Memorandum

Date:	August 30, 2011
To:	Gordon Sweet, Project Engineer, BKF Engineers Christophe Schneiter, Assistant Public Works Director, City Engineer, City of Santa Cruz Yvonne Hoffman, Environmental Manager, Caltrans District 5
Cc:	
From:	Dave Buehler, Senior Acoustical Engineer, ICF International Debbie Loh, Project Manager, ICF International
Subject:	**Santa Cruz Route 1/Route 9 Intersection Improvement Project, Noise Technical Memorandum**

Background

The California Department of Transportation (Caltrans) is proposing to construct improvements to the intersection of Route 1 and Route 9/River Street (Route 1/9 intersection) in the City of Santa Cruz, California. A noise technical memorandum was prepared for this project and reviewed by Caltrans District 5 in June 2007. Since that time, minor changes to the project have been proposed. The purpose of this memo is to incorporate Caltrans' comments and to update the project description. The changes to the project primarily affect the southeast quadrant of the intersection and involve construction of an earthen embankment into the adjacent drainage culvert (known as the Arroyo de San Pedro Regaldo) to accommodate standard lane and shoulder width dimensions. This project change does not substantively affect the noise analysis that was conducted for the original noise technical memo reviewed by Caltrans.

Introduction

Because the project will use federal funding, the project must comply with the requirements of Title 23 Part 772 of the Code of Federal Regulations (23CFR 772) and Caltrans' noise analysis policy as described in *Traffic Noise Analysis Protocol for New Highway Construction and Highway Reconstruction Projects* (*Protocol*) (Caltrans 2006). This memorandum assesses noise impacts in accordance with 23 CFR 772 and the *Protocol*. Caltrans is the NEPA lead agency (under Caltrans' assumption of responsibility pursuant to 23 U.S.C. 327) and CEQA lead agency since Routes 1 and 9 are under Caltrans' jurisdiction.

23 CFR 772 defines a Type I project as either of the following:

- A proposed federal or federal-aid highway project for construction of a highway on a new location.
- The physical alteration of an existing highway that significantly changes the horizontal or vertical alignment or increases the number of through traffic lanes.

A project determined to be a Type I project must be evaluated for traffic noise impacts. Caltrans has determined that the proposed project is not a Type I project. Consequently, the evaluation of traffic noise impacts and consideration of traffic noise abatement under 23 CFR 772 and the *Protocol* are not required. Construction noise however must be assessed under 23 CFR 772. Both construction and traffic noise impacts must also be evaluated under CEQA. This memorandum summarizes these evaluations for the proposed project.

Project Description

Project Location

The proposed project is located at the intersection at Route 1/9 in the City of Santa Cruz, Santa Cruz County, California. Figure 1 shows the project location. The purposes of the project are to:

- Alleviate congestion at the Route 1/9 intersection
- Accommodate existing and projected traffic volumes at the Route 1/ 9 intersection
- Improve safety

Proposed Improvements

The following improvements are proposed at the Route 1/9 intersection (listed below by segment). The project design plan is shown in Figure 2. Right-of-way acquisition and temporary construction easements that would be required for the project are identified in Figure 2 and Table 1.

Although both Route 1 and Route 9 are generally considered north-south thoroughfares, in the project area, Route 1 runs east-west orientation and Route 9 runs north-south. Thus, travel lanes on Route 1 are referred to as running in an “eastbound” or “westbound” direction, and travel lanes on Route 9 are referred to as running in a “northbound” or “southbound” direction.

Route 9 (north of the Route 1/9 intersection)

Northbound Route 9

- Add a second northbound lane and an 8-foot shoulder on northbound Route 9, from Route 1 to Fern Street, to receive vehicular and bicycle traffic from both the new left-turn lane on Route 1 and the converted shared left/through lane from northbound River Street.

Table 1 Proposed Right-of-Way Acquisition and Temporary Construction Easements

APN No.	Property Owner	Land Use	Square Footage			
			Required for Road Right-of-Way	Excess on Full Property Acquisitions[1]	Temporary Construction Easement	Comments
Northwest Quadrant of SR 1/9 Intersection						
008-171-33-000	City of Santa Cruz	Homeless Services Center	741	0	1,751	
Northeast Quadrant of SR 1/9 Intersection						
008-163-06-000	Santee	Central Home Supply Business (landscaping and building supply)	30,709	24,879	0	Entire parcel is not needed for roadway right-of-way. A number of options will be evaluated during final design. Full acquisition of this parcel is assumed for this analysis.
008-172-16-000	Santee	Materials Storage for Central Home Supply	3,253	3,253	0	Parcel not needed for roadway right-of-way. However, full acquisition is assumed since the owner of this parcel also owns APN 008-163-06-000.
008-172-08-000	Santee	Residence at 744 River Street	23,013	15,850	0	
008-163-07-000	State of California	Undeveloped	8,579	0	1,397	
Southeast Quadrant of SR 1/9 Intersection						
008-174-01-000	City of Santa Cruz	Undeveloped	2,278	0	0	
008-174-06-000	City of Santa Cruz	Undeveloped	845	0	0	
008-174-09-000	Tedesco	Gateway Plaza Shopping Center	1,387	0	6,012	
008-601-02-000	SPG Associates	Gateway Plaza Shopping Center	47	0	988	
008-601-04-000	Gateway Plaza Associates	Gateway Plaza Shopping Center	650	0	1,499	

Shaded parcels indicate full acquisition is required.

[1] Square footage that is not directly needed for the proposed roadway right-of-way.

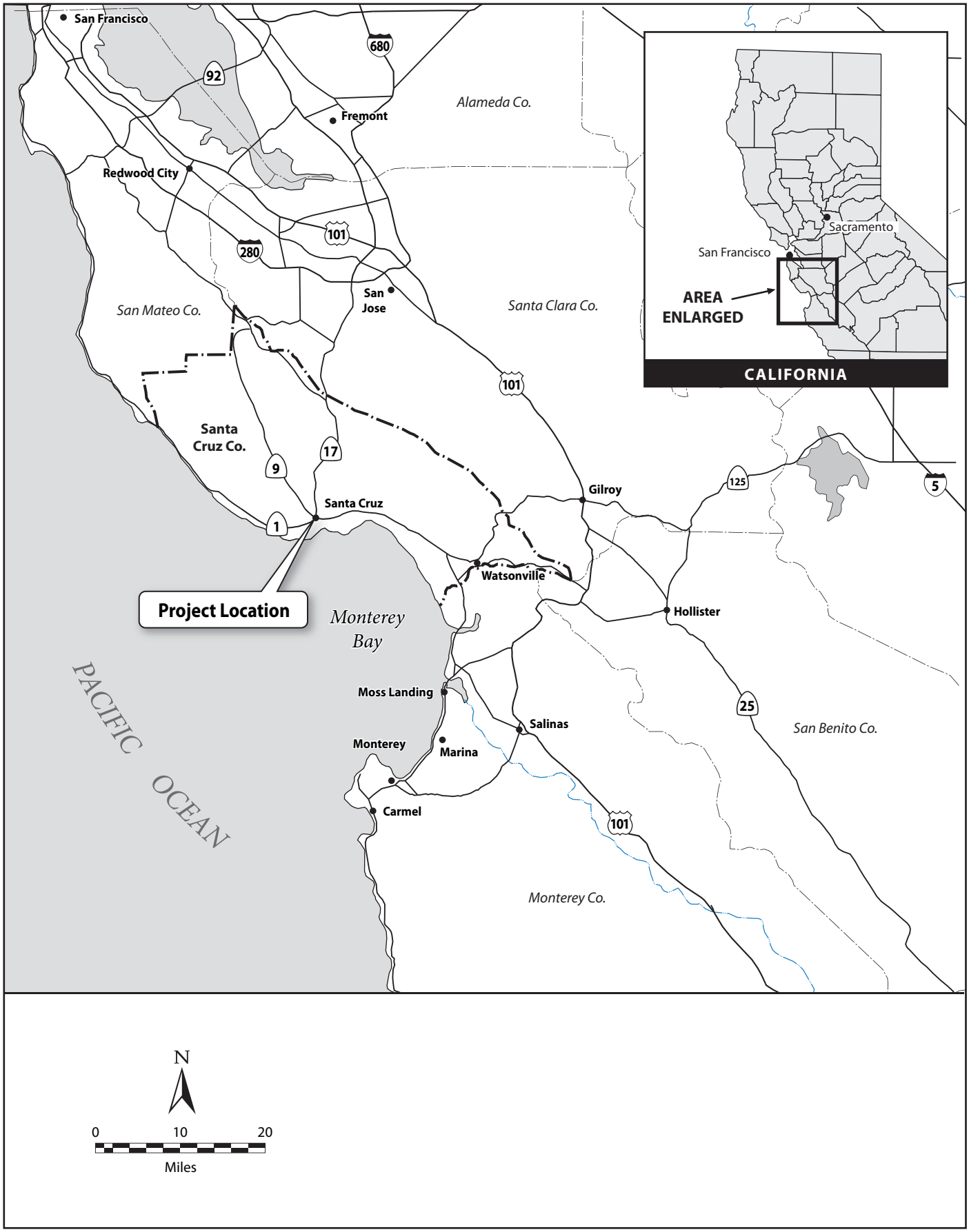

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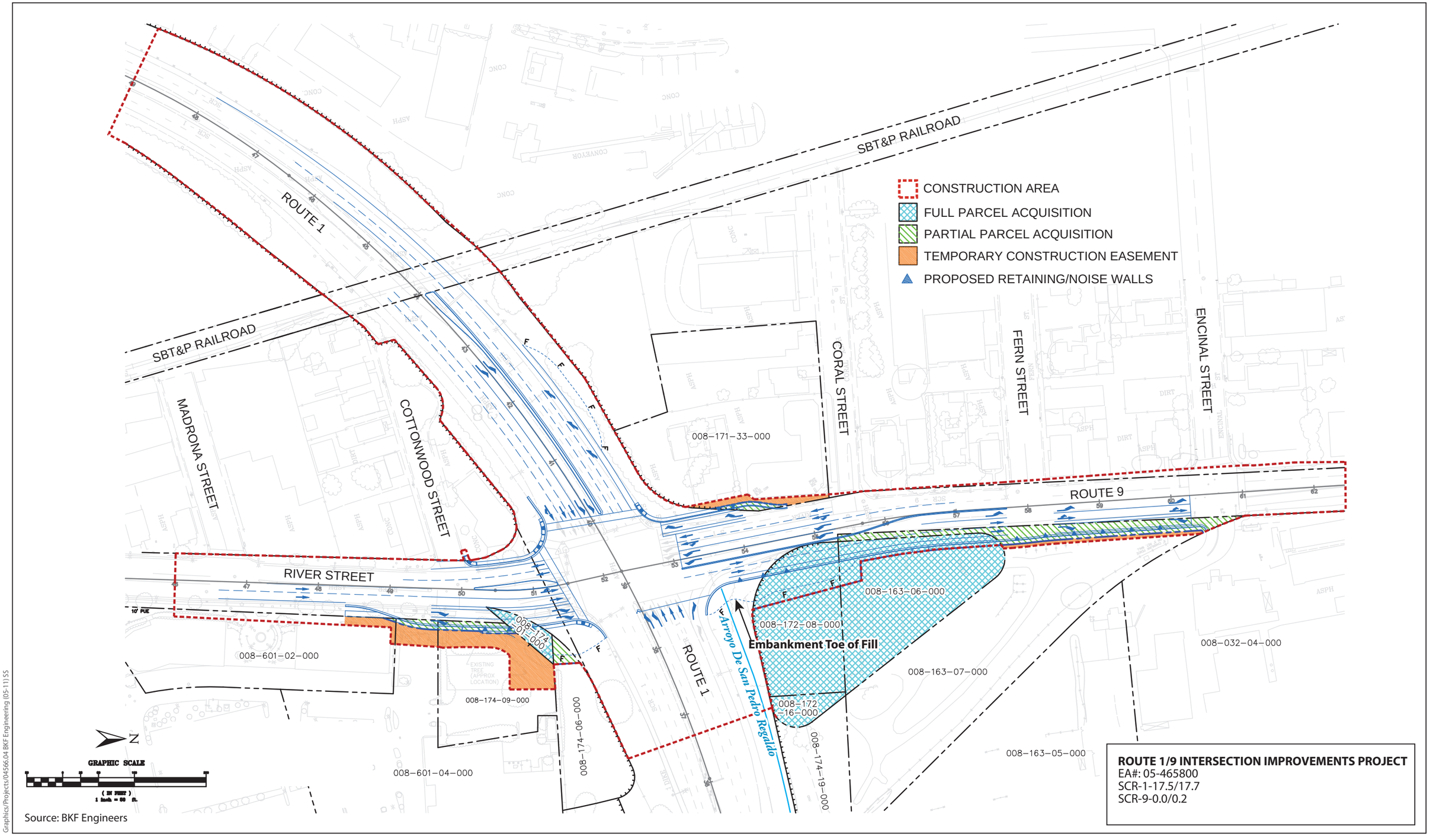
Figure 1
Regional and Project Location



Source: BKF Engineers

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Figure 2
Plan View

- Add a 4-foot through bike lane, 12-foot right turn lane, and 4-foot shoulder on northbound Route 9, between Fern Street and Encinal Street, to accommodate bicycle through traffic, and vehicular traffic turning into the Tannery Arts Center.
- Replace channelizers with a 2-foot raised concrete median along Route 9 from Route 1 to Fern Street.

These improvements, all of which are standard lane and shoulder width dimensions, would require widening the existing roadway. Curb and gutter (at locations noted above) would be constructed along Route 9 from the Route 1/9 intersection to the south side of the Route 9/Encinal Street intersection.

An earthen embankment would be constructed to support the roadway widening over the drainage culvert (known as Arroyo de San Pedro Regaldo) located at the northeast corner of the Route 1/9 intersection (see Figure 2). The embankment would have a 2:1 slope with the toe of the embankment extending approximately 20-40 feet beyond the existing roadway. The existing culvert would be extended approximately 10 feet. The existing concrete apron and cutoff wall that extend approximately 25 feet from the existing culvert would remain in place or reconstructed "in-kind". All construction activities would be conducted during the dry season. Dewatering would be accomplished by using small check dams and bypass pipes.

The road widening would result in the displacement of a private residence (744 River Street, Assessor's Parcel Number [APN] 008-172-08-000) on the east side of Route 9 located between the drainage culvert and the Central Home Supply (808 River Street, APN 008-163-06-000), a landscape and building supply business, both owned by the same property owner. The road widening would also result in loss of unofficial parking in front of Central Home Supply and would displace a portion of the Central Home Supply's showroom; the entire Central Home Supply parcel is not needed to accommodate the additional right-of-way needed for the project. Although full acquisition of APN 008-163-06-000 is not required to accommodate the proposed right-of-way, full acquisition of this parcel is assumed for the purposes of the environmental analysis conducted for this project as a worst-case assumption. Since full acquisition of the parcel that houses the Central Home Supply buildings may be required, full acquisition of APN 008-172-16-000, also owned by the property owner of APN 008-172-08-000 and 008-163-06-000, is also assumed. This parcel is used by Central Home Supply for materials storage.

Road widening may require construction of a retaining wall on the east side of Route 9 between Encinal Street and the Central Home Supply's driveway located south of Fern Street. The area along Central Home Supply is currently within Caltrans right-of-way and is being leased by Central Home Supply. The proposed improvements would also result in the removal of a number of street trees near the Route 9/Fern Street intersection.

Southbound Route 9

- Add a new shared through/left turn lane on southbound Route 9 to permit a triple left onto eastbound Route 1 and two through (receiving) lanes to southbound River Street.
- Add a 4-foot through bike lane to accommodate bicycle through traffic.

These improvements, all of which are standard lane and shoulder width dimensions, would require widening of the existing roadway and removal of the existing landscaping immediately adjacent to the Rebele Family Shelter that is part of the City-owned Homeless Services Center (115 Coral Street) located at the corner of Route 9 and Coral Street. The Rebele Family Shelter structure would not be directly affected, but the southeast corner of the structure would be moved closer to the travel lanes. The nearest lane is currently about 28 feet from the shelter and the new turn pocket would be about 19 feet from the shelter. Due to the standardization of the lane widths, the upstream lane that contributes to this right-turn pocket would actually be seven feet further away from the structure. The road widening may also require the reconstruction of a masonry block wall located at the corner immediately south of the Homeless Services Center and result in the removal of ornamental trees and shrubs adjacent to the masonry wall. Curb, gutter and sidewalk would be reconstructed from the Route 1/9 intersection to Coral Street. Road widening could also require the relocation of various road signs; an ornamental metal picket fence; electrical power poles; light poles along the sidewalk between Route 1 and Coral Street; an existing storm drain inlet; and an electrical box near the northwest quadrant of the Route 1/9 intersection.

River Street (south of the Route 1/9 intersection)

Northbound River Street

- Revise the left turn lane to provide a shared through/left turn lane, so two lanes turn onto westbound Route 1.
- Extend the queuing length for the two right turn lanes onto eastbound Route 1.

These improvements, all of which are standard lane and shoulder width dimensions, would require widening of the existing roadway. Curb, gutter, and sidewalk would be reconstructed from the Route 1/9 intersection to a point approximately 300 feet south of the intersection. Due to the elevation difference between the roadway and the existing grade immediately southeast of the intersection, a retaining wall may be necessary to minimize impacts to the adjacent properties. Where there is sufficient room to grade, the slope would be graded to a 2:1 (horizontal: vertical) maximum slope. The existing street frontage landscaping would be removed, and the sidewalk would be narrowed from eight feet to five feet. Road widening would also result in the removal of approximately five street trees; relocation of a utility joint trench located beneath the existing sidewalk, including utility boxes, vaults, backflow preventers, roadside signs, and street lights; and reconstruction of the pedestrian and bicycle access to the Gateway Plaza shopping center. Road widening would also impact the driveway to the commercial office building located at 700/720 River Street which could require reconstruction of the driveway and the retaining wall (including hand railing) immediately adjacent to the commercial office, necessitate the removal of two redwood trees (including one of heritage size), and result in the loss of one to two onsite parking spaces along the driveway.

Additionally, the narrow concrete raised median in the middle of River Street, between Madrone Street and Cottonwood Street, would be removed and replaced with a double-yellow median stripe. The median surrounding the existing River Street gateway sign would be reconstructed to accommodate the new alignment, and the gateway sign would need to be removed and/or relocated.

Southbound River Street

- Realign the two lanes to receive traffic from the two through lanes on southbound Route 9.

These improvements all which are standard lane and shoulder width dimensions, would require widening of southbound River Street from the Route 1/9 intersection to the River Street/Cottonwood Street intersection. To accommodate curb, gutter, and sidewalk (including curb returns), the street frontage landscaping, including two street trees, would be removed, and the existing sidewalk would be narrowed from eight feet to five feet. The existing street light poles and other utility facilities would be relocated due to the widening.

Route 1 (west of Route 1/9 intersection)

Eastbound Route 1

- Add a left turn lane on eastbound Route 1 so that two lanes turn onto northbound Route 9.
- Remove the existing traffic signal mast arm and "pork chop" island between the right turn lane and through lane. A new signal mast arm will be installed at the curb return at the southwest corner of the intersection of Route 1/River Street, just south of the handicap ramps.
- Reconstruct the median, from the Route 1/9 intersection to the SCBT&P railroad tracks, to accommodate the additional left turn lane.

Road widening would be minor and within the Caltrans right-of-way. The crosswalk would be restriped to align with the reconstructed median.

Westbound Route 1

- Minor widening and striping realignment of westbound Route 1 due to widening associated with the second left turn lane along eastbound Route 1.

Road widening would be minor and within the Caltrans right-of-way. There would be no impacts to existing land uses or resources.

Route 1 (east of Route 1/9 intersection)

Eastbound Route 1

- Minor modification to the median nose to accommodate Route 1/9 intersection improvements, including receiving the triple left-turn movement from southbound Route 9.

These improvements would not require road widening.

Westbound Route 1

There are no improvements proposed on westbound Route 1 east of the Route 1/9 intersection.

Regulatory Setting

Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects

Construction noise is regulated by Caltrans Standard Specifications Section 14-8, "Sound Control Requirements," which states 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 manufacturers' specifications.

Local Standards

City of Santa Cruz General Plan Noise Element

The City of Santa Cruz General Plan Noise Element establishes the following interior and exterior noise standards for various types of land uses. Table 2 summarizes acceptable noise levels for various land uses within the City of Santa Cruz.

In addition, policy 6.7.2 establishes a standard of 60 dBA, L_{dn} for outdoor activity areas and 45 dBA, L_{dn} for indoor areas of noise-noise-sensitive uses (residences, schools, medical facilities, libraries, churches, daycare centers and convalescent homes). Where it is not possible to reduce exterior noise to 60 dBA, L_{dn} or less by incorporating a practical application of the best available noise-reduction technology, an exterior noise level of up to 65 dBA, L_{dn} may be allowed. Interior noise shall not exceed 45 dBA, L_{dn} with windows and doors closed.

City of Santa Cruz Noise Ordinance

The City of Santa Cruz noise ordinance does not enumerate explicit noise level standards. However, Section 9.36.010 prohibits any offensive noise within 100 feet of any building or place regularly used for sleeping purposes between the hours of 10:00 p.m. and 8:00 a.m. This prohibition may be changed to the hours between 10:00 a.m. and 7:00 a.m. for any activity performed under contract for public works awarded by the City of Santa Cruz where the Director of Public Works determines that the project has the potential to disrupt traffic and that this disruption could be alleviated by authorizing construction work to commence at 7:00 a.m. or that due to time constraints on project completion it is necessary to allow the contractor to begin work at 7:00 a.m. In addition, these prohibitions do not apply to activities undertaken by, or pursuant to contract with, the City of Santa Cruz, or apply to any other activity undertaken by the city, another governmental agency, or city contractor, for public health and safety purposes.

Work conducted within Caltrans right-of-way is not subject to the noise ordinance. However, any work conducted outside the right-of way would be.

Physical Setting

Existing Noise Environment

The existing noise environment in the study area is dominated by noise from traffic traveling on Routes 1 and 9, occasional trains on the nearby railroad tracks, and activities from the adjacent industrial and commercial land uses.

Noise Sensitive Land Uses

Figure 3 shows land uses in the project area. Land uses south of Route 1 in the project area are commercial. A single family residence is located in the northeast quadrant of the intersection (744 River Street) but this residence will be removed as part of the proposed project. The northwest quadrant contains the Homeless Services Center Complex including the Rebele Family Shelter at the corner of SR 9/Coral Street that contains emergency housing for the homeless.

Impacts

Impact NOISE-1: Evaluation of Construction Noise Levels under 23 CFR 772/Protocol. Table 2 summarizes noise levels produced by construction equipment that is commonly used on roadway construction projects. During construction of the project, noise from construction activities (primarily operation of heavy equipment) may intermittently dominate the noise environment in the immediate area of construction.

A reasonable worst-case assumption is that the three loudest pieces of equipment anticipated for use on the project (paver, loader, and a truck) would operate simultaneously and continuously for at least a 1-hour period. At 50 feet from the source, the combined sound level would be 92 dBA. Table 3 summarizes predicted noise levels at various distances from an active construction site, assuming this combined source level, distance attenuation (6dB per doubling of distance), and attenuation from ground absorption (1 to 2 dB per doubling of distance).

No adverse noise impacts from construction are anticipated because construction would be conducted in accordance with Caltrans Standard Specifications Section 14-8. Construction noise would be short-term, intermittent, and overshadowed by local traffic noise. Further, implementing the following measures would minimize the temporary noise impacts from construction.

- All equipment will have sound-control devices that are no less effective than those provided on the original equipment. No equipment will have an unmuffled exhaust.
- As directed by Caltrans, the contractor will implement appropriate additional noise mitigation measures, including changing the location of stationary construction equipment, turning off idling equipment, rescheduling construction activity, notifying adjacent residents in advance of

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Figure 3
Adjacent Land Uses

construction work, and installing acoustic barriers around stationary construction noise sources.

Impact NOISE-2: CEQA Evaluation of Construction Noise Levels under City of Santa Cruz Noise Standards. Construction activities that occur outside of the Caltrans right-of-way are subject to local noise standards. In general, adverse noise impacts from construction activities are not anticipated to occur because construction would be short-term, intermittent, and dominated by local traffic noise. Nighttime construction activities may be needed to minimize traffic disruptions. These activities are anticipated to result in the greatest disruption to adjacent noise-sensitive land uses. The City's noise ordinance prohibits construction activities between the hours of 10:00 p.m. and 8:00 a.m. However, this prohibition does not apply to the proposed project because activities undertaken by the City or another governmental agency for public health and safety purposes are exempt from the requirements of the noise ordinance. During periods of nighttime construction activities, it is anticipated that construction activities in close proximity to nearby and adjacent noise-sensitive land uses could be exposed to high levels of construction noise. This impact is therefore considered to be significant. Implementation of Mitigation Measures NOISE-1 through NOISE-3 would reduce this impact to a less-than-significant level.

Table 2. Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 ft from Source
Air compressor	81
Backhoe	80
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane, derrick	88
Crane, mobile	83
Dozer	85
Generator	81
Grader	85
Impact wrench	85
Jack hammer	88
Loader	85
Paver	89
Pile driver (impact)	101
Pile driver (sonic)	96
Pneumatic tool	85
Pump	76
Rock drill	98
Roller/sheep's foot	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Truck	88

Source: Federal Transit Administration 2006.

Table 3. Estimated Construction Noise in the Vicinity of an Active Construction Site

Entered Data:			
Construction Condition: Site leveling			
Source 1: Scraper - Sound level (dBA) at 50 feet =			89
Source 2: Dozer – Sound level (dBA) at 50 feet =			85
Source 3: Truck - Sound level (dBA) at 50 feet =			88
Average Height of Sources - Hs (ft) =			10
Average Height of Receiver - Hr (ft.) =			5
Ground Type (soft or hard) =			soft
Calculated Data:			
All Sources Combined - Sound level (dBA) at 50 feet =			92
Effective Height (Hs+Hr)/2 =			7.5
Ground factor (G) =			0.0
Distance Between Source and Receiver (ft.)	Geometric Attenuation (dB)	Ground Effect Attenuation (dB)	Calculated Sound Level (dBA)
50	0	0	92
100	-6	-2	85
200	-12	-4	77
300	-16	-5	72
400	-18	-6	69
500	-20	-6	66
600	-22	-7	64
700	-23	-7	62
800	-24	-7	61
900	-25	-8	60
1000	-26	-8	58
1200	-28	-9	56
1400	-29	-9	55
1600	-30	-9	53
1800	-31	-10	52
2000	-32	-10	50
2500	-34	-10	48
3000	-36	-11	46

Impact NOISE-3: CEQA Evaluation of Traffic Noise Levels. Based on information provided by the project traffic engineer, Hexagon Transportation Consultants, the proposed project is not expected to divert traffic from other roadways, cause a change in trip distribution patterns, or increase traffic volumes over no project conditions (van den Hout pers. comm.). The project will however involve construction of a right-turn pocket on southbound Route 9. The roadway curb will move from 22 feet from the building to 11 feet from the building. Due to the standardization of the lane widths, the upstream lane that contributes to this right-turn pocket will actually be seven feet further away from the Rebele Family Shelter. Near the southeast corner of the shelter building, the new turn pocket will place a traffic lane closer to the shelter. The nearest lane is currently about 28 feet from the shelter and the new lane will be about 19 feet from the shelter. This shift in the lane geometry could increase noise at the shelter by as much as about 2.5 dB. However, the increase will likely be less because of noise from the other five adjacent traffic lanes.

Because the potential change in operational noise is small (below the threshold of perception) and well below the Caltrans definition of a substantial change (12 dB), this impact is considered to be less than significant and no mitigation is required.

Mitigation

Mitigation Measure NOISE-1: Employ Noise-Reduction Construction Measures.

Caltrans shall require the construction contractor to employ noise-reducing construction practices such that noise from construction outside the Caltrans right-of-way does not exceed 60 dBA, Leq at outdoor activity areas noise sensitive uses during daytime hours or 45 dBA, Leq during nighttime hours. Measures that can be used to limit noise include but are not limited to those listed below. The construction contractor shall prepare a detailed noise control plan, to be reviewed and approved by Caltrans prior to construction, that includes those measures deemed to be feasible and effective in meeting the noise limits specified above:

- Locating equipment as far as practical from noise sensitive uses,
- Using sound control devices such as mufflers on equipment,
- Turning off idling equipment,
- Using equipment that is quieter than standard equipment,
- Selecting construction access routes that affect the fewest number of people,
- Using noise-reducing enclosures around noise-generating equipment,
- Constructing barriers between noise sources and noise sensitive land uses or taking advantage of existing barrier features (terrain, structures) to block sound transmission,
- Temporarily relocating residents during periods of high construction noise that cannot be effectively reduced by other means.

Mitigation Measure NOISE-2: Disseminate Essential Information to Residences and Implement a Complaint/Response Tracking Program.

Caltrans shall require the construction contractor to notify residences within 500 feet of the construction areas of the construction schedule in writing prior to construction. The construction contractor will designate a noise disturbance coordinator who will be responsible for responding to complaints regarding construction noise. The coordinator will determine the cause of the complaint and will ensure that reasonable measures are implemented to correct the problem. A contact telephone number for the noise disturbance coordinator will be conspicuously posted on construction site fences and will be included in the written notification of the construction schedule sent to nearby residents.

Mitigation Measure NOISE-3: Prohibit the Operation of High-Noise Producing Construction Equipment During Nighttime Hours.

Caltrans shall require the construction contractor to prohibit the operation of high-noise producing construction equipment (e.g., pavement breakers, pile drivers, concrete saws) outside of the City right-of-way during the hours between 10:00 p.m. and 8:00 a.m. (or 7:00 a.m. if authorized by the City Director of Public Works) per Section 9.36.010 of the City code. This stipulation shall be made a part of the construction contract.

References

California Department of Transportation. 2006. Traffic Noise Analysis Protocol for New Highway Construction, Reconstruction, and Retrofit Barrier Projects. Sacramento, CA: Division of Environmental Analysis. August 14.

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