



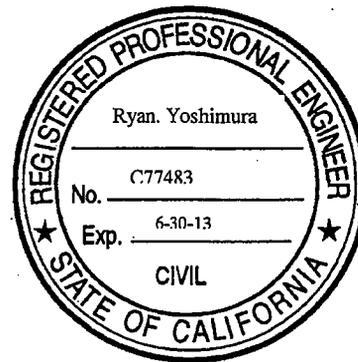
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**San Francisco Bay Bridge - Seismic Safety Project
 Fact Sheet Exceptions to Advisory Design Standards**

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1. PROPOSED PROJECT

A. Project Description

The San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project (East Span Project) will replace the existing East Span with a seismically upgraded crossing between Yerba Buena Island (YBI) and the City of Oakland. Construction of the East Span Project is being performed under multiple contracts (21 in total), some of which have been completed while others are ongoing or under development.

As part of the new East Span, the mainline Yerba Buena Island Transition Structures (YBITS) will connect the new Self-Anchored Suspension (SAS) Span and the YBI Tunnel. To allow for the construction of the YBITS, the dismantling of the existing bridge on YBI will be necessary. Traffic will use the temporary South-South Detour (SSD) that redirects all lanes of I-80 from the existing bridge. The YBITS will be built under two contracts – YBITS Contract 1 and Contract 2. The YBITS Contract 1 will build the mainline structures and complete other work that will enable traffic to be transitioned from the existing East Span to the new East Span. The YBITS Contract 2 will demolish the SSD, dismantle the cantilever truss, realign Southgate Road and the eastbound (EB) off-ramp east of the tunnel, build the permanent eastbound on-ramp and bike path, and complete Yerba Buena Island restoration activities (some in association with the United States Coast Guard).

This Fact Sheet documents the YBITS Contract 2 design features that require an exception from advisory design standards. Please see Attachment A for the YBI #2 Contract Project Location Map (Figure A-1) and Project Vicinity Map (Figure A-2).

B. Existing Highway

I-80 currently has 5 lanes of traffic in the eastbound (EB) and westbound (WB) directions at the SFOBB. The SFOBB currently serves approximately 260,000 vehicles per day, and 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 existing double-decked bridge spans across two separate sections (the East Span and the West Span), and both the eastbound (EB) and westbound (WB) levels are striped with five 3.4-m lanes without left or right shoulders. Toll is collected from WB traffic at the east approach of the bridge in the City of Oakland.

C. Safety Improvements

The new East Span will consist of two side-by-side bridge structures separated by 15 m (49 ft). Each bridge structure will include five travel lanes, each 3.6 meters (12 feet) wide, and 3.0 m (10 ft) wide left and right shoulders. The bridge structures will also include standard cross slope and superelevation compliant with the Highway Design Manual (HDM), Fifth Edition. In addition, a 5.80 m (19 ft) pedestrian/bicycle path will be located in most locations 0.3 m (one ft) above the roadway along the south side of the eastbound bridge deck. The eastbound (EB) and westbound (WB) YBI transition structures will have similar features. Also, a new eastbound on-ramp will be constructed to provide standard freeway entrance from YBI to the City of Oakland and beyond.

D. Total Project Cost

Total cost for the project is estimated at approximately \$139,000,000. Roadway items are estimated at \$54,000,000, and structures items are estimated at \$85,000,000.

2. FEATURES REQUIRING AN EXCEPTION

Table II is a summary of nonstandard features that are exceptions from advisory design standards:

Table II Summary of Advisory Design Exceptions

Feature No.	HDM Index	Feature	Standard	Proposed Exception	Location/Ref. Dwg
A1	201.7, Table 201.7, 504.2(4) (a)	Decision Sight Distance	Min Decision Sight Distance = 230 m (Design Speed = 80 km/h)	Decision Sight Distance = 39.28 m.	EB Off-Ramp, R4 Line/Figure B-2
A2	202.5(2)	Superelevation Transition, Runoff	Two-thirds L on tangent/One-third L within curve	Two-third/One-third distribution not achieved	EB Off-Ramp, R4 Line, Horizontal Curve (BC 50+94.310/EC 51+35.780)/Figure B-3
A3	202.5(3)	Superelevation Transition, Restrictive Situations	Min Rate of Change of Cross Slope = 4% per 20 m	(a) Rate of Change = 4.7% per 11.7 m (b) Rate of Change = 4.7% per 11.7 m	(a) Southgate Road, SG Line Sta 11+52.654 to Sta 11+64.359/Figure B-4 (b) SG1 Line Sta 20+57.829 to Sta 20+69.554/Figure B-5
A4	204.3	Standards for Grade	Max Grade = 8%	Grade = 10%	WB Off-Ramp, WW Line/Figure B-6
A5	204.4	Vertical Curves	Min. Vertical Curve Length = 60 m	(a) Vertical Curve Length = 30 m (b) Vertical Curve Length = 20 m (c) Vertical Curve Length = 20 m (d) Vertical Curve Length = 30 m (e) Vertical Curve Length = 40 m	(a) EB Off-Ramp, R4 Line, BC Sta 50+95/EC Sta 51+25)/Figure B-3 (b) EB Off-Ramp, R4 Line, BC Sta 51+25/EC Sta 51+45)/Figure B-3 (c) WB Off-Ramp, WW Line, BC Sta 80+08/EC Sta 80+28)/Figure B-6 (d) WB Off-Ramp, WW Line, BC Sta 80+28/EC Sta 80+58)/Figure B-6 (e) WB Off-Ramp, WW Line, BC Sta 80+60/EC Sta 81+00)/Figure B-6
A6	404.3(1) (a)	Design Vehicles and Related Definitions	STAA Design Vehicle	STAA Design Vehicle will offtrack outside the lane	Southgate Road, SG Line Sta 10+00.000 to 10+45.713/Figure B-2

Feature No.	HDM Index	Feature	Standard	Proposed Exception	Location/Ref. Dwg
A7	504.2(2), Figure 504.2B	Freeway Entrances and Exits, Standard Designs	(a) – (b) Min Length Between Exit Nose and End of Ramp = 160 m (c) Divergence Angle = 4°52'45"	(a) Length Between Exit Nose and End of Ramp = 36.61 m (b) Length Between Exit Nose and End of Ramp = 100 m (c) Curved Departure, R = 16 m	(a) EB Off-Ramp, R4 Line/Figure B-2 (b) WB Off-Ramp, WW Line/Figure B-1 (c) WB Off-Ramp, WW Line/Figure B-1
A8	504.2(5) (a)	Freeway Entrances and Exits, Grades, Freeway Exits, Stopping Sight Distance	Min Stopping Sight Distance = 130 m (Design Speed = 80 kph)	Stopping Sight Distance = 38.82 m	EB Off-Ramp, R4 Line/Figure B-3
A9	504.2(5) (a)	Freeway Entrances and Exits, Grades, Freeway Exits, Sag Vertical Curve Length	Min Sag Vertical Curve Length = 30 m	(a) Sag Vertical Curve Length = 20 m (b) Sag Vertical Curve Length = 20 m	(a) EB Off-Ramp, R4 Line, BC Sta 51+25/EC Sta 51+45/Figure B-3 (b) WB Off-Ramp, WW Line, BC Sta 80+08/EC Sta 80+28/Figure B-6
A10	504.3(1) (a)	Ramps, General, Design Speed	Min Design Speed = 40 km/h	Design Speed = 30 km/h	(a) EB Off-Ramp, R4 Line/Figure B-2 (b) WB Off-Ramp, WW Line/Figure B-1
A11	504.3(3)	Ramps, Location and Design of Ramp Intersections on the Crossroads, Grade	Min Grade of Connecting Roadway = 4%	Grade of Hillcrest Road = 10%	WB Off-Ramp (WW Line) Intersection with Hillcrest Road (H Line)/Figure B-7
A12	504.3(3) (405.1)	Ramps, Location and Design of Ramp Intersections on the Crossroads, Corner Sight Distance	Min Corner Sight Distance = 90 m (Design Speed = 40 km/h)	Corner Sight Distance = 50 m.	WB Off-Ramp (WW Line) Intersection with Hillcrest Road (H Line)/Figure B-1

A. Design Exception Feature #A1

Nonstandard Feature

This project proposes nonstandard decision sight distance at the following location:

EB Off-Ramp, R4 Line. The proposed decision sight distance is 39.28 m. See Attachment B, Figure B-2.

Standard for Which Exception is Requested

Highway Design Manual Index 201.7 states the following:

On freeways and expressways the decision sight distance values in Table 201.7 should be used at lane drops and at off-ramp noses to interchanges, branch connections, roadside rests, vista points, and inspection stations. Per Table 201.7, the decision sight distance for this ramp is 230 m.

Reason for Requesting Exception

The nonstandard decision sight distance is a result of geographical constraints. The off-ramp ties into local Hillcrest and Southgate Roads, and the terminus of the off-ramp is directly adjacent to the entrance of the EB on-ramp. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA), and increasing the decision sight distance would significantly affect the amount of ESA that is impacted. There are two historic United States Coast Guard (USCG) buildings (Quarters 8 & 9) within the project limits that would have to be removed to fix this nonstandard feature. The area south of the SFOBB is also owned by the USCG, and increasing the decision sight distance would further encroach into the USCG right-of-way, as this would require the ramp to be lengthened approximately 190 m and realignment of the EB on-ramp and both Hillcrest and Southgate Roads to match the longer ramp length. This results in additional right-of-way acquisition and security concerns for the USCG. Advanced warning signs will be placed to warn drivers about the sharp turn and reduced speed on the ramp. The proposed decision sight distance is an improvement over the existing condition by 2.61 m.

Added Cost to Make Standard

A preliminary cost estimate to obtain standard decision sight distance is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard features #A2, #A5A, #A5B, #A7A, #A8A, #A9A & #A10A would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 5.0 million	\$ 5.0 million	\$ 2.0 million	\$ 12.0 million

B. Design Exception Feature #A2

Nonstandard Feature

This project proposes a nonstandard superelevation transition at the following location:

EB Off-Ramp, R4 Line, Horizontal Curve (BC 50+94.310/EC 51+35.780). See Attachment B, Figure B-3.

Standard for Which Exception is Requested

Highway Design Manual Index 202.5(2) states the following:

Two-thirds of the superelevation runoff should be on the tangent and one-third within the curve.

Reason for Requesting Exception

The nonstandard superelevation transition is a result of geographical constraints. The off-ramp ties into local Hillcrest and Southgate Roads, and the terminus of the off-ramp is directly adjacent to the entrance of the EB on-ramp. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA), and providing a standard transition would significantly affect the amount of ESA that is impacted. There are two historic United States Coast Guard (USCG) buildings (Quarters 8 & 9) within the project limits that would have to be removed to fix this nonstandard feature. The area south of the SFOBB is also owned by the USCG, and providing a standard transition would further encroach into the USCG right-of-way, as this would require the ramp to be lengthened approximately 44 m and realignment of the EB on-ramp and both Hillcrest and Southgate Roads to match the longer ramp length. This results in additional right-of-way acquisition and security concerns for the USCG. It should also be noted that the proposed transition does not exceed the minimum rate of change of cross slope of 4% per 20 m.

Added Cost to Make Standard

A preliminary cost estimate to obtain standard superelevation transitions is presented below.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 3.0 million	\$ 1.5 million	\$ 1.5 million	\$ 6.0 million

C. Design Exception Feature #A3

Nonstandard Feature

This project proposes nonstandard superelevation transitions at the following locations:

- (a) Southgate Road, SG Line Sta 11+52.654 to Sta 11+64.359. The proposed superelevation runoff length is 11.71 m for a superelevation rate change of 4.68%. See Attachment B, Figure B-4.
- (b) Southgate Road, SG1 Line Sta 20+57.829 to Sta 20+69.554. The proposed superelevation runoff length is 11.73 m for a superelevation rate change of 4.69%. See Attachment B, Figure B-5.

Standard for Which Exception is Requested

Highway Design Manual Index 202.5(3) states the following regarding restrictive situations:

In such situations the highest possible superelevation rate(s) and transition length should be used, but the rate of change of cross slope should not exceed 4% per 20 m.

Reason for Requesting Exception

Southgate Road ties into Macalla Road, which has a profile grade of approximately 12% at the intersection location. The crosswalk across Southgate Road about 5 m before this tie-in location prevents the use of a standard superelevation transition, as the maximum grade/cross-slope for

the crosswalk is 5% per ADA standards. The space between the crosswalk and Macalla Road conform dictate the superelevation runoff length.

Added Cost to Make Standard

As explained above, nonstandard superelevation transitions are being used to satisfy ADA standards on the crosswalk.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 0 million	\$ 0 million	\$ 0 million	\$ 0 million

D. Design Exception Feature #A4

Nonstandard Feature

This project proposes a nonstandard profile grade at the following location:

WB Off-Ramp, WW Line. A portion of the off-ramp has a proposed grade of 10%. See Attachment B, Figure B-6.

Standard for Which Exception is Requested

Highway Design Manual Index 204.3 states the following:

Ramp grades should not exceed 8%.

Reason for Requesting Exception

The garage for Quarters 8 (historic residence) was removed for Bay Bridge seismic retrofit work and needs to be replaced. The garage had access off of the EB off-ramp, but access to the new parking area was changed to the WB off-ramp because this ramp will be superceded by a subsequent project (EA 04-43A641), which will construct a new WB off-ramp on the north side of the freeway. This project is programmed and currently scheduled to begin construction in May 2014. The WB off-ramp built in this project will be used solely as a driveway after the new WB off-ramp is constructed. For this reason, the alignment of the ramp was modified to provide access in both directions along Hillcrest Road, and the nonstandard profile grade is a result of geographical constraints. The WB off-ramp is constrained by the existing viaduct structure on one side and Hillcrest Road on the other, which is surrounded by the steep "goat hill" slope and USCG buildings (historic Qtrs 8 & 9). Hillcrest Road also ties into the EB on and off-ramps and Southgate Road. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA) and USCG property. Lengthening the WB off-ramp would impact a larger portion of the ESA & historical properties, and result in additional right-of-way acquisition and security concerns for the USCG.

Added Cost to Make Standard

A preliminary cost estimate to obtain a standard profile grade is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard features #A5C, #A5D, #A5E, #A7B, #A9B would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 3.0 million	\$ 2.0 million	\$ 2.0 million	\$ 7.0 million

E. Design Exception Feature #A5

Nonstandard Feature

This project proposes nonstandard vertical curve lengths at the following locations:

- (a) EB Off-Ramp, R4 Line, BC Sta 50+95/EC Sta 51+25. The proposed vertical curve length is 30 m. See Attachment B, Figure B-3.
- (b) EB Off-Ramp, R4 Line, BC Sta 51+25/EC Sta 51+45. The proposed vertical curve length is 20 m. See Attachment B, Figure B-3.
- (c) WB Off-Ramp, WW Line, BC Sta 80+08/EC Sta 80+28. The proposed vertical curve length is 20 m. See Attachment B, Figure B-6.
- (d) WB Off-Ramp, WW Line, BC Sta 80+28/EC Sta 80+58. The proposed vertical curve length is 30 m. See Attachment B, Figure B-6.
- (e) WB Off-Ramp, WW Line, BC Sta 80+60/EC Sta 81+100. The proposed vertical curve length is 40 m. See Attachment B, Figure B-6.

Standard for Which Exception is Requested

Highway Design Manual Index 204.4 states the following:

For algebraic grade differences of less than 2%, or design speeds less than 60 km/h, the vertical curve length should be a minimum of 60 m.

Reason for Requesting Exception

(a) – (b) The nonstandard vertical curve lengths are a result of geographical constraints. The off-ramp ties into local Hillcrest and Southgate Roads, and the terminus of the off-ramp is directly adjacent to the entrance of the EB on-ramp. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA), and increasing the vertical curve lengths would significantly affect the amount of ESA that is impacted. There are two historic United States Coast Guard (USCG) buildings (Quarters 8 & 9) within the project limits that would have to be removed to fix this nonstandard feature. The area south of the SFOBB is also owned by the USCG, and increasing the vertical curve lengths would further encroach into the USCG right-of-way, as this would require the ramp to be lengthened approximately 70 m and realignment of the EB on-ramp and both Hillcrest and Southgate Roads to match the longer off-ramp length. This results in additional right-of-way acquisition and security concerns for the USCG. The vehicle speeds through these vertical curves are not expected to be high. The curve on the ramp will be posted for 25 km/h (15 mph), and the ramp ties into Hillcrest Road which is posted for 40 km/h (25 mph).

(c) – (e) The garage for Quarters 8 (historic residence) was removed for Bay Bridge seismic retrofit work and needs to be replaced. The garage had access off of the EB off-ramp, but access to the new parking area was changed to the WB off-ramp because this ramp will be

superceded by a subsequent project (EA 04-43A641), which will construct a new WB off-ramp on the north side of the freeway. This project is programmed and currently scheduled to begin construction in May 2014. The WB off-ramp built in this project will be used solely as a driveway after the new WB off-ramp is constructed. For this reason, the alignment of the ramp was modified to provide access in both directions along Hillcrest Road, and the nonstandard vertical curve lengths are a result of geographical constraints. The WB off-ramp is constrained by the existing viaduct structure on one side and Hillcrest Road on the other, which is surrounded by the steep "goat hill" slope and USCG buildings (historic Qtrs 8 & 9). Hillcrest Road also ties into the EB on and off-ramps and Southgate Road. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA) and USCG property. Lengthening the WB off-ramp a minimum of 90 m would impact a larger portion of the ESA & historical properties, and result in additional right-of-way acquisition and security concerns for the USCG.. The vehicle speeds through these vertical curves are not expected to be high as they are all near stop signs on the alignment.

Added Cost to Make Standard

(a) – (b) A preliminary cost estimate to obtain standard vertical curve lengths is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard feature #A9A would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 4.0 million	\$ 2.0 million	\$ 2.0 million	\$ 8.0 million

(c) – (e) A preliminary cost estimate to obtain standard vertical curve lengths is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard feature #A9B would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 4.0 million	\$ 2.0 million	\$ 2.0 million	\$ 8.0 million

F. Design Exception Feature #A6

Nonstandard Feature

This project proposes a nonstandard truck turning lane at the following location:

Southgate Road, SG Line Sta 10+00.000 to 10+45.713. A STAA Design Vehicle cannot turn out of Southgate Road without offtracking. See Attachment B, Figure B-2.

Standard for Which Exception is Requested

Highway Design Manual Index 404.3(1)(b) states the following:

The STAA Design Vehicle in Figures 404.5A and B should be used in the design of all projects on the National Network and on Terminal Access routes.

Reason for Requesting Exception

The USCG requires access to their base for semi-trucks carrying buoys. The standard semi-truck trailer length is 16.15 m, which is slightly longer than the STAA design vehicle. These trucks arrive as often as once every 3 days. These trucks will need to use both lanes on Southgate Road to make the right turn on to Hillcrest Road.

The nonstandard condition is a result of geographical constraints. Southgate Road is surrounded by the steep "goat hill" slope, USCG buildings (historic Qtrs 8 & 9), I-80 EB on and off-ramps, bike/pedestrian path, and local Hillcrest Road. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA) and USCG property. Realignment Southgate Road would impact a larger portion of the ESA & historical properties, increase right-of-way costs, and result in additional security concerns for the USCG. It should also be noted that buses will not offtrack on the proposed layout, which is an improvement over the existing condition.

Added Cost to Make Standard

A preliminary cost estimate to obtain standard truck turning lanes is presented below.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 2.0 million	\$ 1.5 million	\$ 2.0 million	\$ 5.5 million

G. Design Exception Feature #A7

Nonstandard Feature

This project proposes a nonstandard single lane freeway exit at the following location:

- (a) EB Off-Ramp, R4 Line. The proposed length between exit nose and end of ramp is 36.61 m. See Attachment B, Figure B-2.
- (b) WB Off-Ramp, WW Line. The proposed length between exit nose and end of ramp is 100 m. See Attachment B, Figure B-1.
- (c) WB Off-Ramp, WW Line. The proposed off-ramp has a curved departure with no divergence angle. See Attachment B, Figure B-1.

Standard for Which Exception is Requested

Highway Design Manual Index 504.2(2) states the following:

Design of freeway entrances and exits should conform to the standard designs illustrated in Figure 504.2A-B (single lane), and Figure 504.3L (two-lane entrances and exits) and/or Figure 504.4 (diverging branch connections), as appropriate. (a) – (b) Per Figure 504.2B, the minimum length between exit nose and end of ramp is 160 m for full stop at end of ramp. (c) Per Figure 504.2B, the divergence angle for a single lane freeway exit is 4°52'45".

Reason for Requesting Exception

- (a) The nonstandard freeway exit is a result of geographical constraints. The off-ramp ties into local Hillcrest and Southgate Roads, and the terminus of the off-ramp is directly adjacent to the entrance of the EB on-ramp. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA), and increasing the length between the exit nose and end of the ramp would significantly affect the amount of ESA that is impacted. There are two historic United States Coast Guard (USCG) buildings (Quarters 8 & 9) within the project limits that would have to be removed to fix this nonstandard feature. The area south of the SFOBB is also owned by the USCG, and increasing the length between the exit nose and end of the ramp would further encroach into the USCG right-of-way, as this would require the ramp to be lengthened approximately 124 m and realignment of the EB on-ramp and both Hillcrest and Southgate Roads to match the longer off-ramp length. This results in additional right-of-way acquisition and security concerns for the USCG.
- (b) The garage for Quarters 8 (historic residence) was removed for Bay Bridge seismic retrofit work and needs to be replaced. The garage had access off of the EB off-ramp, but access to the new parking area was changed to the WB off-ramp because this ramp will be superceded by a subsequent project (EA 04-43A641), which will construct a new WB off-ramp on the north side of the freeway. This project is programmed and currently scheduled to begin construction in May 2014. The WB off-ramp built in this project will be used solely as a driveway after the new WB off-ramp is constructed. For this reason, the alignment of the ramp was modified to provide access in both directions along Hillcrest Road, and the nonstandard freeway exit is a result of geographical constraints. The WB off-ramp is constrained by the existing viaduct structure on one side and Hillcrest Road on the other, which is surrounded by the steep "goat hill" slope and USCG buildings (historic Qtrs 8 & 9). Hillcrest Road also ties into the EB on and off-ramps and Southgate Road. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA) and USCG property. Lengthening the WB off-ramp a minimum of 60 m would impact a larger portion of the ESA & historical properties, increase right-of-way costs, and result in additional security concerns for the USCG.
- (c) The nonstandard freeway exit is an existing condition and a result of geographical constraints. The WB off-ramp is constrained by the existing viaduct structure on one side and Hillcrest Road on the other, and is surrounded by the steep "goat hill" slope and USCG buildings (historic Qtrs 8 & 9). Hillcrest Road also ties into the EB on and off-ramps and Southgate Road. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA) and USCG properties. Providing a standard freeway exit would impact a larger portion of the ESA & historical properties, increase right-of-way costs, and result in additional security concerns for the USCG. This ramp will be superceded by a subsequent project (EA 04-43A641), and will be used as a driveway to the Quarters 8 parking area after the new WB off-ramp is constructed. This project is programmed and currently scheduled to begin construction in May 2014.

Added Cost to Make Standard

- (a) A preliminary cost estimate to obtain a standard freeway exit is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard feature #A5A, #A5B, and #A9A would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 6.0 million	\$ 2.5 million	\$ 4.0 million	\$ 12.5 million

- (b) A preliminary cost estimate to obtain a standard freeway exit is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard feature #A5C, #A5D, and #A9B would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 4.0 million	\$ 2.0 million	\$ 2.0 million	\$ 8.0 million

- (c) A preliminary cost estimate to obtain a standard freeway exit is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard feature #A4, #A5C, #A5D, #A5E, #A9B, and #A10B would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 5.0 million	\$ 6.0 million	\$ 3.0 million	\$ 14.0 million

H. Design Exception Feature #A8

Nonstandard Feature

This project proposes a nonstandard freeway exit at the following location:

EB Off-Ramp, R4 Line. The proposed stopping sight distance at the vertical curve just beyond the exit nose is 38.82 m. See Attachment B, Figure B-3.

Standard for Which Exception is Requested

Highway Design Manual Index 504.2(5)(a) states the following:

Vertical curves located just beyond the exit nose should be designed with a minimum 80 km/h stopping sight distance. Per Table 201.1, the minimum stopping sight distance for a design speed of 80 km/h is 130 m.

Reason for Requesting Exception

The nonstandard stopping sight distance is a result of geographical constraints. The off-ramp ties into local Hillcrest and Southgate Roads, and the terminus of the off-ramp is directly adjacent to the entrance of the EB on-ramp. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA), and increasing the stopping sight distance would significantly affect the amount of ESA that is impacted. There are two historic United States Coast Guard (USCG) buildings (Quarters 8 & 9) within the project limits that would have to be removed to fix this nonstandard feature. The area south of the SFOBB is also owned by the USCG, and increasing the stopping sight distance would further encroach into the USCG right-of-way, as this would require the ramp to be lengthened approximately 90 m and realignment of the EB on-ramp and both Hillcrest and Southgate Roads to match the longer off-ramp length. This results in additional right-of-way acquisition and security concerns for the USCG.

Added Cost to Make Standard

A preliminary cost estimate to obtain standard stopping sight distance is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard feature #A2, #A5A, #A5B, and #A9A would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 4.0 million	\$ 2.0 million	\$ 2.0 million	\$ 8.0 million

I. Design Exception Feature #A9

Nonstandard Feature

This project proposes a nonstandard freeway exit at the following location:

- (a) EB Off-Ramp, R4 Line, BC Sta 51+25/EC Sta 51+45. The proposed sag vertical curve length is 20 m. See Attachment B, Figure B-3.
- (b) WB Off-Ramp, WW Line, BC Sta 80+08/EC Sta 80+28. The proposed sag vertical curve length is 20 m. See Attachment B, Figure B-6.

Standard for Which Exception is Requested

Highway Design Manual Index 504.2(5)(a) states the following:

On descending off-ramps, the sag vertical curve at the ramp terminal should be a minimum of 30 m in length.

Reason for Requesting Exception

- (a) The nonstandard vertical curve length is a result of geographical constraints. The off-ramp ties into local Hillcrest and Southgate Roads, and the terminus of the off-ramp is directly adjacent to the entrance of the EB on-ramp. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA), and increasing the vertical curve length would significantly affect the amount of ESA that is impacted. There are two historic United States Coast Guard (USCG) buildings (Quarters 8 & 9) within the project limits that would have to be removed to fix this nonstandard feature. The area south of the SFOBB is also owned by the USCG, and increasing the vertical curve length would further encroach into the USCG right-of-way, as this would require the realignment of the EB on-ramp and both Hillcrest and Southgate Roads to match the longer off-ramp length. This results in additional right-of-way acquisition and security concerns for the USCG. The vehicle speeds through the vertical curve is not expected to be high. The ramp ties into Hillcrest Road which is posted for 40 km/h (25 mph).
- (b) The garage for Quarters 8 (historic residence) was removed for Bay Bridge seismic retrofit work and needs to be replaced. The garage had access off of the EB off-ramp, but access to the new parking area was changed to the WB off-ramp because this ramp will be superceded by a subsequent project (EA 04-43A641), which will construct a new WB off-ramp on the north side of the freeway. This project is programmed and currently scheduled to begin construction in May 2014. The WB off-ramp built in this project will be used solely as a driveway after the new WB off-ramp is constructed. For this reason, the alignment of

the ramp was modified to provide access in both directions along Hillcrest Road, and the nonstandard vertical curve length is a result of geographical constraints. The WB off-ramp is constrained by the existing viaduct structure on one side and Hillcrest Road on the other, which is surrounded by the steep "goat hill" slope and USCG buildings (historic Qtrs 8 & 9). Hillcrest Road also ties into the EB on and off-ramps and Southgate Road. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA) and USCG property. Lengthening the WB off-ramp would impact a larger portion of the ESA & historical properties, increase right-of-way costs, and result in additional security concerns for the USCG. The vehicle speeds through the vertical curve is not expected to be high as it is located at the end of the alignment, which is at a stop sign.

Added Cost to Make Standard

- (a) A preliminary cost estimate to obtain standard sag vertical curve lengths is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard feature #A5B would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 2.0 million	\$ 1.0 million	\$ 2.0 million	\$ 5.0 million

- (b) A preliminary cost estimate to obtain standard sag vertical curve lengths is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard feature #A5C would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 2.0 million	\$ 1.0 million	\$ 2.0 million	\$ 5.0 million

J. Design Exception Feature #A10

Nonstandard Feature

This project proposes a nonstandard ramp at the following location:

- (a) EB Off-Ramp, R4 Line. The proposed minimum design speed along the ramp is 30 km/h. See Attachment B, Figure B-2.
- (b) WB Off-Ramp, WW Line. The proposed minimum design speed along the ramp is 30 km/h. See Attachment B, Figure B-1.

Standard for Which Exception is Requested

Highway Design Manual Index 504.3(1)(a) states the following:

When ramps terminate at an intersection at which all traffic is expected to make a turning movement, the minimum design speed along the ramp should be 40 km/h. When a "through" movement is provided at the ramp terminus, the minimum ramp design speed should meet or exceed the design speed of the highway facility for which the through movement is provided.

Reason for Requesting Exception

- (a) The nonstandard design speed is a result of geographical constraints. The EB off-ramp ties into local Hillcrest and Southgate Roads, and the terminus of the off-ramp is directly adjacent to the entrance of the EB on-ramp. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA), and increasing the design speed would significantly affect the amount of ESA that is impacted. There are two historic United States Coast Guard (USCG) buildings (Quarters 8 & 9) within the project limits that would have to be removed to fix this nonstandard feature. The area south of the SFOBB is also owned by the USCG, and increasing the design speed would further encroach into the USCG right-of-way, as this would require the realignment of the EB on-ramp and both Hillcrest and Southgate Roads to match the longer off-ramp length. This results in additional right-of-way acquisition and security concerns for the USCG.
- (b) The nonstandard design speed is an existing condition and a result of geographical constraints. The WB off-ramp is constrained by the existing viaduct structure on one side and Hillcrest Road on the other, and is surrounded by the steep "goat hill" slope and USCG buildings (historic Qtrs 8 & 9). Hillcrest Road also ties into the EB on and off-ramps and Southgate Road. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA) and USCG properties. Increasing the design speed would impact a larger portion of the ESA & historical properties, increase right-of-way costs, and result in additional security concerns for the USCG, as larger radius curves and much longer ramps for sight distance would be required. This ramp will be superceded by a subsequent project (EA 04-43A641), and will no longer be used as a ramp facility after the new WB off-ramp is constructed. This project is programmed and currently scheduled to begin construction in May 2014.

Added Cost to Make Standard

- (a) A preliminary cost estimate to obtain standard design speed is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard feature #A5A, #A5B, and #A9A would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 6.0 million	\$ 2.5 million	\$ 4.0 million	\$ 12.5 million

- (b) A preliminary cost estimate to obtain standard design speed is presented below. It should also be noted that by fixing this nonstandard feature, nonstandard feature #A4, #A5C, #A5D, #A5E, and #A9B would also be corrected in the process.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 5.0 million	\$ 6.0 million	\$ 3.0 million	\$ 14.0 million

K. Design Exception Feature #A11

Nonstandard Feature

This project proposes a nonstandard ramp at the following location:

WB Off-Ramp (WW Line) intersection with Hillcrest Road (H Line). The proposed grade of Hillcrest Road at the intersection is 10%. See Attachment B, Figure B-7.

Standard for Which Exception is Requested

Highway Design Manual Index 504.3(3) states the following:

Ramp terminals should connect where the grade of the overcrossing is 4% or less to avoid potential overturning of trucks.

Reason for Requesting Exception

The garage for Quarters 8 (historic residence) was removed for Bay Bridge seismic retrofit work and needs to be replaced. The garage had access off of the EB off-ramp, but access to the new parking area was changed to the WB off-ramp because this ramp will be superceded by a subsequent project (EA 04-43A641), which will construct a new WB off-ramp on the north side of the freeway. This project is programmed and currently scheduled to begin construction in May 2014. The WB off-ramp built in this project will be used solely as a driveway after the new WB off-ramp is constructed. For this reason, the alignment of the ramp was modified to provide access in both directions along Hillcrest Road, and the nonstandard grade at the ramp terminus is a result of geographical constraints. The steep topography and USCG buildings (historic Qtrs 8 & 9) surrounding the WB off-ramp limit the feasible tie-in locations. Hillcrest Road also ties into the EB on and off-ramps and Southgate Road. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA) and USCG property. Realigning the vertical profile of Hillcrest Road to meet the standard minimum grade would impact a larger portion of the ESA & historical properties, increase right-of-way costs, and result in additional security concerns for the USCG, as this would also require adjusting the vertical profile of Southgate Road and both EB on and off-ramps.

Added Cost to Make Standard

A preliminary cost estimate to obtain a standard ramp terminus is presented below.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 5.0 million	\$ 2.0 million	\$ 1.0 million	\$ 8.0 million

L. Design Exception Feature #A12

Nonstandard Feature

This project proposes nonstandard corner sight distance at the following location:

WB Off-Ramp (WW Line) intersection with Hillcrest Road (H Line). The proposed minimum corner sight distance is 50 m. See Attachment B, Figure B-1.

Standard for Which Exception is Requested

Highway Design Manual Index 504.3(3) states the following:

For left-turn maneuvers from an off-ramp at an unsignalized intersection, the length of crossroads open to view should be greater than the product of the prevailing speed of

vehicles on the crossroads, and the time required for a stopped vehicle on the ramp to execute a left-turn maneuver. This time is estimated to be 7-1/2 seconds. For a design speed of 40 km/h, the minimum corner sight distance is 90 m.

Reason for Requesting Exception

The garage for Quarters 8 (historic residence) was removed for Bay Bridge seismic retrofit work and needs to be replaced. The garage had access off of the EB off-ramp, but access to the new parking area was changed to the WB off-ramp because this ramp will be superceded by a subsequent project (EA 04-43A641), which will construct a new WB off-ramp on the north side of the freeway. This project is programmed and currently scheduled to begin construction in May 2014. The WB off-ramp built in this project will be used solely as a driveway after the new WB off-ramp is constructed. For this reason, the alignment of the ramp was modified to provide access in both directions along Hillcrest Road, and the nonstandard corner sight distance at the ramp terminus is a result of geographical constraints. The proposed layout minimizes impacts to the environmentally sensitive areas (ESA) and USCG property. The steep topography on the west side of the WB off-ramp limits the sight distance of vehicles travelling EB on Hillcrest Road. The steep slope has to be cut back with a retaining wall.

Added Cost to Make Standard

A preliminary cost estimate to obtain standard corner sight distance is presented below.

Roadway Construction Cost	Structure Construction Cost	Right of Way Cost	Total Cost
\$ 2.0 million	\$ 2.0 million	\$ 1.0 million	\$ 5.0 million

3. ACCIDENT DATA

Table 1 shows the most recent traffic accident rates for the EB I-80 mainline between YBI and Oakland, as well as the EB entrance and exit ramps from YBI to Oakland.

Table 1 Accident Data

Location	Period	Total Accidents	Fatalities	Injuries	Actual Accident Rate ¹	Average Accident Rate ²
EB I-80	04/01/07 to 3/31/10	233	3	65	2.17	0.73
EB Entrance Ramp (East of Tunnel)		2	0	1	1.40	0.75
EB Exit Ramp (West of Tunnel)		2	0	1	10.75	0.60
WB Exit Ramp (East of Tunnel)		25	0	12	8.77	0.95

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.

The accident rate for the EB I-80 mainline is nearly three times higher than that experienced on similar facilities in the State, with the prevalent accident types being Rear End (50%), Hit Object (26%), and Side Swipe (19%). The high traffic volumes that are often in stop-and-go conditions,

along with the lack of shoulders, may be factors that contribute to these prevalent accident types and higher accident rates.

The accident rate for the EB entrance ramp from YBI to Oakland, which is on the east side of the tunnel, is almost twice as high as that experienced on similar facilities in the State, with the prevalent accident types being Rear End (50%) and Hit Object (50%). Factors such as high mainline traffic volumes limiting the number of adequate gaps for merging, and the high speed differential required for merging, might attribute to collisions.

The accident rate for the EB exit ramp from San Francisco to YBI, which is on the west side of the tunnel, is considerably higher than that experienced on similar facilities in the State, with the prevalent accident type being Hit Object (100%). The substandard geometric features of the ramp might attribute to the higher accident rate.

The accident rate for the WB exit ramp from Oakland to YBI, which is on the east side of the tunnel, is considerably higher than that experienced on similar facilities in the State, with the prevalent accident type being Hit Object (100%). The substandard geometric features of the ramp might attribute to the higher accident rate.

4. FUTURE CONSTRUCTION

The YBI Westbound (WB) Ramps Improvement Project (EA 04-43A641) will reconstruct the WB on and off-ramps, and is currently scheduled to begin construction in May 2014.

After construction of the East Span is completed, the existing East Span bridge structure will be dismantled (EA 04-012094).

5. PROPOSED EXCEPTION REVIEWS AND CONCURRENCE

The proposed exceptions to design standards were reviewed and concurred by Gordon Brown on 10/11/11.

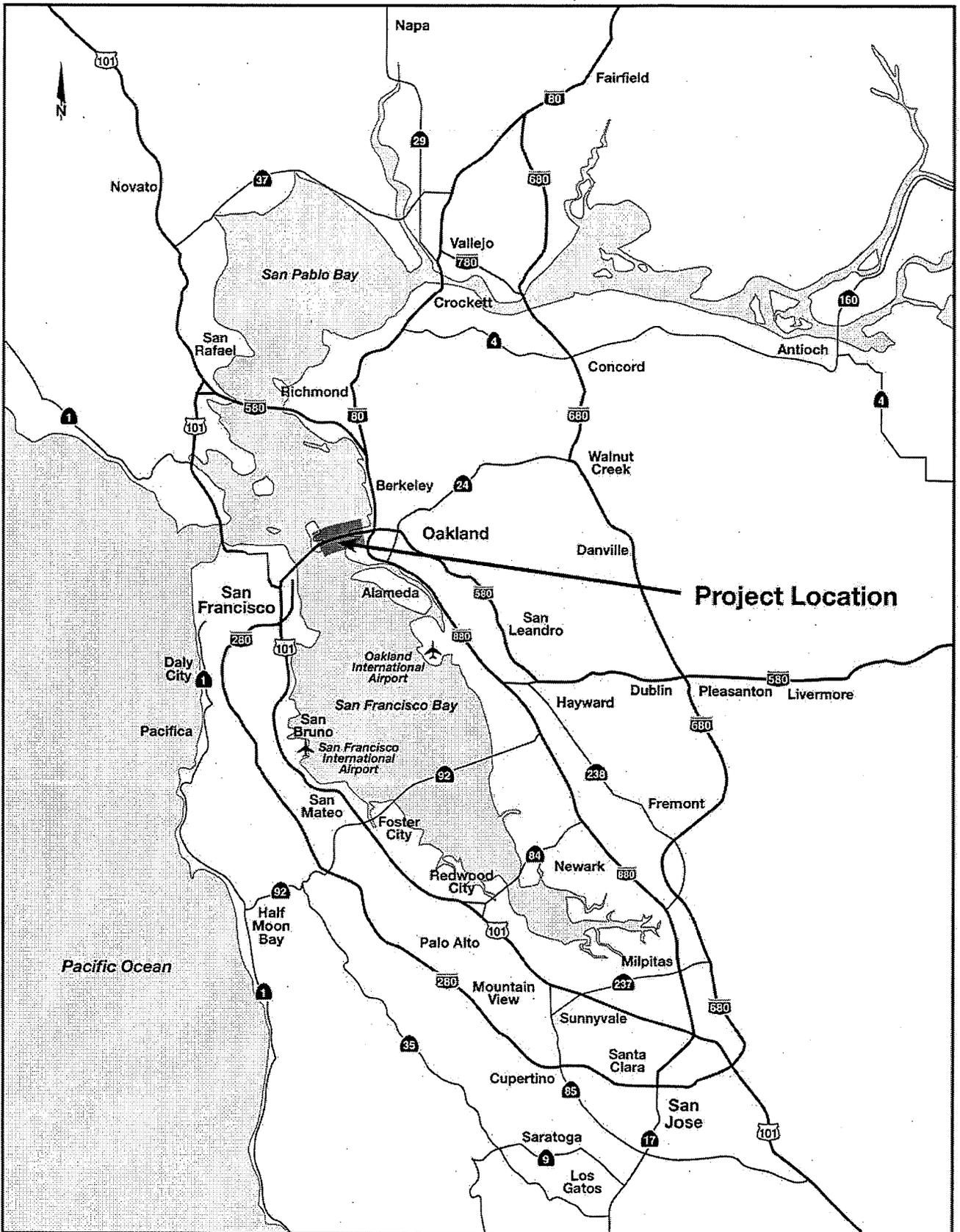
6. ATTACHMENTS

Attachment A	Project Location Map and Project Vicinity Map
Attachment B	Advisory Design Exception Features

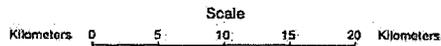
District 4-SF-80-KP 12.6/13.9
04-0120T1
\$139,000,000

Attachment A

Project Location Map and Project Vicinity Map



SFOBB
EAST SPAN
SEISMIC SAFETY
PROJECT



Project Location Map

Figure A-1

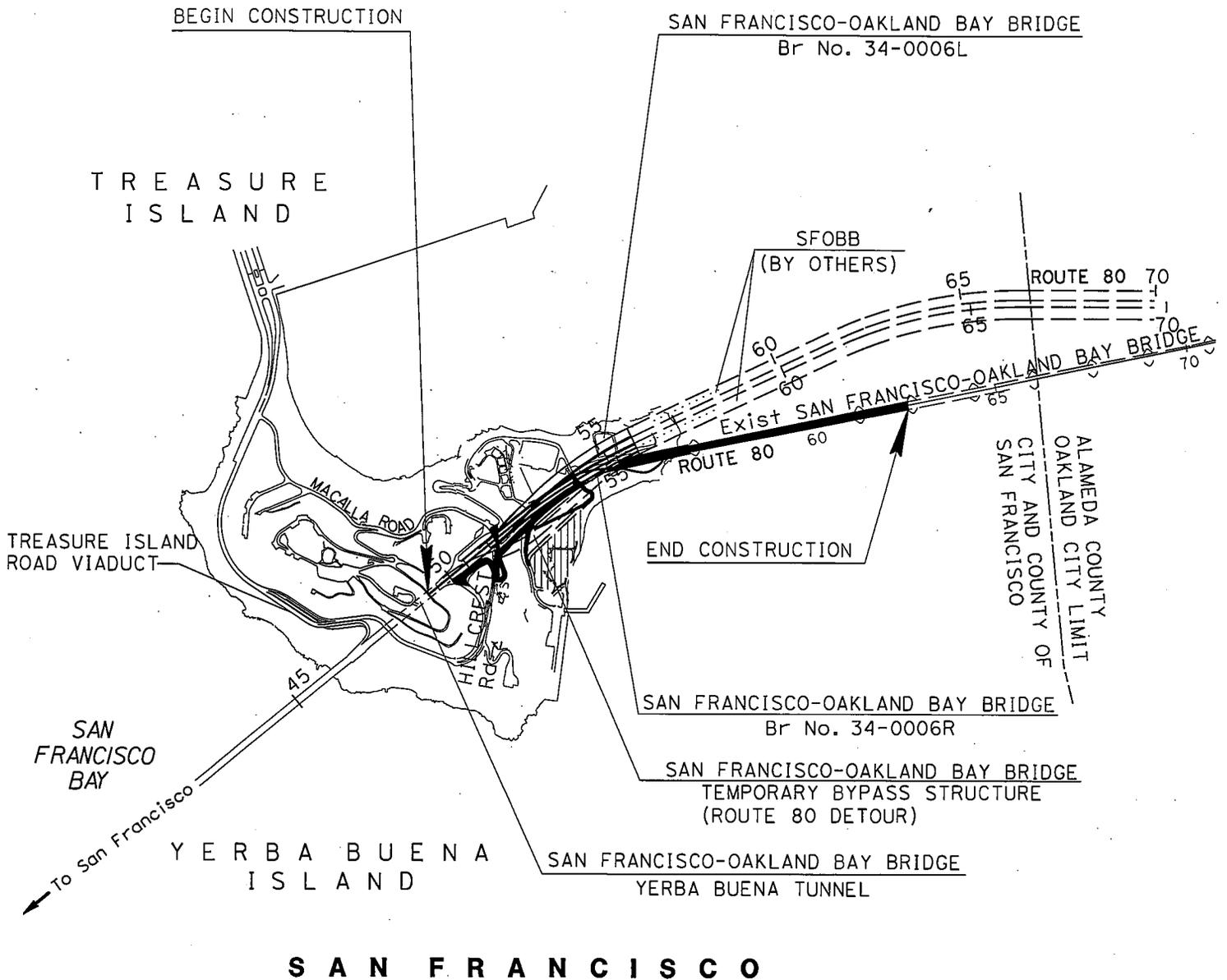


FIGURE A-2

PROJECT VICINITY MAP

SFOBB SEISMIC SAFETY PROJECT
YBI CONTRACT 2

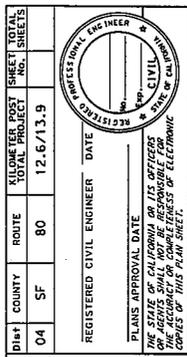
District 4-SF-80-KP 12.6/13.9
04-0120T1
\$139,000,000

Attachment B
Advisory Design Exception Features

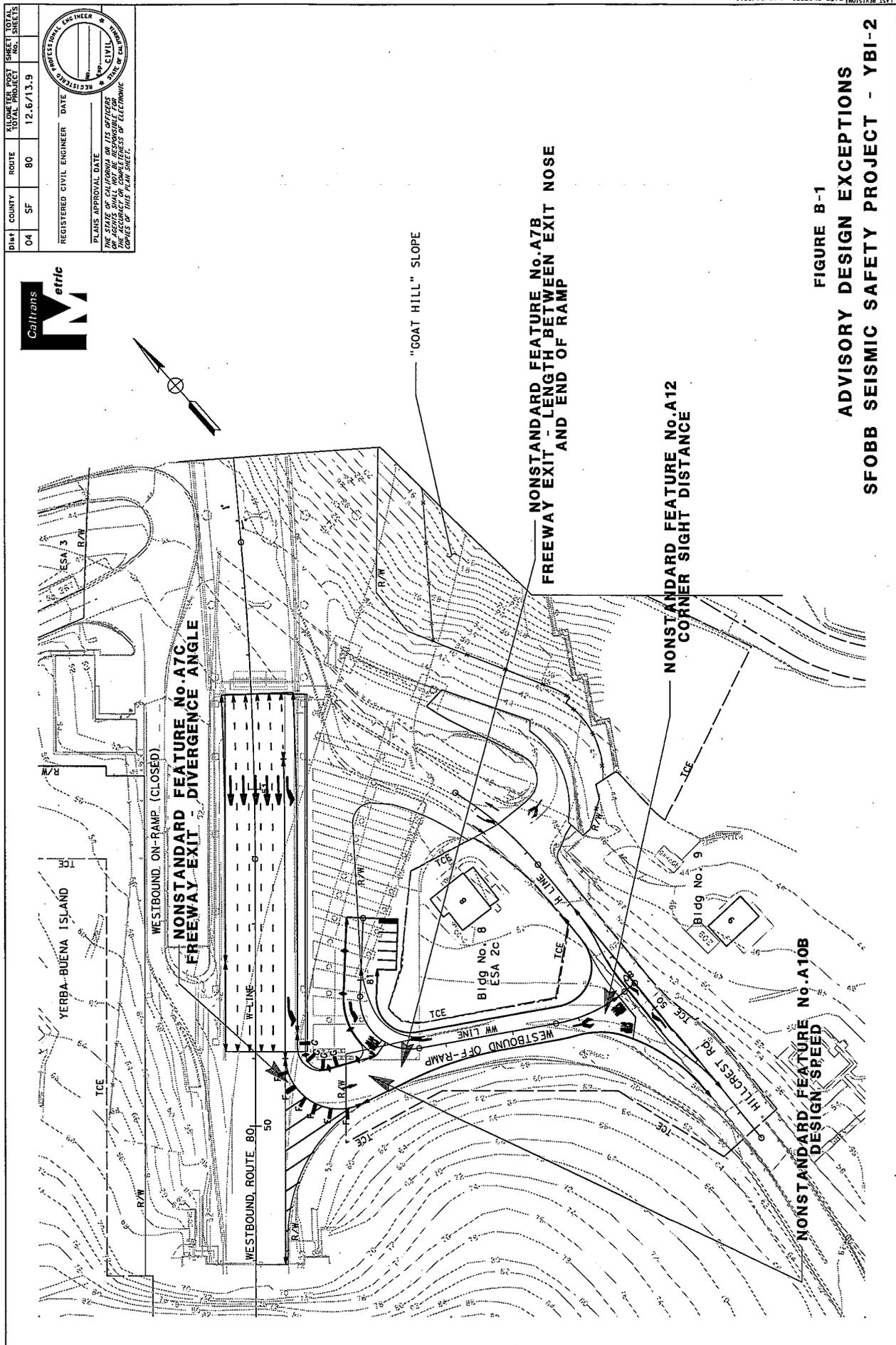
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04	SF	80	12.6/13.9		

REGISTERED CIVIL ENGINEER	DATE	REGISTERED PROFESSIONAL ENGINEER
PLANS APPROVAL DATE		

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DESIGNED BY	REVISOR
REVISOR	DATE REVISED



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REVISIONS

RELATIVE BORDER SCALE
1:5 IN. = 100 METERS

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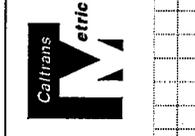
CU 04251

EA 012011

BORDER LAST REVISED 3/1/2007

FIGURE B-1
ADVISORY DESIGN EXCEPTIONS
SFOBB SEISMIC SAFETY PROJECT - YBI-2

DIST	COUNTY	ROUTE	MILEAGE POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	12.6/13.9		



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 CIVIL
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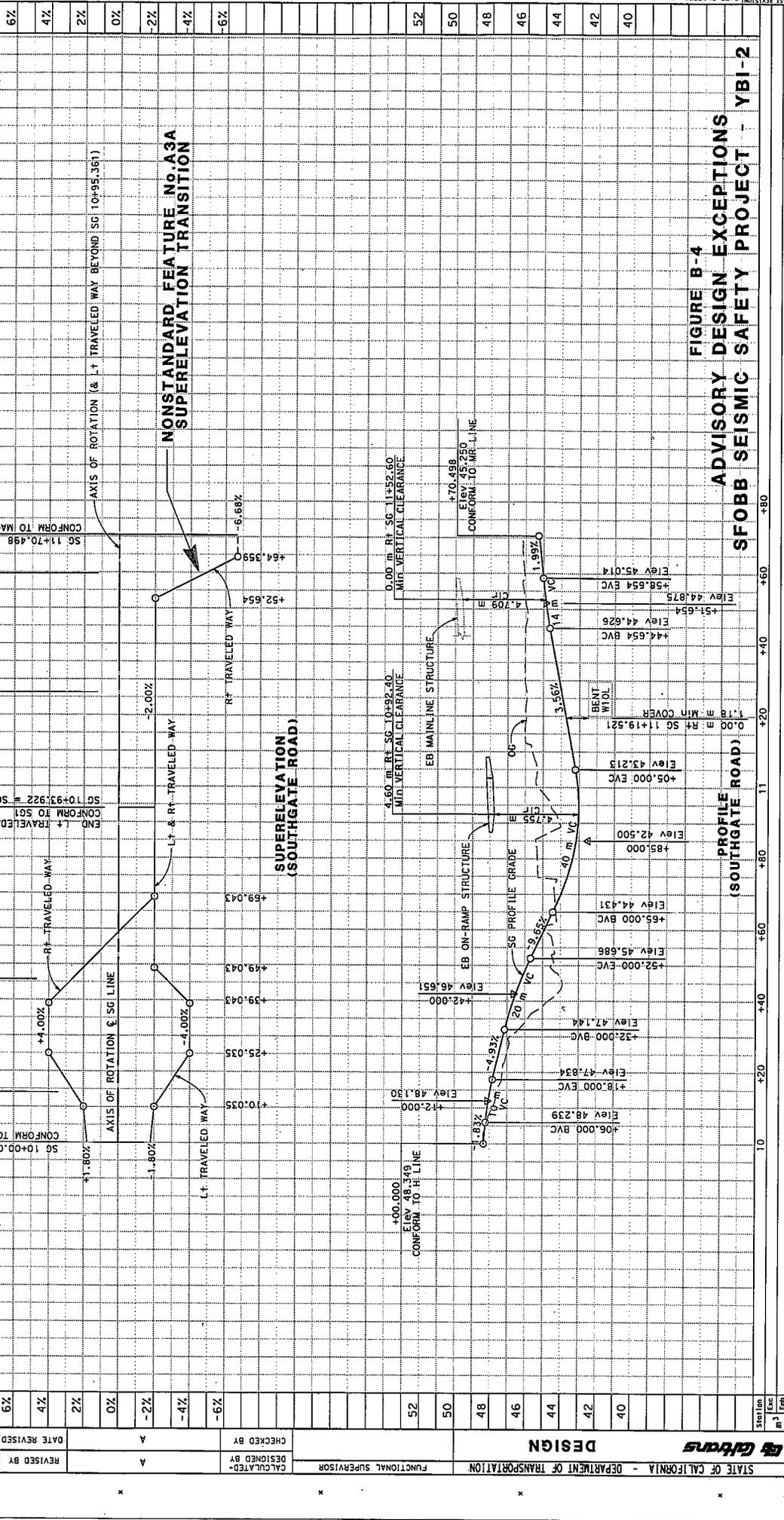
DESIGNED BY
 CHECKED BY
 DATE REVISED
 REVISED BY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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BORDER LAST REVISED 3/1/2007

RELATIVE BORDER SCALE IS IN MILLIMETERS
 USERNAME: jstark
 DON FILE: BIC_MCS_FigB-4.dgn
 CU 04251
 EA 012011



Station	10	20	40	60	80	100	110	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520	
Elev	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00	+10.00

DATE PLOTTED => 9/27/07 AM
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DATE PLOTTED => 10/4/2011
 TIME PLOTTED => 9:58:51 AM
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ROUTE 80
 COUNTY SF
 DISTRICT 04

SHEET NO. 13
 TOTAL SHEETS 13

REVISIONS
 REVISION NO. DATE REVISION BY

DESIGNED BY
 CHECKED BY
 DATE REVISION BY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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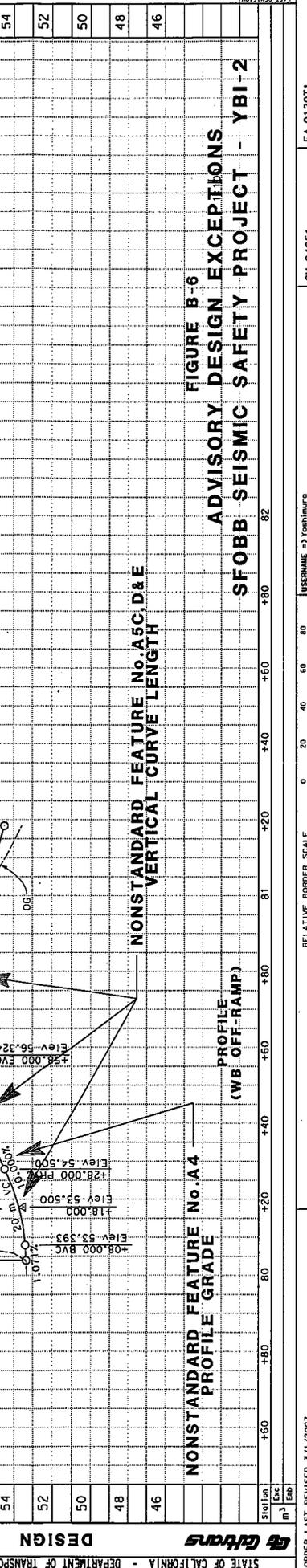
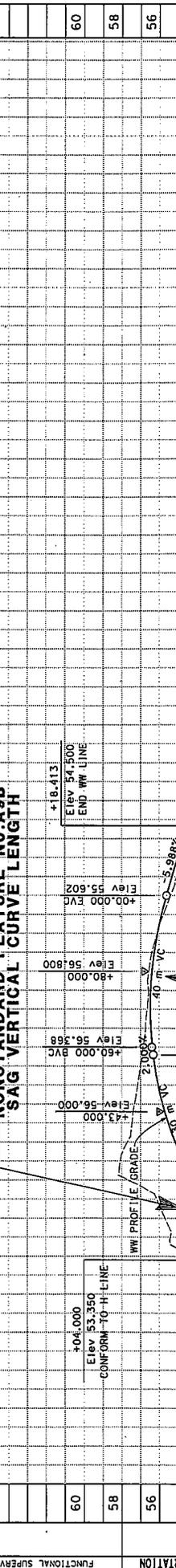
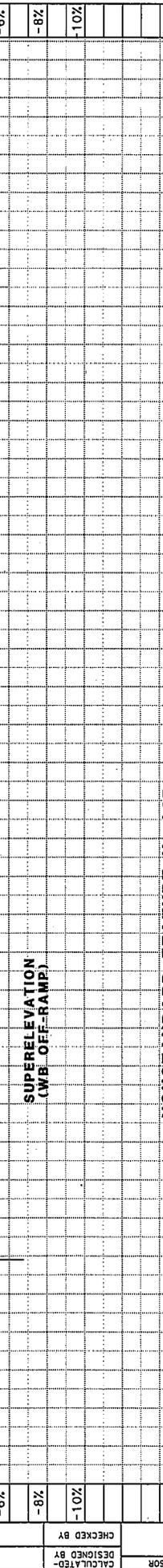
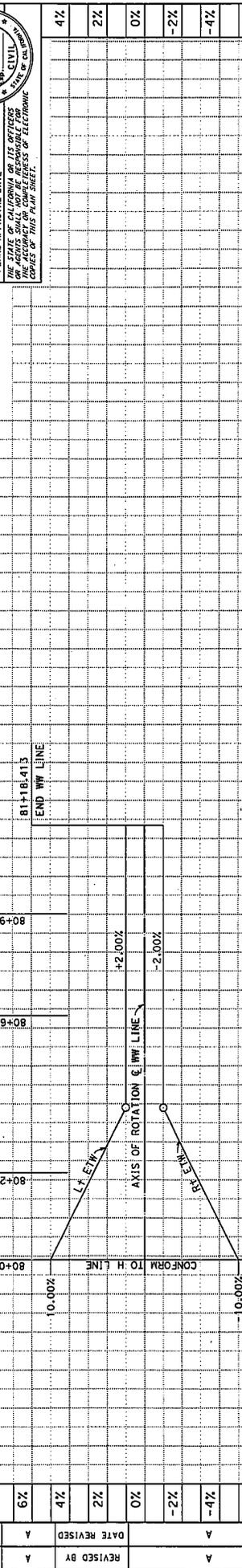


FIGURE B-6
 ADVISORY DESIGN EXCEPTIONS
 SFOBB SEISMIC SAFETY PROJECT - YBI-2

Dist	County	Route	Volume per Post	SHEET NO.	TOTAL SHEETS
04	SF	80	12.6/13.9		



REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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CONFORM TO R1 & P1 LINES

R=100 LT

50+87.625 EC

50+55.085 BC

AXIS OF ROTATION

RIGHT LINE

RT & LT ETW

-1.00% & Vdc

CONFORM TO EXIST

2.00%

3.33%

Lt ETW

Lt ETW

+72.869

CONFORM TO EXIST

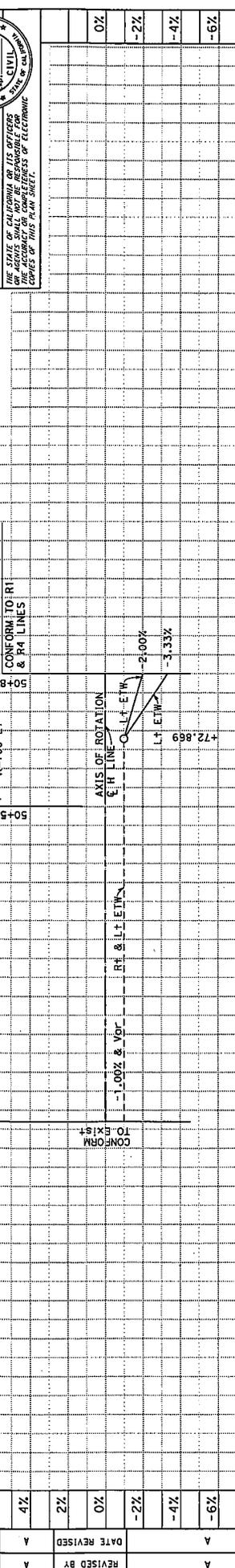
+71.99

10.00%

OG

NONSTANDARD FEATURE NO. A11

MINIMUM GRADE OF CONNECTING ROADWAY



58	56	54	52	50	48	46	44	42	40	38	36
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LAST REVISION

FIGURE B-7

ADVISORY DESIGN EXCEPTIONS

SFOBB SEISMIC SAFETY PROJECT - YBI-2

RELATIVE BARBER SCALE

1" = 10' HORIZONTAL

1" = 4' VERTICAL

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EA 012011

CU 04251