

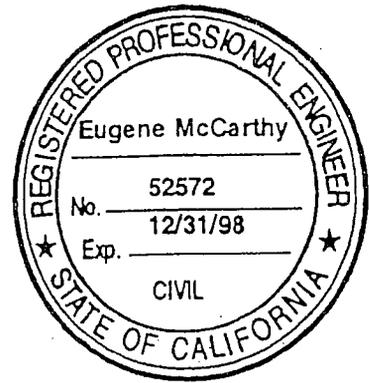
04-SF-80-KP 12.2/14.3
04-ALA-80 KP 0.0/2.1
RU 4251 - EA 012000
Project Cost \$1.3 to \$1.6 billion

Fact Sheet

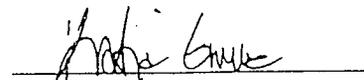
EXCEPTION TO MANDATORY DESIGN STANDARDS

Prepared By:


Eugene McCarthy, P.E.
Parsons Brinckerhoff



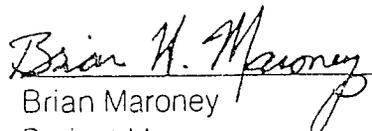
Submitted By:


Katja Greve
Design Senior

9/22/98
Date

(510) 286-4476
Telephone

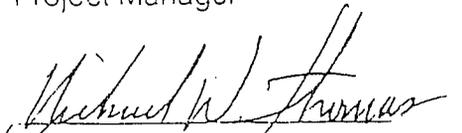
Recommended
for Approval By:


Brian Maroney
Project Manager

Sept 22, 1998
Date

(510) 227-8867
(510) 286-5885
Telephone

Approved By


Michael W. Thomas
Project Development Coordinator
Design and Local Programs

9/23/98
Date

916 683-5220
510 286-4687
Telephone



1. PROPOSED PROJECT AND NONSTANDARD FEATURES

A. Project Description

The State of California, Department of Transportation (Caltrans) proposes retrofitting or replacing the eastern span of the San Francisco/Oakland Bay Bridge (SFOBB) for seismic safety reasons. The design exceptions discussed in this fact sheet apply to the replacement alternatives only. For replacement Alternatives N2, N6 and S4, the span would be replaced from the Yerba Buena Island Tunnel east to the Oakland Shore, and the project will conform to existing conditions west of the Toll Plaza. The SFOBB currently serves approximately 274,000 vehicles per day. The SFOBB provides regional access between the San Francisco Peninsula and the East Bay. As a component of Interstate 80 (I-80), it is a critical link in the interstate network.

The San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project provides a lifeline vehicular connection that:

- Connects Yerba Buena Island (YBI) in San Francisco and the SFOBB Toll Plaza in Oakland;
- Connects to a lifeline route linking the East Bay, San Francisco, and the San Francisco Peninsula;
- Maintains the current vehicular capacity of the existing East Span;
- Provides for safety of bridge users during a maximum credible earthquake (MCE); and
- Improves operational and safety design to meet current standards to the greatest extent possible.

See Attachments A and B for project information.

B. Non-Standard Features

The proposed eastbound entrance ramp from YBI for the replacement alternatives has non-standard superelevation rates on two of its horizontal curves. The 55-meter radius horizontal curve has a 6% superelevation rate; the standard rate is 12%. The comfortable design speed for the curve is therefore 40 kilometers per hour (km/hr). The 593-meter radius horizontal curve has a 2% superelevation rate; the standard rate is 6%. The comfortable design speed for the curve is therefore 102 km/hr. The mainline design speed for the project is 100 km/hr and the ramp terminal design speed is 40 km/hr. The proposed eastbound entrance ramp is an improvement over the existing configuration.

C. Mandatory Standard for Which Exception is Being Requested

HDM Index 202.2 states that "Based on an e_{max} selected by the designer for one of the conditions, superelevation rates from Table 202.2 shall be used within the given range of curve radii. If less than standard superelevation rates are approved (see Index 82.1), Figure 203.2 shall be used to determine superelevation based on the curve radius and comfortable design speed."

D. Existing Highway

The existing bridge has several nonstandard features: the lane widths, shoulder widths, horizontal curves, superelevation rates and decision sight distances are all below current standards. The proposed mainline alignment has been designed to meet current Caltrans standards to the greatest extent possible, and it significantly improves what currently exists. The mandatory design exception documented in this fact sheet is the only mandatory exception, whereas the current alignment has several nonstandard mandatory and advisory design features. The existing highway is not part of the FHWA 42,000km Priority Network.

E. Safety Improvements

The proposed alignment will improve safety by designing the mainline geometry to meet current Caltrans standards to the greatest extent possible, including standardizing the horizontal curves and installing standard-width shoulders and travel lanes.

F. Total Project Cost

Total cost for the project has been estimated to range between \$1.3 and \$1.6 billion.

2. REASON FOR REQUESTING EXCEPTION

The 6% superelevation rate for the 55-meter horizontal curve is proposed because the curve is of insufficient length to develop the standard 12% superelevation rate. As stated in HDM 504.3(3) on superelevation for ramps, "where the length of curve is too short to develop standard superelevation, the highest obtainable rate should be used."

The 2% superelevation rate for the 593-meter radius horizontal curve is proposed because this curve parallels the mainline structure, which has a standard 2% cross-slope. This curve was selected to approximate the convergence angle of a standard entrance ramp. It is equivalent to the 1000-meter radius horizontal curve of a standard entrance ramp on a tangent which generally follows the cross slope of the mainline. HDM Figure 504.2A, Note 8, states that "2% superelevation may be acceptable for the 1000 m radius curve on entrance ramps." The standard 6% superelevation rate for curves of this radius would require a grade break across the gore area of the ramp. See attachment C and D for a layout and superelevation diagram for the eastbound entrance ramp.

3. ADDED COST TO MAKE STANDARD

Providing the standard superelevation rate on the eastbound entrance ramp curves would cost approximately \$1 million.

4. TRAFFIC DATA

The SFOBB currently serves approximately 274,000 vehicles per day. The westbound approaches to the SFOBB frequently operate at capacity during peak commuter periods and are also heavily traveled during off-peak periods. The SFOBB generally operates just at capacity due to the metering of vehicles on the bridge by the San Francisco ramp system and metering lights at the SFOBB Toll Plaza. Traffic flow on the SFOBB is vulnerable to congestion due to stalls, accidents, lane closures required for bridge maintenance, and the lack of shoulders for clearing stopped vehicles.

The freeway ramps to and from the SFOBB from YBI typically operate with no more than 200 vehicles during the peak hour. Despite low traffic volumes, the ramps operate at capacity due to severely restricted design limitations (e.g., restricted merge lanes). All of the local streets on YBI currently operate with low volumes of traffic.

In the future, peak-hour traffic demand for the approaches to the SFOBB are expected to increase. These increases will be due to increased demand for travel between the East and West Bay Area. However, traffic volumes on the bridge itself are expected to remain fairly constant due to the metering lights in the westbound direction at the Oakland Toll Plaza and the geometric meter in the eastbound direction in San Francisco. The geometric meter is a result of the three through lanes on eastbound I-80 and the two entrance ramps from downtown San Francisco merging at the beginning of the bridge.

5. ACCIDENT ANALYSIS

Table 1 shows the most recent traffic accident rates for eastbound traffic on I-80 from YBI to Oakland. The accident rate for eastbound I-80 is higher than that experienced on similar facilities around the State. This may be attributed to several factors: the absence of shoulders on I-80, the mix of entrance ramps entering from the right and exit ramps exiting to the right, and high traffic volumes on I-80.

Table 1 Accident Data

Source: Caltrans District 4

Location	Period	Total Accidents	Fatalities	Injuries	Actual Accident Rate ¹	Average Accident Rate ²
I-80 Eastbound	01/01/95 to 12/31/97	549	2	160	1.46	1.03

¹ The Actual Accident Rate is the rate of accidents per million vehicles miles on the facility described

² The Average Accident Rate is the rate of accidents per million vehicles miles on similar facilities in the State.

A selective retrieval of accident data on eastbound I-80 in this area revealed a total of 61 accidents for the three-year period from January 1995 to December 1997. Of these accidents, 11.4% were at the ramp intersection.

The proposed project provides a standard entrance ramp while maintaining the existing exit ramp for the eastbound YBI ramps. The existing entrance ramp operates as an intersection where merging vehicles must wait for a gap in the mainline traffic. The proposed entrance ramp is expected to reduce the number of collisions associated with vehicles merging.

6. INCREMENTAL IMPROVEMENTS

The eastbound entrance from YBI will be constructed entirely on structure. There are no incremental improvements which could increase the superelevation rates on the ramp.

7. FUTURE CONSTRUCTION

The City of San Francisco is considering replacing the existing ramps that provide access to Yerba Buena and Treasure Islands as part of the redevelopment of these Islands. The conform of the proposed eastbound entrance ramp may be realigned at that time and standard superelevation provided. However, the merge configuration for the entrance ramp will remain as proposed and therefore cannot be made standard in the future.

8. PROJECT REVIEW AND CONCURRENCE

The proposed design exceptions were reviewed by John Roccanova, HQ Geometric Reviewer, on August 19, 1998 and he has concurred with the proposed design exceptions.

9. ATTACHMENTS

Attachment A - Location Map

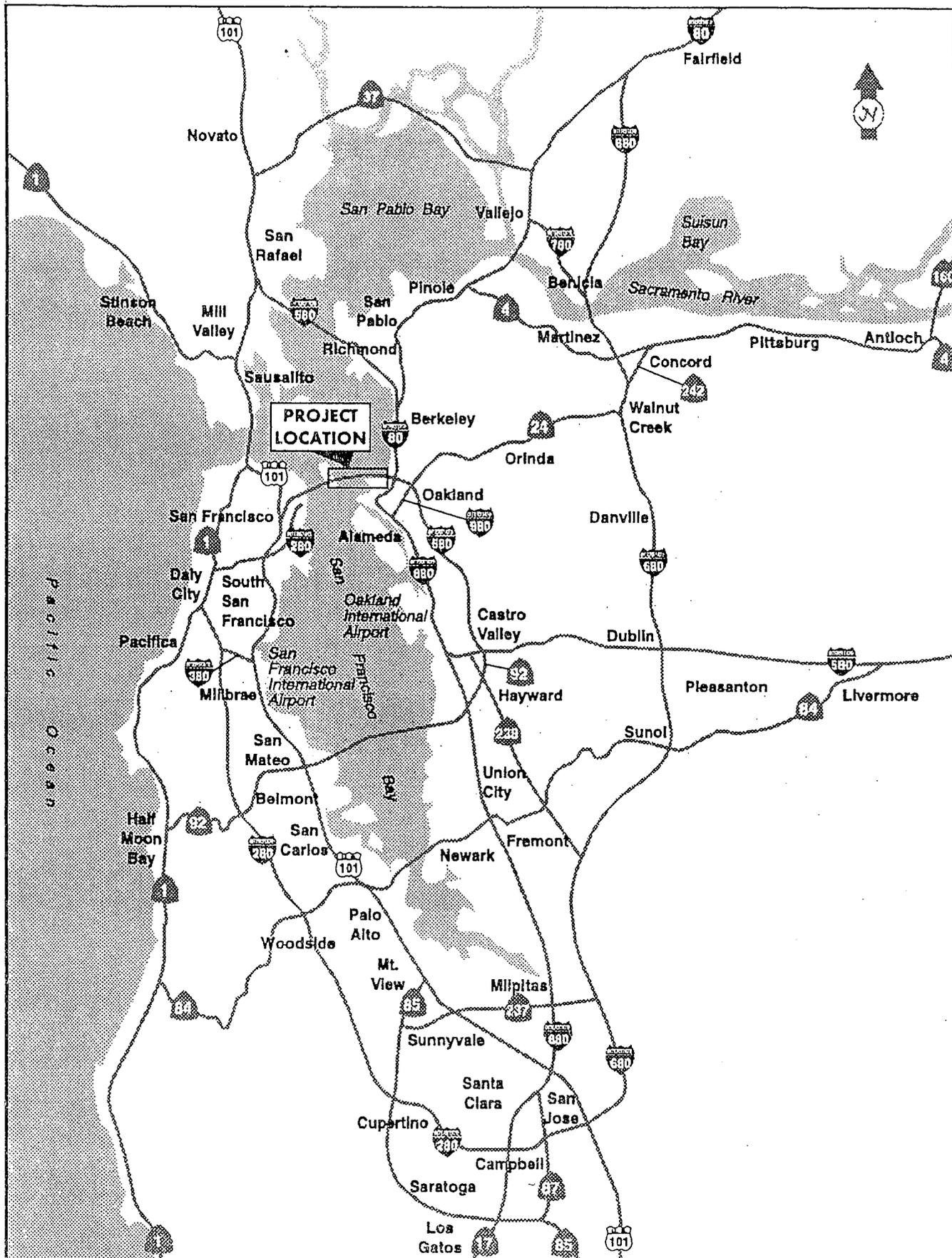
Attachment B - Project Area

Attachment C - Entrance Ramp Layout

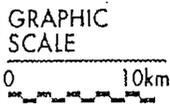
Attachment D - Entrance Ramp Superelevation Diagram

Attachment A

Location Map



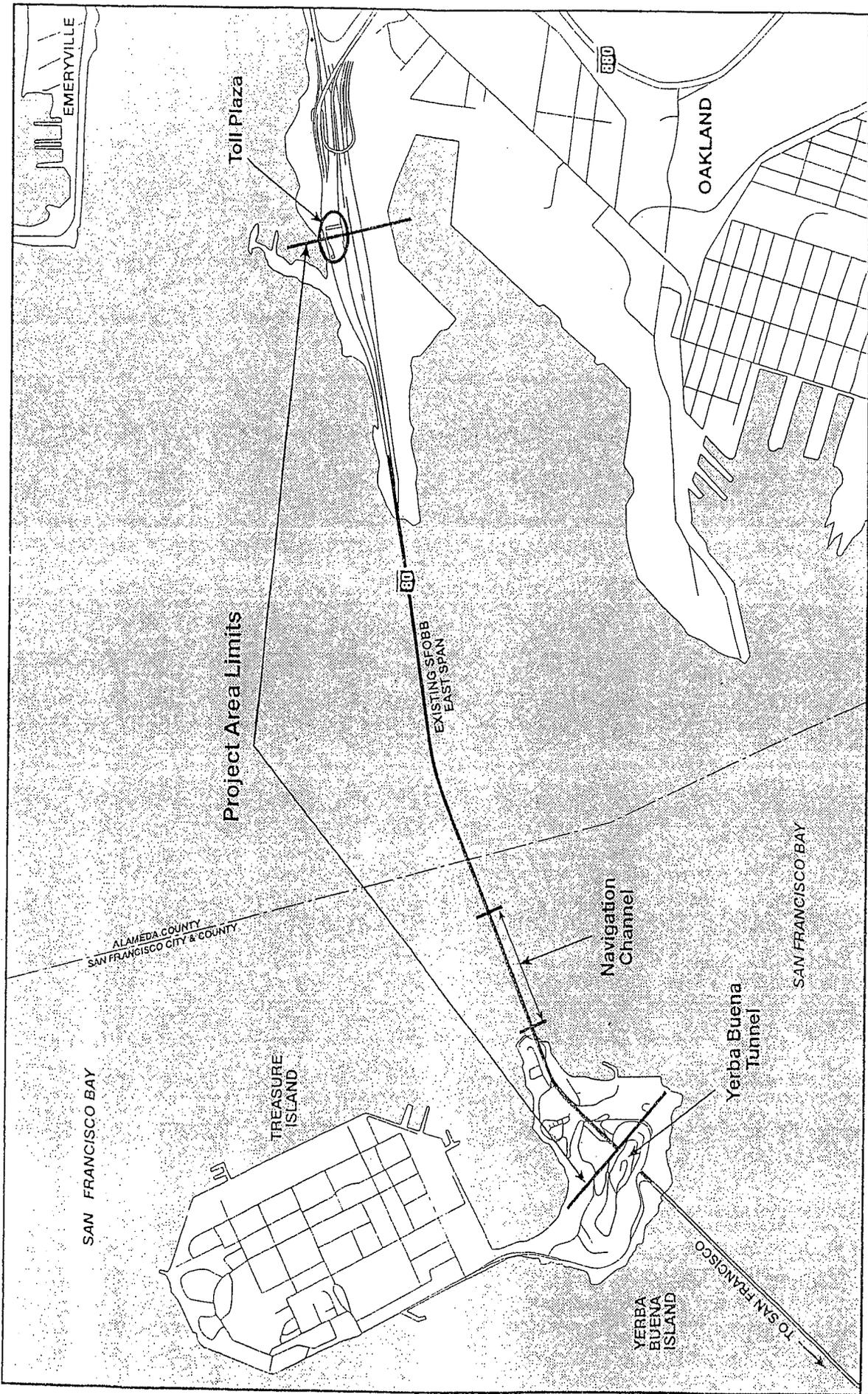
**SFOBB EAST SPAN
SEISMIC SAFETY PROJECT**



Project Location

Attachment B

Project Area



Project Area Limits

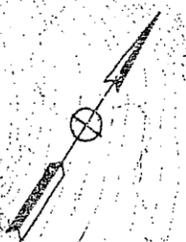
SFOBB EAST SPAN SEISMIC SAFETY PROJECT

GRAPHIC SCALE 1:27,500



Attachment C

Entrance Ramp Layout



MACALLA ROAD

U. S. NAVY

U. S. C. G.

Westbound I-80

Eastbound I-80

Bike Path

Eastbound Entrance Ramp

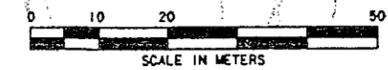
50+99.794 BC

51+65.260 EC

53+08.429 BC

53+84.039 PCC

54+00.000 EC



PRELIMINARY
SUBJECT TO REVISION



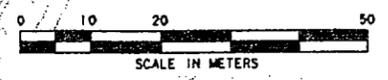
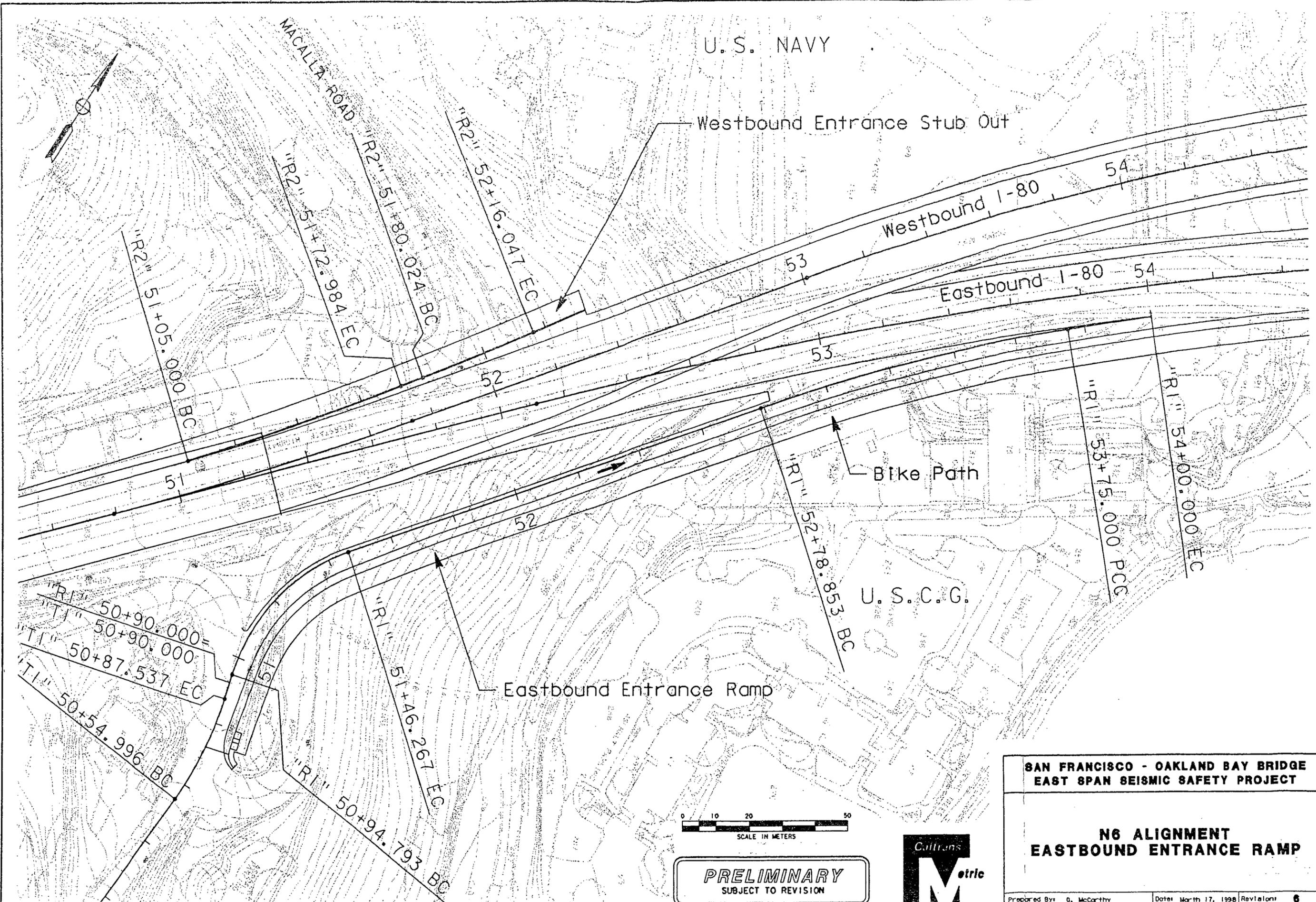
SAN FRANCISCO - OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

S4 ALIGNMENT
EASTBOUND ENTRANCE RAMP

Prepared By: G. McCarthy Date: March 17, 99 Revisions: 1

REV	CK	REVISIONS	DATE

REV	CK	DATE	REVISIONS



PRELIMINARY
SUBJECT TO REVISION

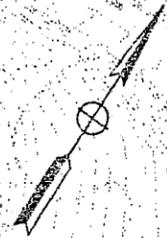


**SAN FRANCISCO - OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT**

**N6 ALIGNMENT
EASTBOUND ENTRANCE RAMP**

Prepared By: G. McCarthy Date: March 17, 1998 Revisions: 6

DATE PLOTTED -> \$DATE



MACALLA ROAD

U. S. NAVY

Westbound I-80

Eastbound I-80

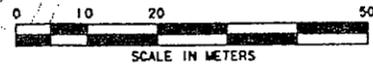
Bike Path

Eastbound Entrance Ramp

U. S. C. G.

REV	CK	REVISIONS	DATE

REV	CK	REVISIONS	DATE



PRELIMINARY
SUBJECT TO REVISION

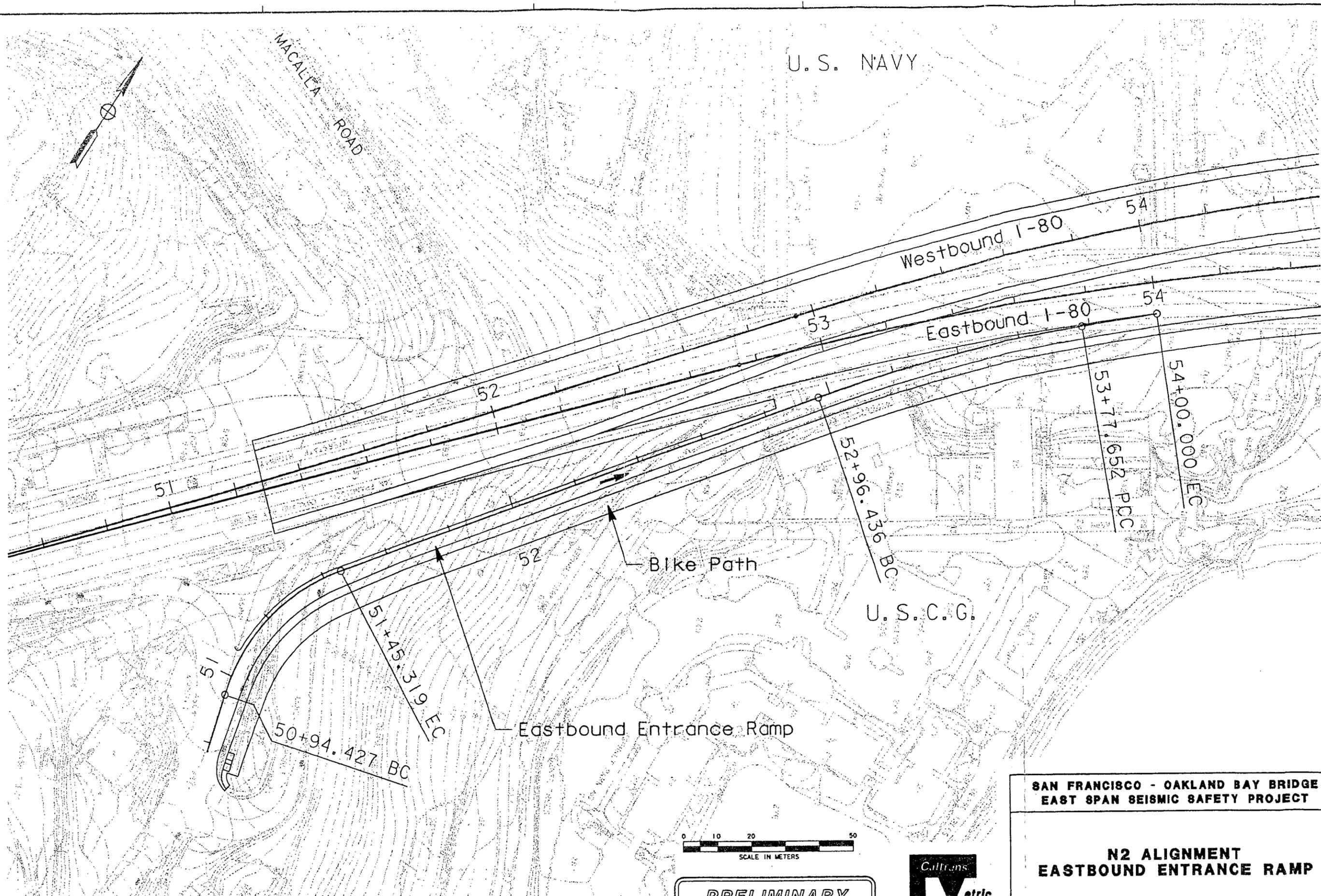


**SAN FRANCISCO - OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT**

**N2 ALIGNMENT
EASTBOUND ENTRANCE RAMP**

Prepared By: G. McCarthy	Date: March 17, 99	Revision: 1
Checked By: X	Date: X	Draw No. N2E03

DATE PLOTTED -> 8DATE



Attachment D

Entrance Ramp Superelevation Diagram

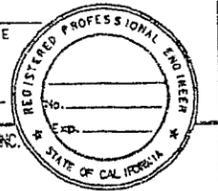
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SF, A 10	80	12.2 / 14.3 0.0 / 2.1	30	43



REGISTERED CIVIL ENGINEER DATE _____

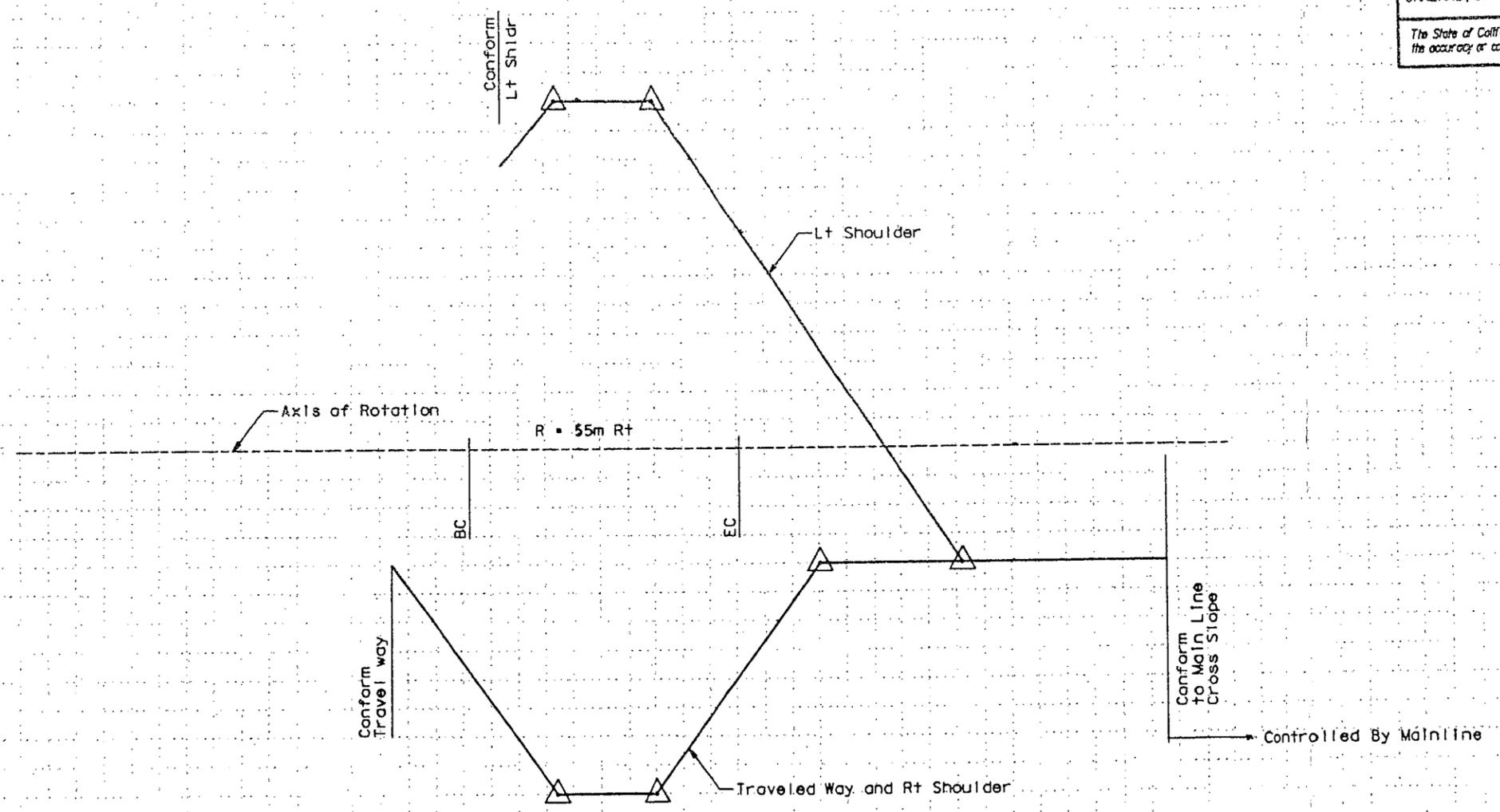
PLANS APPROVAL DATE _____

PARSONS BRINCKERHOFF QUAD & DOUGLAS, INC.
1000 BROADWAY, SUITE 250
OAKLAND, CA 94607-4040



The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	DESIGN OVERSIGHT XXXXXXXXXXXX	CALCULATED/ DESIGNED BY	REVISOR BY
		CHECKED BY	DATE REVISOR
		DATE XXXX	DATE XXXX
		0%	6%
		1%	5%
		2%	4%
		3%	3%
		4%	2%
		5%	1%
		6%	0%
		-1%	
		-2%	
		-3%	
		-4%	
		-5%	
		-6%	



**TYPICAL EASTBOUND ENTRANCE RAMP
SUPERELEVATION DIAGRAM**

SCALE: 1:1000 HORIZ

SUPERELEVATION DIAGRAM

ALL DIMENSIONS ARE IN METER UNLESS OTHERWISE SHOWN

SCALE AS SHOWN

SE-X

Station	
Sta.	
Exc.	
Emb.	

LAST REVISION