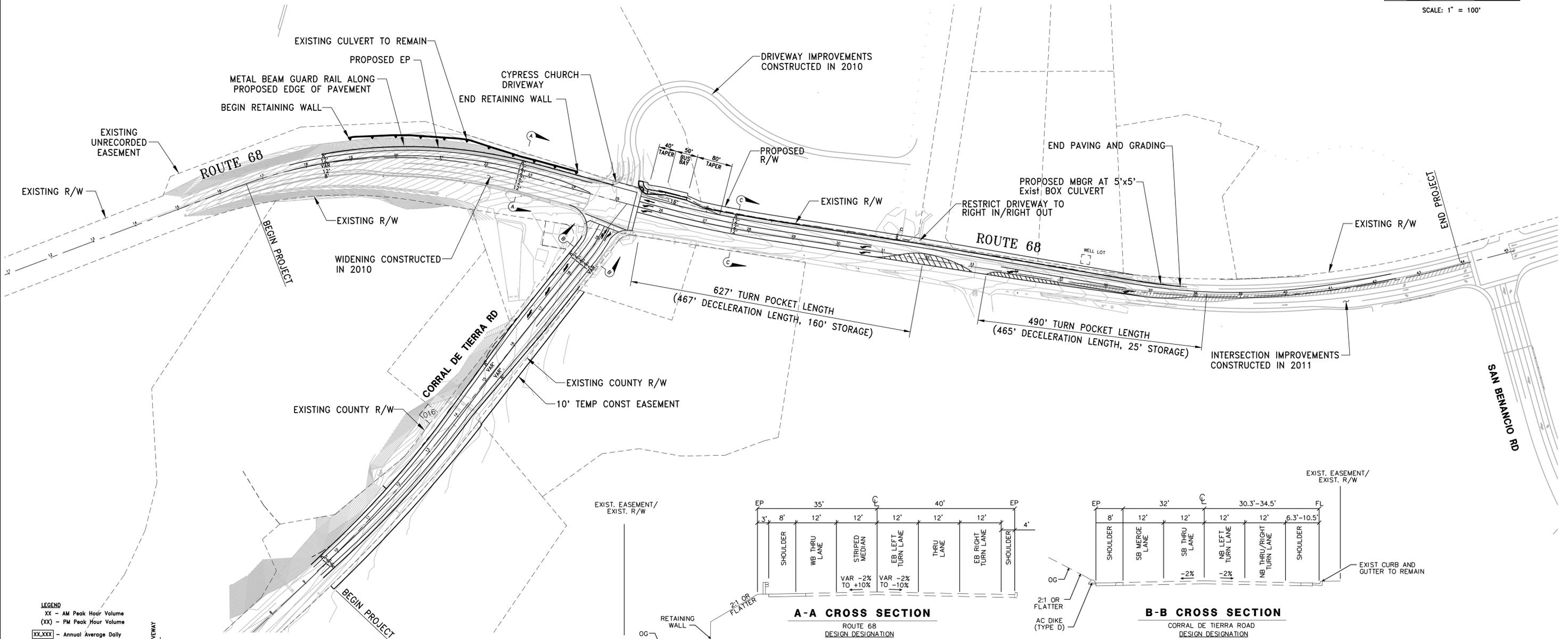
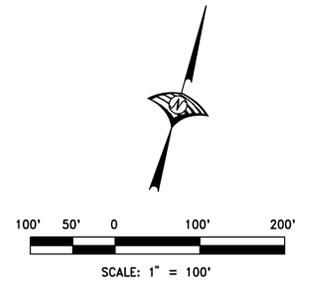
CONCEPT PLANS

ROUTE 68/CORRAL DE TIERRA ROAD INTERSECTION IMPROVEMENTS

BUILD ALTERNATIVE

COUNTY OF MONTEREY CALIFORNIA

JANUARY, 2013



*NOTE: This volume scenario does not include traffic volumes from the proposed Shopping Center on the south-east quadrant of the project intersection.

