# Appendix F

# Natural Environmental Study

**Golden Gate Bridge Physical Suicide Deterrent System Project**
***NES (MI)***

# Natural Environment Study

(Minimal Impacts)

Golden Gate Bridge

City and County of San Francisco and County of Marin, California

**July 2008**

STATE OF CALIFORNIA
Department of Transportation

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GOLDEN GATE BRIDGE
HIGHWAY & TRANSPORTATION DISTRICT

Caltrans
CALIFORNIA DEPARTMENT OF TRANSPORTATION

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# 1. Summary

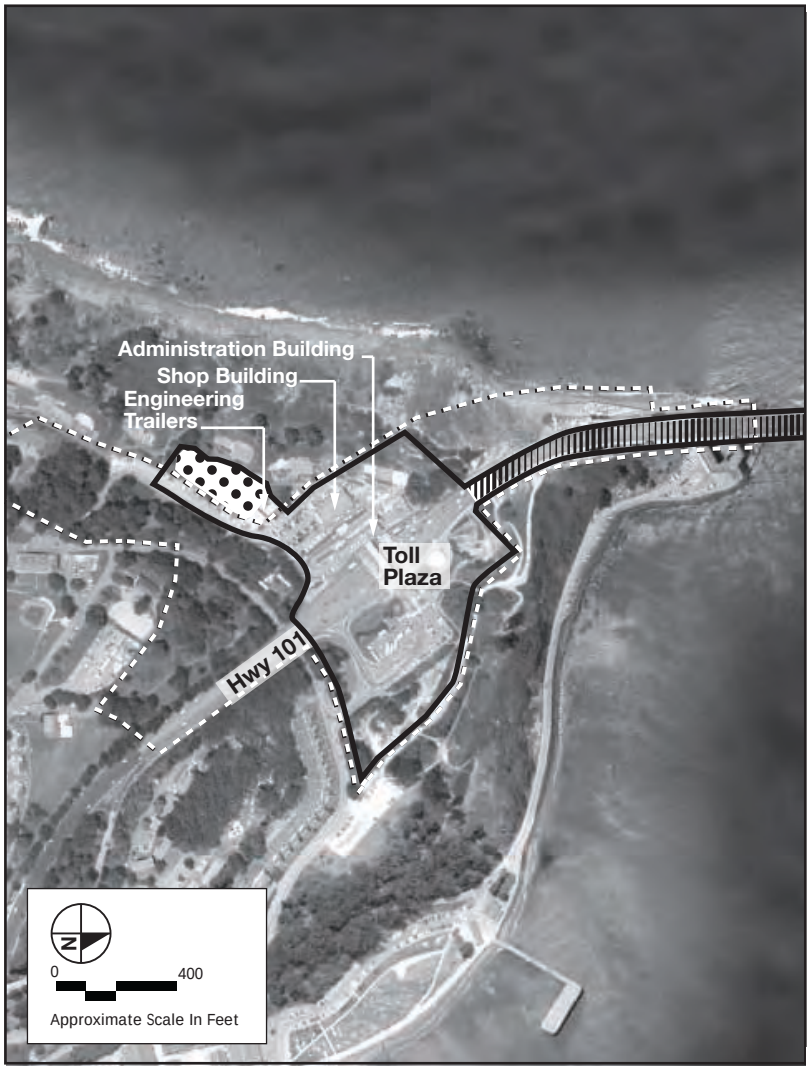
The project proposes to construct a physical suicide deterrent system along both sides of the Golden Gate Bridge (Bridge). Construction-related activities would be limited to the Bridge and to five staging areas, which are generally denuded of vegetation and are either paved or graveled. The avoidance measures currently being implemented as part of the Golden Gate Bridge Seismic and Wind Retrofit Project to protect sensitive biological resources bordering and near the staging areas within Golden Gate National Recreational Area (GGNRA) lands would continue to be implemented as part of the proposed project.

# 2. Introduction

The proposed project is located in the City and County of San Francisco and Marin County (see Figure 1). The project proposes to construct a physical suicide deterrent system along both sides of the Bridge. As shown in Figure 1, the project limits are from the San Francisco Abutment to the Marin Abutment of the Bridge. Appendix D provides a description of the Alternatives.

The project would occur along the Bridge and does not include the direct disturbance of undeveloped lands. However, the project does include the use of four construction staging areas within GGNRA lands. One is an existing gravel area located in a switchback of Conzelman Road. The other three are gravel areas located under the northern span of the Bridge, which are currently being used for similar staging and maintenance activities. There is also one proposed construction staging area within the Presidio in a location that is a paved parking lot, located just west of the toll plaza off Merchant Road. The locations of the staging areas are shown in Figure 1.

The four staging areas located within GGNRA lands have and/or continue to be used for similar activies associated with the Golden Gate Bridge Seismic and Wind Retrofit Project. As part of the Golden Gate Bridge Seismic and Wind Retrofit Project, a Biological Assessment was prepared (pursuant to the requirements of Section 7 of the federal Endangered Species Act) and a subsequent Biological Opinion was issued by the U.S. Fish and Wildlife Service (USFWS). These documents addressed potential impacts from construction activites and use of staging areas within GGNRA lands on federally-listed species and other senstive biological resources.



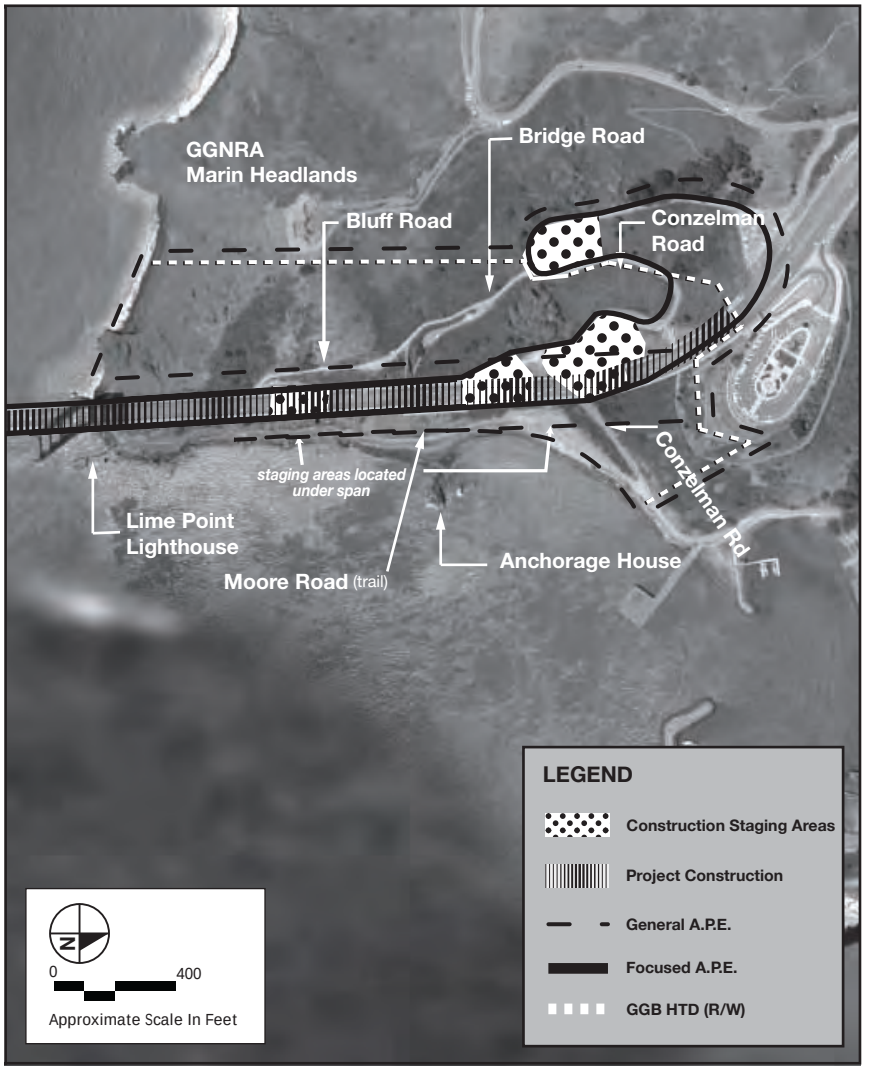




FIGURE 1
**LOCATION OF CONSTRUCTION STAGING AREAS**

Source: Golden Gate Bridge, Highway & Transportation District

The avoidance measures being implemented for the Golden Gate Bridge Seismic and Wind Retrofit Project to protect sensitive biological resources would continue to be implemented as part of the proposed Golden Gate Bridge Physical Suicide Deterrent System Project. These measures include:

**Measure 1:** A qualified biologist or biologists will be retained by the District prior to the start of construction to act as a biological Environmental Compliance Monitor (ECM) and implement and oversee the below activities/measures.

**A.** The biological ECM will flag and stake native vegetation near the staging areas within GGNRA lands as "Environmentally Sensitive Areas" and will oversee the contractor's installation of protective fencing around the designated ESA(s). Signs will be installed indicating that the fenced area is "restricted" and that all construction activities, personnel, and operational disturbances are prohibited.

**B.** The biological ECM will prepare and provide worker educational materials that describe the value and importance of the coastal scrub habitat bordering the staging areas and the importance of not disturbing the habitat.

**C.** The biological ECM will conduct regular visits of the staging areas to inspect if any damage to adjacent habitats has occurred, to evaluate if dust control measures need to be implemented or increased, to ensure that erosion control devices located near native vegetation and ESA(s) are functioning properly, and to evaluate if weed control measures need to be implemented.

**D.** Based on the findings of the site visits, the biological ECM will make recommendations to be implemented regarding weed control, re-vegetation of disturbed areas, the need for additional fencing, and other measures to protect biological resources.

**E.** The biological ECM will prepare monthly monitoring reports for the District that will address the effectiveness of the avoidance measures being implemented and identify any other measures to be implemented.

**Measure 2:** The District will provide specifications for erosion and dust control to the Contractor, which will be implemented.

**Measure 3:** Contractor's vehicles traveling on access roads within GGNRA lands would be restricted to a maximum speed of 20 mph during the period of March 15 to July 4, which is the flight season for the Mission blue butterfly. The Contractor will post and enforce this speed limit.

**Measure 4:** To prevent the introduction of non-native vegetation or other deleterious materials to GGNRA lands, the Contractor will inspect all construction equipment prior to accessing the staging areas. If any vegetation or deleterious materials are present, the Contractor will decontaminate its equipment with a high-pressure washer and properly dispose of the wastewater and debris prior to entering GGNRA lands.

# 3. Study Methods

The *Golden Gate Bridge Seismic and Wind Retrofit Project Biological Assessment* prepared by Environmental Science Associates (October 1995) was reviewed. Additionally, the monitoring reports prepared and required for the Golden Gate Bridge Seismic and Wind Retrofit Project were reviewed. These documents were reviewed as they address the staging areas within GGNRA lands that would be used to facilitate the proposed Golden Gate Bridge Physical Suicide Deterrent System Project.

The latest version of the California Natural Diversity Data Base (CNDDB) was also reviewed. Appendix B illustrates the results of the CNDDB review and highlights documented occurrences of special-status species within two miles of the Bridge. Additionally, a list of federally-listed and candidate species occurring in Marin and San Francisco Counties was obtained from the U.S. Fish and Wildlife Service (USFWS); the USFWS species list is included in Appendix C. The review of the CNDDB and the USFWS species list served to identify documented occurrences of special-status plant and wildlife species in the project area.

Pacific Biology conducted reconnaissance-level field surveys on June 13 and June 15, 2008. These surveys included walking the proposed staging areas and the length of the Bridge, as well as assessable areas under the northern span of the Bridge. The intent of the surveys was to confirm the graded, graveled, and/or paved condition of the proposed staging areas, to describe the plant communities occurring adjacent to and near the staging areas, to assess the types of wildlife likely to occur in the project area, and to identify locations supporting or potentially supporting sensitive biological resources that could be adversely affected by the proposed project.

# 4. Environmental Setting

## 4.1. Description of the Existing Biological and Physical Conditions

The proposed physical suicide deterrent system would be installed along both sides of the Bridge. The western side of the Bridge contains a heavily used bikeway and the eastern side contains a heavily used pedestrian walkway. The Bridge is heavily traveled by cars and trucks, and is often subject to strong winds given its location at the entrance to San Francisco Bay. These factors and the lack of natural habitats deter wildlife use of the Bridge, although the Bridge is used by some bird species. The staging areas located within GGNRA lands are bordered by large expanses of coastal scrub habitat, which supports a variety of plant and wildlife species.

## 4.2. Regional Species and Habitats of Concern

**Table 1** lists the special-status species that have been documented within 2 miles of the Bridge and staging areas, as well as the species' listing status and an evaluation of the species' potential to occur within or near the staging areas and Bridge. Additional special-status plant and wildlife species were identified from the greater project region (see Appendix B and C). However, these species are not expected to occur within or near the project's disturbance boundaries given the absence of suitable habitat. More specifically, these species are not associated the types of disturbed habitats within the staging areas or with coastal scrub habitat (which borders the staging areas). Additionally, many of these species are marine species or are associated with other water features (*e.g.,* vernal pools, stock ponds); the proposed project does not include any activities that would disturb these types of habitats.

**Table 1: Special-Status Species Documented in the Project Area.**

| Common Name | Scientific Name | Status | General Habitat Description | Rationale | Potentially Impacted[1] |
|---|---|---|---|---|---|
| *Invertebrates* | | | | | |
| Monarch butterfly | *Danaus plexippus* | SSA | Wintering sites in California are associated with wind-protected groves of large trees (primarily eucalyptus or pines) with nectar and water sources nearby, generally near the coast. | *Could occur near staging areas.* Winter roost sites are known from the project area, but documented or potential winter roost sites are not located in potentially affected areas. | No |
| Mission blue butterfly | *Plebejus icarioides missionensis* | FE | Coastal scrub and grassland habitats; three larval host plants are used, including *Lupinus albifrons, L. variicolor*, and *L. formosus.* | *Known to occur near staging areas*. The larval host plants of the species are present in areas bordering and near the staging areas within GGNRA lands; adults observed in the area during earlier studies (ESA, 1995). | No |
| *Mammals* | | | | | |
| Southern sea otter | *Enhydra lutris nereis* | FT/FP | Nearshore marine environments; needs canopies of giant kelp and bull kelp for rafting and feeding. | *Not expected.* Known from the project area, but suitable habitat is not present in areas potentially affected by the proposed project. | No |
| American badger | *Taxidea taxus* | SSC | Drier open stages of shrub, forest, and herbaceous habitats with friable soils. | *Not expected.* Known from the project area, but suitable habitat is not present within or bordering the staging areas. | No |

[1] The determination of if a species could be impacted by the proposed project assumes that ongoing avoidance measures would continue to be implemented (see Section 2) or that active bird nests protected by the Migratory Bird Treaty Act and/or California Fish and Game Code would be avoided (see Section 6).

| Common Name | Scientific Name | Status | General Habitat Description | Rationale | Potentially Impacted[1] |
|---|---|---|---|---|---|
| Point Reyes jumping mouse | *Zapus trinotatus orarius* | SSC | Bunch grass marshes on the uplands of Point Reyes. | *Not expected.* Suitable habitat is not present in areas potentially affected by the proposed project; outside of expected distribution of the species. | No |
| *Amphibians* | | | | | |
| California red-legged frog | *Rana draytonii* | FT/ SSC | Water sources such as ponds, lakes, reservoirs, streams and adjacent riparian woodlands. | *Not expected.* Known from the project area, but suitable habitat is not present in areas potentially affected by the proposed project. | No |
| *Birds* | | | | | |
| Peregrine falcon | *Falco peregrinus anatum* | BCC/ SE-SCD | Nests on steep cliffs and tall structures. | *Known to use the Bridge:* Has attempted nesting under the Bridge roadway and uses the Bridge year-round. | No |
| Double-crested cormorant | *Phalacrocorax auritus* | SSC | Colonial nester on coastal cliffs, offshore islands, and along lake margins in the interior of the state. Also known to nest on the San Francisco-Oakland Bay Bridge. | *Not expected.* No cormorants have been reported to nest on the Golden Gate Bridge (CNDDB, 2008); no nest sites documented within two miles of the Bridge or staging areas (CNDDB, 2008). | No |
| *Plants* | | | | | |
| Presidio manzanita | *Arctostaphylos hookeri* ssp. *ravenii* | FE/SE CNPS 1B.1 | Chaparral, coastal prairie, coastal scrub. | *Not expected:* Known only from south side of the Bridge and suitable habitat not present within or near the southern staging area. | No |

| Common Name | Scientific Name | Status | General Habitat Description | Rationale | Potentially Impacted[1] |
|---|---|---|---|---|---|
| Marsh sandwort | *Arenaria paludicola* | FE/SE CNPS 1B.1 | Marshes and swamps/sandy openings. | *Not expected:* extirpated from the project area (CNPS, 2008); suitable habitat not present within or near the staging areas. | No |
| Franciscan thistle | *Cirsium andrewsii* | CNPS 1B.2 | Broadleafed upland forest, coastal bluff scrub, coastal scrub, coastal prairie. | *Could occur near staging areas*. Suitable habitat is not present within the staging areas, but the species could occur in nearby locations. | No |
| San Francisco Bay spineflower | *Chorizanthe cuspidata* var. *cuspidata* | CNPS 1B.2 | Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub. | *Could occur near staging areas*. Suitable habitat is not present within the staging areas, but the species could occur in nearby locations. | No |
| Presidio clarkia | *Clarkia franciscana* | FE/SE CNPS 1B.1 | Coastal scrub, valley and foothill grassland/ serpentinite | *Not expected:* Known only from south side of the Bridge and suitable habitat not present within or near the southern staging area. | No |
| Round-headed Chinese houses | *Collinsia corymbosa* | CNPS 1B.2 | Coastal dunes. | *Not expected*. Historically known from San Francisco County (not Marin County), but now believed to be extirpated (CNPS, 2008); suitable habitat is not present within or near the southern staging area. | No |
| Blue coast gilia | *Gilia capitata* ssp. *chamissonis* | CNPS 1B.1 | Coastal dunes, coastal scrub. | *Could occur near staging areas*. Suitable habitat is not present within | No |

| Common Name | Scientific Name | Status | General Habitat Description | Rationale | Potentially Impacted[1] |
|---|---|---|---|---|---|
| | | | | the staging areas, but the species could occur in nearby locations. | |
| Dark-eyed gilia | *Gilia millefoliata* | CNPS 1B.2 | Coastal dunes. | *Not expected:* Suitable habitat is not present within or near staging areas; extirpated from San Francisco County (CNPS, 2008). | No |
| San Francisco gumplant | *Grindelia hirsutula* var. *maritima* | CNPS 1B.2 | Coastal bluff scrub, coastal scrub, valley and foothill grassland/sandy and serpentinite. | *Could occur near staging areas*. Suitable habitat is not present within the staging areas, but the species could occur in nearby locations. | No |
| Marin western flax | *Hesperolinon congestum* | FT/ST CNPS 1B.1 | Chaparral, valley and foothill grassland/ Serpentinite. | *Not expected:* Suitable habitat not present within or near staging areas. | No |
| Kellogg's horkelia | *Horkelia cuneata* ssp. *sericea* | CNPS 1B.1 | Closed-cone coniferous forest, chaparral, coastal dunes, coastal scrub. | *Not expected:* Extirpated from the project area (CNPS, 2008). | No |
| San Francisco lessingia | *Lessingia germanorum* | FE/SE CNPS 1B.1 | Coastal scrub (remnant dunes) | *Not expected*. Known from San Francisco County (not Marin County), but suitable habitat is not present within or near the southern staging area. | No |
| Marsh microseris | *Microseris paludosa* | CNPS 1B.2 | Closed cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland. | *Could occur near staging areas*. Suitable habitat is not present within the staging areas, but the species could occur in nearby locations. | No |

| Common Name | Scientific Name | Status | General Habitat Description | Rationale | Potentially Impacted[1] |
|---|---|---|---|---|---|
| San Francisco popcorn flower | *Plagiobothrys diffusus* | SE CNPS 1B.1 | Coastal prairie, valley and foothill grassland. | *Not expected:* Suitable habitat not present within or near staging areas. | No |
| San Francisco campion | *Silene verecunda* ssp. *verecunda* | CNPS lB.2 | Coastal bluff scrub, chaparral, coastal prairie, coastal scrub, valley and foothill grassland/sandy. | *Not expected:* Known only from south side of the Bridge and suitable habitat not present within or near the southern staging area. | No |
| San Francisco owl's clover | *Triphysaria floribunda* | CNPS 1B.2 | Coastal prairie, coastal scrub, valley and foothill grassland. | *Could occur near staging areas.* Suitable habitat is not present within the staging areas, but the species could occur in nearby locations. | No |

FE: Federal Endangered; FT: Federal Threatened; FP: Federally Proposed; SE: State Endangered; SSC: State Species of Special Concern; ST: State Threatened; SCD: State Candadate for Delisting; SSA: State Special Animal List; CNPS 1B.1: Rare, threatened, or endangered in California and elsewhere-seriouslyendangered in Califonnia; CNPS 1B.2: Rare, threatened, or endangered in California and elsewhere-fairly endangered in California

### 4.3. Vegetation

The four staging areas within GGNRA lands are generally denuded of vegetation and are covered by gravel and compacted dirt, with only small patches of ruderal (*i.e*, weedy) vegetation present within one of the staging areas (Staging Area 3). The staging areas have and/or continue to be used for staging and maintenance activities associated with the Golden Gate Bridge Seismic and Wind Retrofit Project. The one proposed staging area within the Presidio is within a paved parking lot. Photographs of the staging areas are included in Appendix A. Given the above, and the developed condition of the Bridge, construction-related activites would only occur within areas denuded of vegetation or with only limited ruderal vegation present.

However, the staging areas within GGNRA are located adjacent to well-developed coastal scrub habitat. This plant community is characterized by a dense growth of native species such as coyote brush (*Baccharis pilularis*), California blackberry (*Rubus ursinus*), poison oak (*Toxicodendron diversilobum*), California sagebrush (*Artemisia californica*), arroyo willow (*Salix laseolepis*), and various lupine species (*Lupinus* sp.), as well as non-native invasive

species such as French broom (*Genista monspessulana*), wild radish (*Raphanus sativus*), and fennel (*Foeniculum vulgare*).

Based on the California Department of Fish and Game (CDFG) *List of California Terrestrial Natural Communities* (CDFG, 2003), the coastal scrub habitat bordering the staging areas is not denoted on the list as "high priority for inventory in CNDDB and thus is not considered a sensitive plant community. Nevertheless, this plant community provides valuable wildlife habitat and can support several locally-occurring special-status plant species, such as Franciscan thistle, San Francisco Bay spineflower, blue coast gilia, San Franisco gumplant, marsh microseris, San Francisco owl's clover, and potentially other species (see Table 1, above).

### 4.4. Animals

Given that the staging areas are generally denuded of vegetation, covered with gravel, or paved, and the developed condition of the Bridge, potential habitat for special-status wildlife species within the project's disturbance area is limited. However, as shown in Table 1, Mission blue butterfly, a federally Endangered species, is known to occur in areas near the staging areas on the north side of the Bridge. Peregrine falcon, a state Endangered species (and Candidate for Delisting), has been documented attempting nesting under the Bridge roadway and using the Bridge year-round. Additionally, monarch butterfly wintering sites, which are considered sensitive by the CDFG, have been documented in the project area.

# 5. Project Impacts

The proposed project does not include the development or direct disturbance of plant communities or aquatic habitats. The Bridge is in a developed condition and the proposed staging areas are generally denuded of vegetation, covered by gravel and compacted dirt, or paved. Additionally, the proposed project would continue to implement the avoidance measures currently being implemented to protect sensitive biological resources bordering and near the staging areas within GGNRA lands. **Subsection 5.1** provides a discussion of the sensitive biological resources ocurring or potentially occurring near the staging areas that are protected by the incorporated avoidance measures (see Section 2). **Subsection 5.2** provides a discussion of the sensitive biological resources which could be adversely affected by the proposed project and for which additional avoidance measures are required.

### 5.1. Sensitive Biological Resources Addressed by Incorporated Measures

**Mission blue butterfly**, a federally Endangered species, is known to occur in areas bordering the staging areas. No direct loss of habitat for this species would occur. However, in the absence of avoidance measures, the use of the staging areas could result in other types of impacts to this species.

- *Construction-related traffic:* vehicular traffic, especially at higher speeds, can collide with and kill or injure flying Mission blue butterflies.
- *Unauthorized intrusion into Mission blue butterfly habitat:* Potential intrusion by construction equipment and workers into the coastal scrub habitat bordering the staging areas within GGNRA lands could result in trampling of larval host or adult nectar plants.
- *Dust:* The proposed project does not include grading, vegetation and soil removal, or soil storage, which are often associated within increased dust levels. However, the use of the staging areas within GGNRA lands could result in increased dust levels, which may affect both larval and adult Mission blue butterflies.

To avoid impacts to this species, the avoidance measures currently being implemented to protect the species as part to the Golden Gate Bridge Seismic and Wind Retrofit Project would continue to be implemented. These measures include Measure 1(A-E), Measure 2, and Measure 3 (see Section 2, above).

**Monarch butterfly wintering sites** have been documented in locations near the staging areas. The staging areas within GGNRA lands have and/or continue to be used for similar activities associated with the Golden Gate Seismic and Wind Retrofit Project and do not border areas potentially used as winter roost sites by monarch butterflies. Therefore, the continued use of these staging areas would not adversely affect a monarch butterfly winter roost site. The proposed staging area within the Presidio is paved and used as a parking lot. There are no trees within the parking lot and the preferred winter roost trees of monarch butterflies (*i.e.*, eucalyptus and pine) are not present near the location. Given the above, the proposed project is not expected to have a substantial adverse affect on a monarch butterfly wintering site and no avoidance measures are required.

**Special-Status plant species** could occur in areas bordering or near the staging areas within GGNRA lands, such as Franciscan thistle, San Francisco Bay spineflower, blue coast gilia, San Franisco gumplant, marsh microseris, San Francisco owl's clover, and potentially other species. No direct loss of suitable habitat for special-status plant species would occur.

However, in the absence of avoidance measures, unauthorized intrusion by construction equipment and workers into the coastal scrub habitat bordering the staging areas could result in trampling of special-status plant species.

To avoid impacts to special-status plant species, the avoidance measures currently being implemented to as part to the Golden Gate Bridge Seismic and Wind Retrofit Project would continue to be implemented. These measures include Measure 1(A-E) and Measure 2 (see Section 2, above).

**Invasive plant species** currently occur in various densities in areas bordering the staging areas. However, soil disturbance and the unintentional introduction of seeds by construction equipment could result in the further introduction and spread of invasive plant species.

To avoid the further introduction or spread of invasive plant species, the avoidance measures currently being implemented to as part to the Golden Gate Bridge Seismic and Wind Retrofit Project would continue to be implemented. These measures include Measure 1(A-E) and Measure 4 (see Section 2, above).

## 5.2. Sensitive Biological Resources Not Addressed by Incorporated Measures

**Peregrine falcons** have been reported using the Bridge year-round from 1989 to the present, with nesting being attempted under the roadway on at least two occasions and the towers being used by non-nesting falcons.[2] The proposed project does not include the removal of any potential nesting habitat for the species or barriers to areas potentially used for nesting. However, should an active eyrie (*i.e.,* nest) be present, construction-related activities could result in the abandonment of the eyrie.

**Other nesting birds:** The proposed project does not include the removal of any trees or vegetation potentially used by nesting bird species protected by the California Fish and Game Code and/or the Migratory Bird Treaty Act. However, construction-related activities could still disturb and potentially result in nest abandonment of active bird nests potentially occurring near the staging and construction areas.

**Bird collisions:** The use of transparent panels is a primary component of several of the alternatives being considered for the physical suicide deterrent system. The transparent panels would be placed on top of existing or modified rails (which are 4 feet in height) and extend 8 feet above the rails and 12.5 feet wide. Transparent panels would also be placed around

[2] Personal Communication with Allen Fish, Director of the Golden Gate Bird Observatory. June 30, 2008.

portions of the two Bridge towers. Additionally, netting may be used as part of the physical suicide deterrent system, in which birds could become entangled or otherwise harmed. Several factors detract from the likelihood of birds attempting to fly over the bridge or perch on structures at a height which could result in collisions with the transparent panels or netting, such as the relatively low height of the panels (12 feet above the road surface), heavy car and truck traffic, heavy bike and pedestrian traffic on the Bridge's walkways (which would be adjacent to the transparent panels or netting), and that the panels or netting around the tower would encircle a visible solid surface. However, brown pelicans and other bird species such as terns and sea gulls often fly at relatively low heights across the Bridge[3] and focused studies have not been conducted to determine the likelihood of bird collisions and to what extent they may occur. Therefore, it is assumed that the use of the transparent panels or netting could adversely affect various bird species.

# 6. Mitigation Measures

As discussed in **Subsection 5.1**, the proposed project would continue to implement the avoidance measures currently being implemented for the use of the staging areas within GGNRA lands for the Golden Gate Bridge Seismic and Wind Retrofit Project. These measures address potential impacts to **Mission blue butterfly**, **special-status plant species**, **coastal scrub habitat**, and **invasive plant species**, and no additional measures are required to protect these biological resources.

However, as discussed in **Subsection 5.2**, potential impacts could occur to nesting **peregrine falcon**, **other nesting birds**, and various bird species from **bird collisions**. The below avoidance measures would be implemented to address these potential impacts.

**Measure 5:** Prior to the implementation of construction activities occurring during the nesting season of peregrine falcon (typically February through July), the District will consult with the Golden Gate Raptor Observatory (GGRO) and the Santa Cruz Predatory Bird Group to obtain any existing information on the locations of breeding pairs of peregrine falcon potentially using the Bridge. Focused surveys for nesting peregrine falcons would then be conducted by a qualified biologist to determine if nesting falcons are present in areas potentially affected by project implementation. If nesting falcons are identified, then a construction exclusion zone would be established around the active eyrie. The size of the exclusion zone will be determined by the CDFG and will take into account existing noise levels at the nest location and the type of construction activities

[3] Ibid.

proposed near the eyrie. Construction activities may commence within the exclusion zone only upon determination by a qualified biologist that the eyrie is no longer active. Alternatively, construction activities potentially affecting peregrine falcons nesting on the Bridge may be conducted outside of the nesting season of the species.

**Measure 6:** Prior to the commencement of construction activities occurring during the nesting season of native bird species (typically February through August), the biological ECM will conduct surveys for nesting birds protected by the Migratory Bird Treaty Act and/or California Fish and Game Code. The survey area will include potential nesting habitat within and bordering the staging and construction areas, as well as all areas that would be subject to elevated construction-related noise levels. If an active nest is found, a construction exclusion zone would be established around the active nest. The size of the exclusion zone will be determined by the CDFG and will take into account existing noise levels at the nest location and the sensitivity to noise of the bird species present. Construction activities may commence within the exclusion zone only upon determination by a qualified biologist that the nest is no longer active. The biological ECM will also survey for nesting birds during their regular site visits of the staging areas (see Section 2).

**Measure 7:** The District will retain the services of a qualified avian biologist to further evaluate the potential of birds to collide with the transparent panels potentially used as part of the physical suicide deterrent system, and for the use of netting to harm bird species. At a minimum, the expected fight patterns of migratory and resident birds relative to the installation locations of the transparent panels or netting will be evaluated, as well as the potential of the transparent panels and associated reflections to alter regular flight patterns and encourage collisions. Should it be found that the use of the transparent panels or netting pose a substantial risk to birds, appropriate design modifications would be implemented. These measures may include, but are not limited to visual deterrents such as patterning the transparent material with a UV coating that birds can see but humans cannot; angling transparent panels to reflect the water or other surface (as opposed to the sky, mountains, trees, etc.); utilizing etching, fritting, and opaque patterned glass to reduce transparency; utilizing bird-legible patterns on the transparent material; limiting the amount of transparent panels or amount of panels without a visual deterrent; eliminating or reducing the amount of netting; or other effective means of deterring bird collisions or entrapment.

# 7. Permits Required

The measures incorporated into the proposed project (Measures 1-4) and the additional measures required by this NES (Measures 5-7) would prevent the loss of a state or federally listed species from occurring. Additionally, the proposed project does not include the loss of habitat for such a species. As no "take" would occur, no permits would be required under the California Endangered Species Act. Additionally, the project will have "no effect" pursuant to Section 7 of the Federal Endangered Species Act. Further, no other permits for the loss or alteration of biological resources would be required.

# 8. References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# 9. Appendices

**Appendix A – Site Photos**

Staging Area 1; located within the Presidio

Staging Area 2; located within GGNRA, at hairpin turn on Conzelman Road

Staging Area 3; located within GGNRA, east of Staging Area 2

Staging Area 3 (upper area,); located within GGNRA, south of lower area

Staging Area 4; located within GGNRA, east of Staging Area 3

Typical view of coastal scrub habitat near staging areas in GGNRA

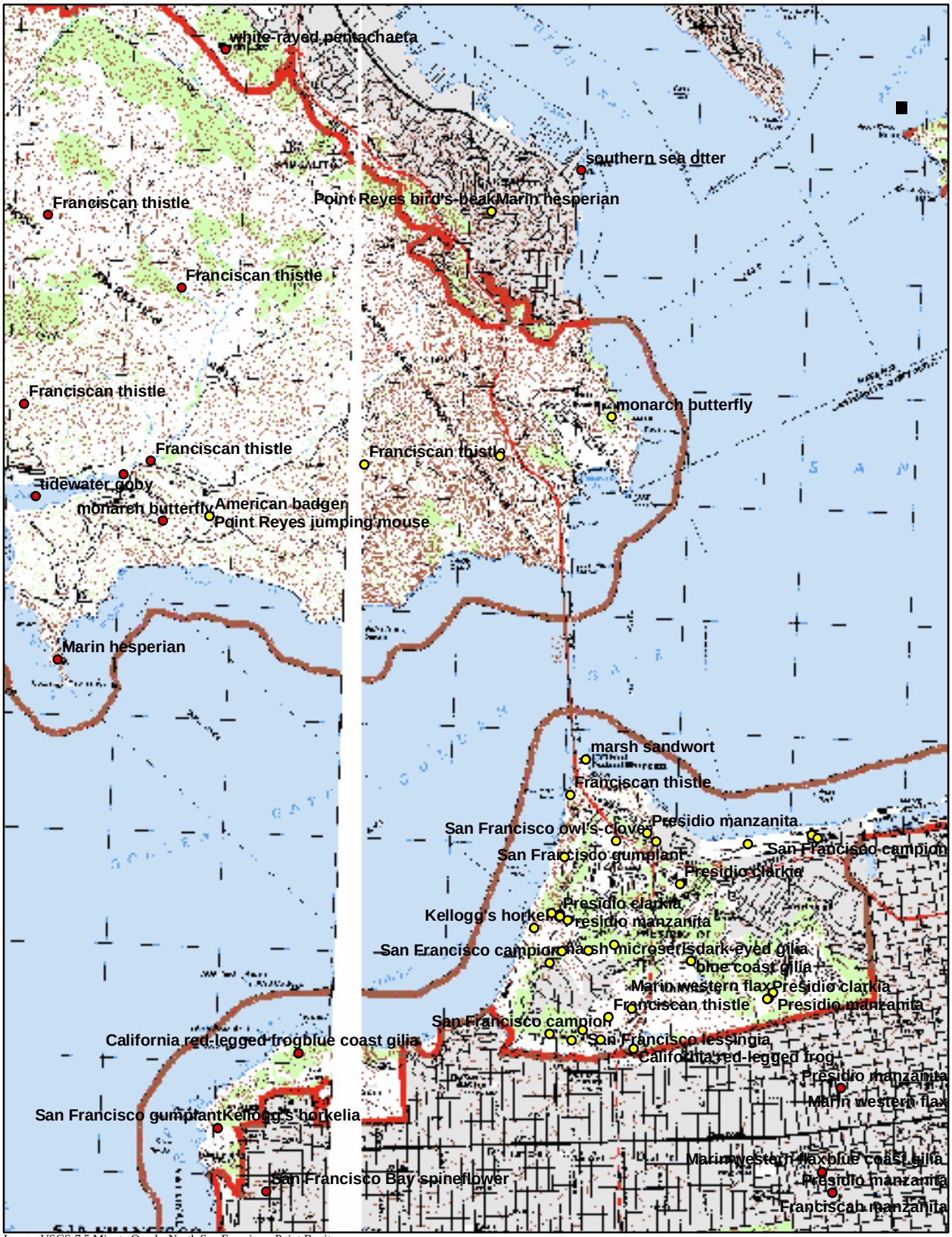


Image: USGS 7.5 Minute Quads: North San Francisco, Point Bonita
Data Source: CNDDB 2008

0 0.5 1 2 Miles

Documented within 2 miles of Bridge

Prepared by Pacific Biology, June 2008

## Appendix B
## Documented Special-Status Species in Project Area

# Appendix C

## US Fish and Wildlife Service Species List

**United States Department of the Interior**
FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

June 24, 2008

Document Number: 080624020134

Jeffrey Lee, PE - Project Manager
Golden Gate Bridge, Highway & Transportation District
PO Box 9000
San Francisco, CA 94129

Subject: Species List for Physical Suicide Deterrent Project

Dear: Mr. Lee

We are sending this official species list in response to your June 24, 2008 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be September 22, 2008.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at www.fws.gov/sacramento/es/branches.htm.

Endangered Species Division

TAKE PRIDE IN AMERICA

# Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 080624020134

Database Last Updated: January 31, 2008

No quad species lists requested.

## County Lists

### Marin County

#### Listed Species

##### Invertebrates

*Haliotes sorenseni*
white abalone (E) (NMFS)

*Icaricia icarioides missionensis*
mission blue butterfly (E)

*Incisalia mossii bayensis*
San Bruno elfin butterfly (E)

*Speyeria zerene myrtleae*
Myrtle's silverspot butterfly (E)

*Syncaris pacifica*
California freshwater shrimp (E)

##### Fish

*Acipenser medirostris*
green sturgeon (T) (NMFS)

*Eucyclogobius newberryi*
critical habitat, tidewater goby (X)
tidewater goby (E)

*Oncorhynchus kisutch*
coho salmon - central CA coast (E) (NMFS)
Critical habitat, coho salmon - central CA coast (X) (NMFS)

*Oncorhynchus mykiss*
Central California Coastal steelhead (T) (NMFS)
Critical habitat, Central California coastal steelhead (X) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)

*Oncorhynchus tshawytscha*
California coastal chinook salmon (T) (NMFS)
Central Valley spring-run chinook salmon (T) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

## Amphibians

*Ambystoma californiense*
California tiger salamander, central population (T)

*Rana aurora draytonii*
California red-legged frog (T)
Critical habitat, California red-legged frog (X)

## Reptiles

*Caretta caretta*
loggerhead turtle (T) (NMFS)

*Chelonia mydas (incl. agassizi)*
green turtle (T) (NMFS)

*Dermochelys coriacea*
leatherback turtle (E) (NMFS)

*Lepidochelys olivacea*
olive (=Pacific) ridley sea turtle (T) (NMFS)

## Birds

*Brachyramphus marmoratus*
Critical habitat, marbled murrelet (X)
marbled murrelet (T)

*Charadrius alexandrinus nivosus*
Critical habitat, western snowy plover (X)
western snowy plover (T)

*Diomedea albatrus*
short-tailed albatross (E)

*Pelecanus occidentalis californicus*
California brown pelican (E)

*Rallus longirostris obsoletus*
California clapper rail (E)

*Sternula antillarum (=Sterna, =albifrons) browni*
California least tern (E)

*Strix occidentalis caurina*
northern spotted owl (T)

## Mammals

*Arctocephalus townsendi*
Guadalupe fur seal (T) (NMFS)

*Balaenoptera borealis*
sei whale (E) (NMFS)

*Balaenoptera musculus*
blue whale (E) (NMFS)

*Balaenoptera physalus*
finback (=fin) whale (E) (NMFS)

*Eubalaena (=Balaena) glacialis*
right whale (E) (NMFS)

*Eumetopias jubatus*
Critical Habitat, Steller (=northern) sea-lion (X) (NMFS)
Steller (=northern) sea-lion (T) (NMFS)

*Megaptera novaeangliae*
humpback whale (E) (NMFS)

*Physeter catodon (=macrocephalus)*
sperm whale (E) (NMFS)

*Reithrodontomys raviventris*
salt marsh harvest mouse (E)

## Plants

*Alopecurus aequalis var. sonomensis*
Sonoma alopecurus (E)

*Calochortus tiburonensis*
Tiburon mariposa lily (T)

*Castilleja affinis ssp. neglecta*
Tiburon paintbrush (E)

*Chorizanthe robusta var. robusta*
robust spineflower (E)

*Chorizanthe valida*
Sonoma spineflower (E)

*Delphinium bakeri*
Baker's larkspur (E)
Critical habitat, Baker's larkspur (X)

*Delphinium luteum*
Critical habitat, yellow larkspur (X)
yellow larkspur (E)

*Hesperolinon congestum*
Marin dwarf-flax (=western flax) (T)

*Layia carnosa*
beach layia (E)

*Lupinus tidestromii*

clover lupine [Tidestrom's lupine] (E)

*Streptanthus niger*
Tiburon jewelflower (E)

*Trifolium amoenum*
showy Indian clover (E)

## Candidate Species

### Invertebrates

*Haliotes cracherodii*
black abalone (C) (NMFS)

## San Francisco County

### Listed Species

### Invertebrates

*Haliotes sorenseni*
white abalone (E) (NMFS)

*Icaricia icarioides missionensis*
mission blue butterfly (E)

*Incisalia mossii bayensis*
San Bruno elfin butterfly (E)

### Fish

*Acipenser medirostris*
green sturgeon (T) (NMFS)

*Eucyclogobius newberryi*
tidewater goby (E)

*Oncorhynchus kisutch*
coho salmon - central CA coast (E) (NMFS)

*Oncorhynchus mykiss*
Central California Coastal steelhead (T) (NMFS)
Critical habitat, Central California coastal steelhead (X) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)

*Oncorhynchus tshawytscha*
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

### Amphibians

*Rana aurora draytonii*
California red-legged frog (T)

### Reptiles

*Caretta caretta*
loggerhead turtle (T) (NMFS)

*Chelonia mydas (incl. agassizi)*
green turtle (T) (NMFS)

*Dermochelys coriacea*
leatherback turtle (E) (NMFS)

*Lepidochelys olivacea*
olive (=Pacific) ridley sea turtle (T) (NMFS)

## Birds

*Charadrius alexandrinus nivosus*
western snowy plover (T)

*Diomedea albatrus*
short-tailed albatross (E)

*Pelecanus occidentalis californicus*
California brown pelican (E)

*Rallus longirostris obsoletus*
California clapper rail (E)

## Mammals

*Arctocephalus townsendi*
Guadalupe fur seal (T) (NMFS)

*Balaenoptera borealis*
sei whale (E) (NMFS)

*Balaenoptera musculus*
blue whale (E) (NMFS)

*Balaenoptera physalus*
finback (=fin) whale (E) (NMFS)

*Eubalaena (=Balaena) glacialis*
right whale (E) (NMFS)

*Eumetopias jubatus*
Critical Habitat, Steller (=northern) sea-lion (X) (NMFS)
Steller (=northern) sea-lion (T) (NMFS)

*Megaptera novaeangliae*
humpback whale (E) (NMFS)

*Physeter catodon (=macrocephalus)*
sperm whale (E) (NMFS)

*Reithrodontomys raviventris*
salt marsh harvest mouse (E)

### Plants

*Arctostaphylos hookeri ssp. ravenii*
Presidio (=Raven's) manzanita (E)

*Clarkia franciscana*
Presidio clarkia (E)

*Hesperolinon congestum*
Marin dwarf-flax (=western flax) (T)

*Lessingia germanorum*
San Francisco lessingia (E)

## Candidate Species

### Invertebrates

*Haliotes cracherodii*
black abalone (C) (NMFS)

## Key:

(E) *Endangered* - Listed as being in danger of extinction.
(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.
(NMFS) Species under the Jurisdiction of theNational Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
*Critical Habitat* - Area essential to the conservation of a species.
(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
(C) *Candidate* - Candidate to become a proposed species.
(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
(X) *Critical Habitat* designated for this species

## Important Information About Your Species List

### How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within,**or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

### Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

## Surveying

Some of the species on your list may not be affected by your project. A trained biologist or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.

For plant surveys, we recommend using theGuidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

## Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

## Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

## Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated ascritical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See ourcritical habitat page for maps.

## Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

## Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

## Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

## Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be September 22, 2008.

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# Appendix D

## Golden Gate Bridge Physical Suicide Deterrent System Project
## Project Description

# 1.0 DESCRIPTION OF THE PROPOSED PROJECT

The Golden Gate Bridge (Bridge) is owned and operated by the Golden Gate Bridge, Highway and Transportation District. It is located within the San Francisco Bay Area. The proposed project is located in the City and County of San Francisco and Marin County (see Figure 1). The project proposes to construct a physical suicide deterrent system along both sides of the Golden Gate Bridge (Bridge). As shown on Figure 1, the project limits are from the San Francisco Abutment to the Marin Abutment of the Bridge.

## 1.1 PROJECT DESCRIPTION

Several build alternatives have been developed that meet the purpose and need for the project and additional criteria established by the Golden Gate Bridge, Highway and Transportation District (District). The following describes alternatives under consideration.

The alternatives were developed after the first phase of the project, wind tunnel testing, was completed. Wind tunnel testing on the generic concepts was performed first in order to determine the limiting characteristics of each concept with respect to wind. The wind tunnel testing and analysis determined that any physical addition to the Bridge would adversely affect the Bridge's aerodynamic stability. However, testing also determined that wind devices could be installed to mitigate the adverse effects associated with the additions.

All of the build alternatives developed and included in this document require the addition of one of two different types of wind devices. The first type of wind device is called a fairing and consists of a curved element placed at two locations below the sidewalk on the top chord of the west stiffening truss. The second type of wind device is called a winglet and consists of a curved element placed above the sidewalk at the top of the alternative posts.

Previous projects at the Bridge, such as the Public Safety Railing Project (2003) and the Seismic Retrofit Project (currently underway) were subject to Section 106 and Section 4(f) evaluations and CEQA environmental analysis. The fairing wind device and modifications to the outside handrail were previously evaluated as part of the District's seismic retrofit program. No adverse Section 106 effects or Section 4(f) uses were identified for either project.

### 1.1.1 Build Alternatives

**Alternative 1A-Add Vertical System to Outside Handrail**

Alternative 1A would construct a new barrier on top of the outside handrail (and concrete rail at north anchorage housing and north pylon). The barrier would extend 8 feet vertically from the top of the 4-foot-high outside handrail for a total height of 12 feet. The barrier's vertical members would be comprised of ½-inch diameter vertical rods spaced at 6 ½ inches on center, leaving a 6-inch clear space between rods. The existing rail posts would be replaced with new 12-foot-high outside rail posts at the same locations and of the same cross-section, size, material, and color of the original posts. The top horizontal header would consist of a chevron-shaped member matching the top element

of the outside handrail. The vertical rods would be attached to the horizontal header and outside handrail. The entire system would be constructed of steel that would be painted International Orange to match the material and color of the outside handrail. Transparent panels would be installed at the belvederes (widened areas located on both the east and west sidewalks) and towers on both sides of the Bridge. Transparency would be preserved through ongoing maintenance of the panels. This alternative assumes that the modification to the outside handrail on the west side of the Bridge between the two main towers and the installation of the wind fairings have been completed as part of the previously approved seismic retrofit project.

Because maintenance workers would no longer be able to climb over the outside handrail to reach the below-deck maintenance traveler, gates would be located at a spacing of 150 feet on center to generally match the locations of the existing light posts and gates on the public safety railing. The gates would be 8 feet wide and 8 feet high (two 4-foot-wide by 8-foot-high panels), and match the appearance of the vertical system. The frame for each gate door would be constructed of 2-inch by 2-inch steel members. The gates would be located on top of the outside handrail. The outside handrail would remain in place.

**Alternative 1B – Add Horizontal System to Outside Handrail**

Alternative 1B would construct a new barrier on top of the outside handrail (and concrete rail at north anchorage housing and north pylon) consisting of ⅜-inch diameter horizontal steel cables at 6 inches on center leaving 5 ⅝ inches clear space between cables. The cable diameter matches the cables on the public safety railing. The new barrier would extend 8 feet above the top of the 4-foot-high outside handrail for a total height of 12 feet. The existing rail posts would be replaced with new 12-foot-high outside rail posts at the same locations and of the same cross-section, size, material, and color of the original posts. The entire system would be constructed of steel that would be painted International Orange to match the material and color of the outside handrail. Transparent panels would be installed at the belvederes and towers on both sides of the Bridge. Transparency would be preserved through ongoing maintenance of the panels.

A transparent winglet would be placed on top of the outside rail posts to ensure aerodynamic stability and impede climbing over the barrier. The winglet would be a transparent 42-inch-wide panel with a slight concave curvature extending approximately 2 feet over the sidewalk. The transparent winglet would run the length of the suicide deterrent barrier, except at the north and south towers. The transparent winglet would be notched at the suspender ropes and light posts.

Because maintenance workers would no longer be able to climb over the outside handrail to reach the below-deck maintenance traveler, gates would be located at a spacing of 150 feet on center to generally match the locations of the existing light posts and gates on the public safety railing. The gates would be 8 feet wide and 8 feet high (two 4-foot-wide by 8-foot-high panels), and match the appearance of the horizontal system. The frame for each gate door would be constructed of 2-inch by 2-inch steel members. The gates would be located on top of the outside handrail. The outside handrail would remain in place.

## Alternative 2A – Replace Outside Handrail with Vertical System

Alternative 2A would construct a new vertical 12-foot-high barrier consisting of ½-inch diameter vertical steel rods spaced at 4 ½ inches on center, leaving a 4-inch clear space between rods. A rub rail would be installed at the same height as the public safety railing (4 feet 6 inches). The existing rail posts would be replaced with new 12-foot-high outside rail posts at the same locations and of the same cross-section, size, material, and color of the original posts. The top horizontal header would consist of a chevron-shaped member matching the top element of the outside handrail to be removed. The vertical rods would be attached to the header and bottom barrier element. The entire system would be constructed of steel that is painted International Orange to match the material and color of the outside handrail. Transparent panels would be installed along the upper 8 feet at the belvederes and towers on both sides of the Bridge. Transparency would be preserved through ongoing maintenance of the panels. This alternative assumes that the modification to the outside handrail on the west side of the Bridge between the two main towers and the installation of the wind fairings have been completed as part of the previously approved seismic retrofit project.
Because maintenance workers would no longer be able to climb over the outside handrail to reach the below-deck maintenance traveler, gates would be located at a spacing of 150 feet on center to generally match the locations of the existing light posts and gates on the public safety railing. The gates would be 8 feet wide (two 4-foot-wide panels) and 12 feet high, and match the appearance of the vertical system. The frame for each gate door would be constructed of 2-inch by 2-inch steel members. A rub rail would be located at a height of 4 feet 6 inches, matching the height of the public safety railing.

## Alternative 2B – Replace Outside Handrail with Horizontal System

Alternative 2B would construct a new 10-foot-high barrier consisting of ⅜-inch diameter steel horizontal cables. The cables in the lower 3 ½ foot section would be spaced at 4.4 inches on center, while the cables in the upper 6 ½ foot section would be spaced 6 inches on center. A rub rail would be installed at the same height as the public safety railing (4 feet 6 inches). The existing rail posts would be replaced with new 10-foot-high outside rail posts at the same locations and of the same cross-section, size, material, and color of the original posts. The entire system would be constructed of steel that would be painted International Orange to match the material and color of the outside handrail. Transparent panels would be installed along the upper 6½-foot portion at the belvederes and towers on both sides of the Bridge. Transparency would be preserved through ongoing maintenance of the panels.

A transparent winglet would be placed on top of the rail posts to ensure aerodynamic stability and impede climbing over the barrier. The winglet would be a clear 42-inch-wide transparent panel with a slight concave curvature extending approximately 2 feet over the sidewalk. The transparent winglet would run the length of the suicide deterrent barrier, except at the north and south towers. The transparent winglet would be notched at the suspender ropes and light posts.

Because maintenance workers would no longer be able to climb over the outside handrail to reach the below-deck maintenance traveler, gates would be located at a spacing of 150 feet on center to generally match the locations of the existing light posts and gates on the public safety railing. The gates would be 8 feet wide (two 4-foot-wide

panels) and 10 feet high, and match the appearance of the horizontal system. The frame for each gate door would be constructed of 2-inch by 2-inch steel members. A rub rail would be located at a height of 4 feet 6 inches, matching the height of the public safety railing.

**Alternative 3 – Add Net System**

Alternative 3 would construct a horizontal net approximately 20 feet below the sidewalk and approximately 5 feet above the bottom chord of the exterior main truss. Use of such net installations for suicide prevention on other facilities have resulted in greatly reduced fatalities and suicide attempts. Should individuals jump, they would be expected to survive the fall and could be rescued. The net would extend horizontally approximately 20 feet from the Bridge and be covered with stainless steel cable netting incorporating a grid between 4 and 10 inches. The horizontal support system would connect directly to the exterior truss and be supported by cables back to the top chord of the truss. The support system for the netting would include cables that would pre-stress the netting to help keep it taut and not allow the wind to whip the netting.

The horizontal net would consist of independent 25-foot sections that could be rotated vertically against the truss to allow the maintenance travelers to be moved. The net and the steel horizontal support system would be painted to match the International Orange Bridge color. With this alternative, there would be no modifications to the above-deck Bridge features. This alternative assumes that the modification to the outside handrail on the west side of the Bridge between the two main towers and the installation of the wind fairings have been completed as part of the previously approved seismic retrofit project.

### 1.1.2 No-Build Alternative

The No-Build Alternative represents an alternative and a baseline for future year conditions if no other actions are taken in the study area beyond what is already in place. Under this alternative, the Bridge's sidewalks would remain open to the public, with the existing outside railing remaining four (4) feet high. The No-Build Alternative would continue the existing non-physical suicide deterrent programs at the Bridge, which include emergency counseling telephones, public safety patrols, and employee training. These programs are more fully described in Chapter 1 of the EIR/EA.

Individuals of varying heights, weights, ages, and sexes, not using the Bridge sidewalks for their intended purpose, could climb over the existing railing and jump to their death. There would be no other physical barrier preventing an individual from jumping, if the railing were to be scaled. Suicide rates under this alternative would likely follow historical trends as indicated below.

- In 2005, there were 622 known suicides in the nine Bay Area counties, of which 23 were estimated to occur at the Bridge. Further, in that same year, 58 persons contemplating suicide were successfully stopped. In 2006, 31 suicides are known to have occurred at the Bridge, while 57 individuals were stopped. Similarly, in 2007, 39 suicides occurred and 90 were stopped. The individuals taken off of the Bridge are transported to a local hospital for a psychiatric evaluation pursuant to Section 5150 of the California Welfare and Institutions Code.

- A variety of non-physical measures to deter suicides on the Bridge have been in place for many years. However, there are still approximately two dozen deaths that occur each year as a result of individuals jumping off the Bridge. The non-physical measures have stopped approximately two-thirds of those individuals with the intent to commit suicide at the Bridge; despite these measures one-third are not prevented.

- Although official figures have not been maintained through the years, since 1937 it is estimated that approximately 1,300 individuals have committed suicide by jumping off of the Bridge.

### 1.1.3 Construction Activities

Construction of any of the physical suicide deterrent system build alternatives would be performed in sections, beginning on the west side of the Bridge and ending on the east side of the Bridge. It is anticipated that it would take 12 to 18 months per side to complete installation of any of the alternatives. Construction operations would be staged to minimize effects on pedestrians, cyclists and motor vehicles using the Bridge.

The work on the west sidewalk would be specified to be performed weekdays during the hours when the sidewalk is not open to the public, so as not to affect the commuter and recreational use on the west sidewalk. The work on the east sidewalk would be specified to be performed primarily at night. Should it be necessary to perform work during the day on the east sidewalk, a 6-foot wide minimum clear passageway would be maintained through the work area with appropriate traffic control and other protective measures in place. These provisions have been successfully used on the seismic retrofit project, the Public Safety Railing project and during the District's on-going maintenance and operations activities.

Anticipated equipment needed during construction of the alternatives would include a boom truck for delivery of material, a crane, welding equipment, a generator, lighting for night work, and general power hand tools.

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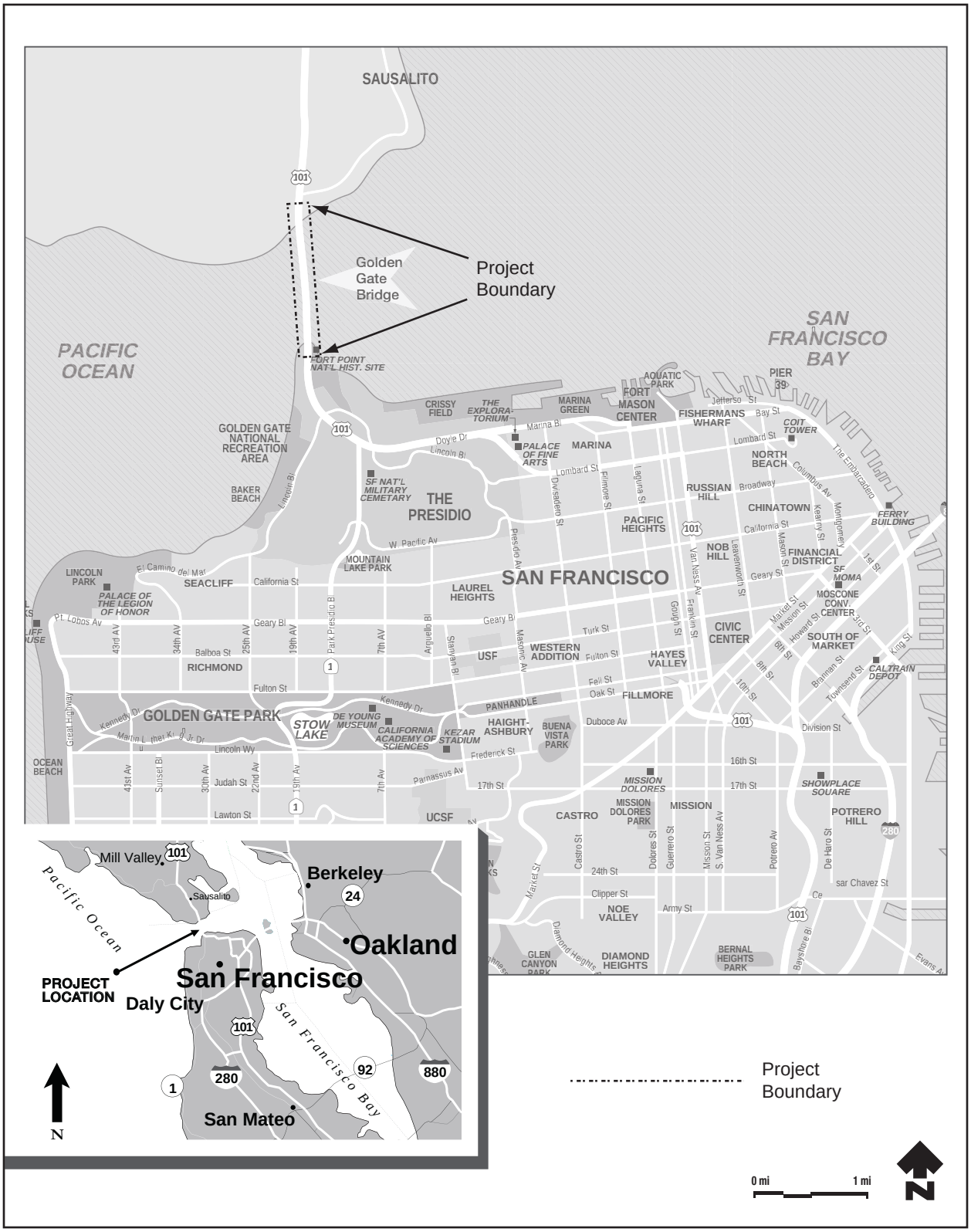



FIGURE 1-1
**PROJECT LOCATION**

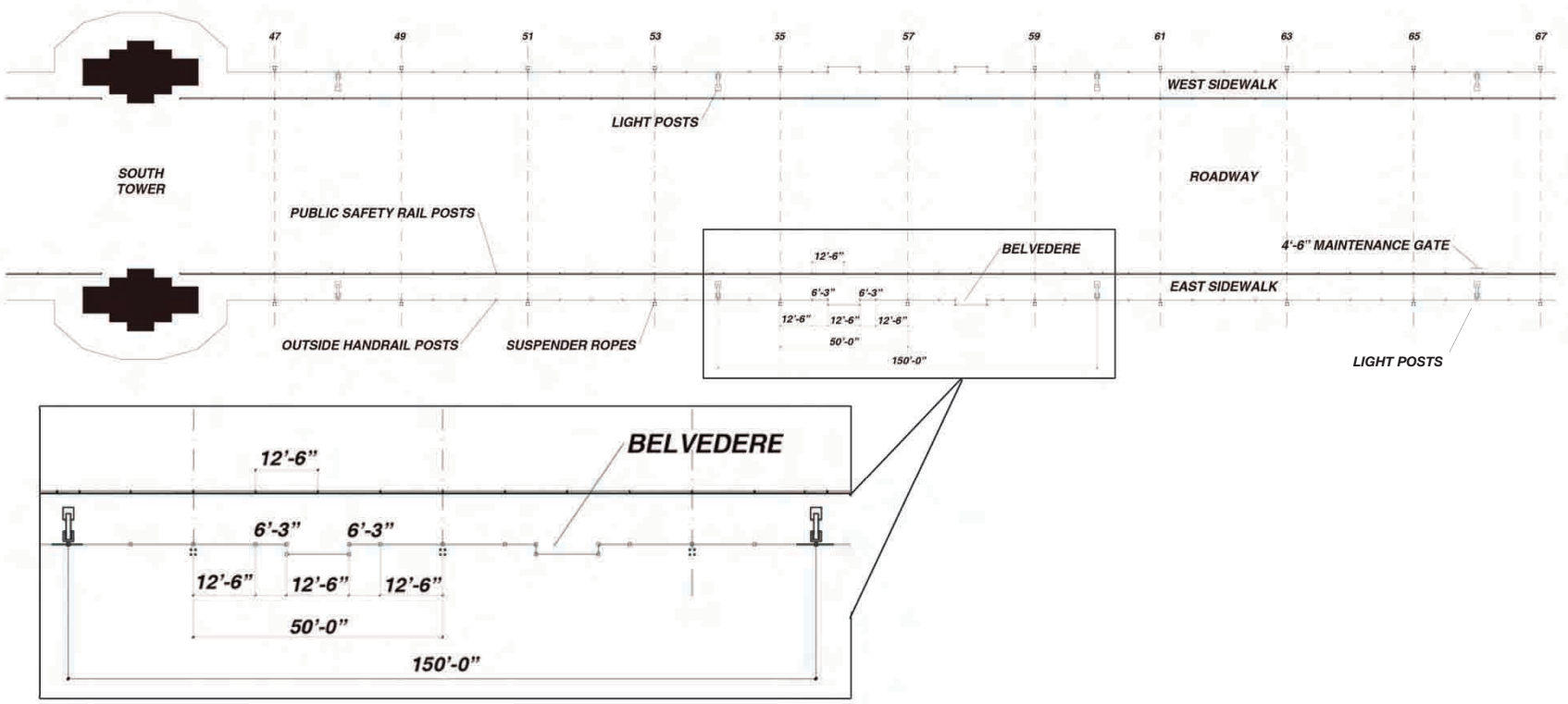
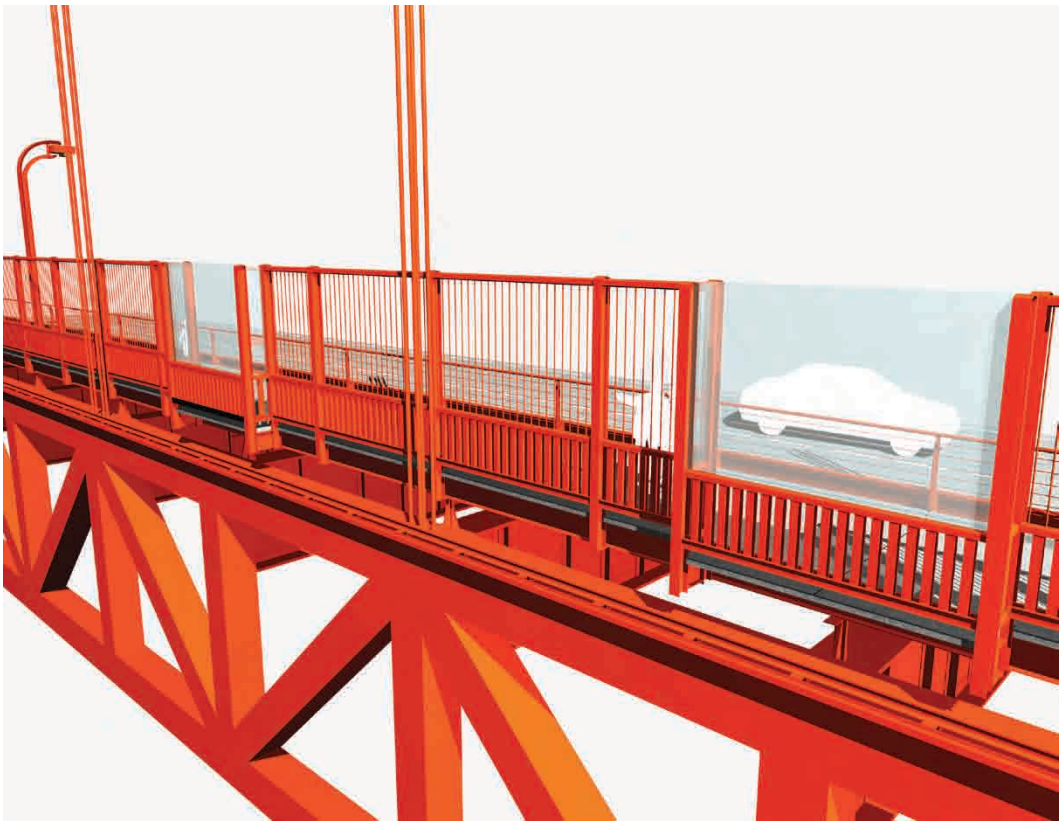



FIGURE 1-2
**PLAN VIEW OF BRIDGE**

Source: macdonald architects, 2008

*ALTERNATIVE 1A: ELEVATION EAST SIDE*

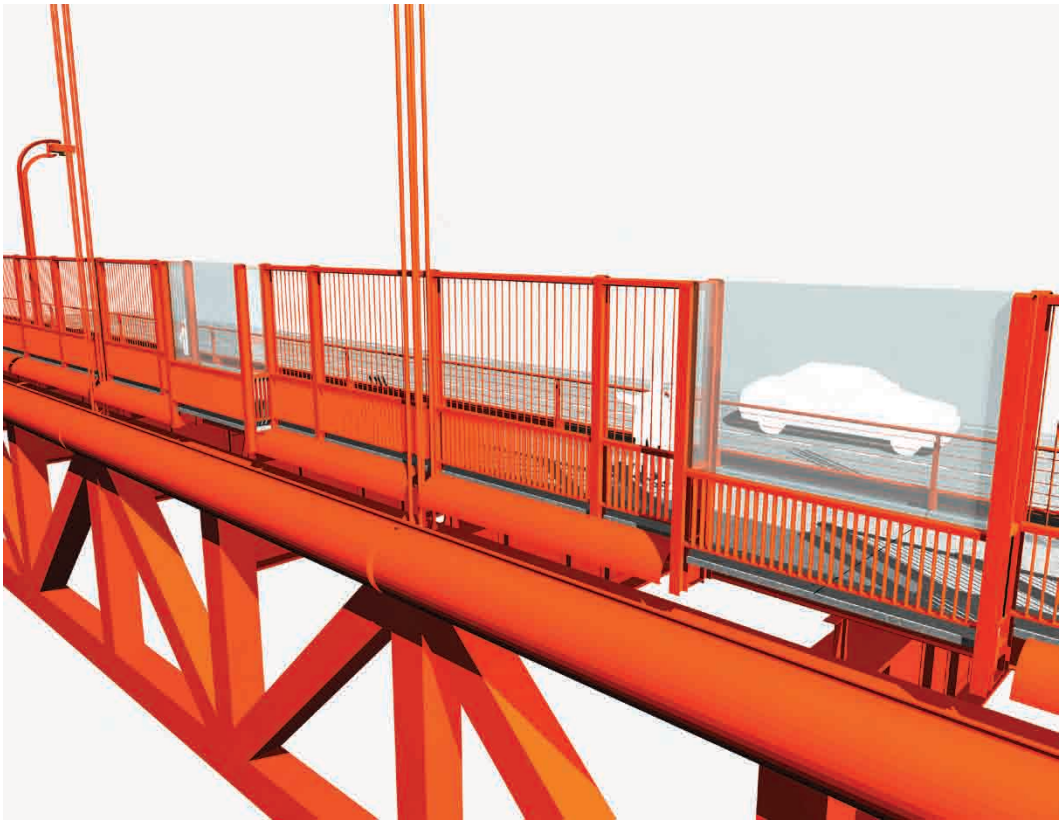


*ALTERNATIVE 1A: EXTERIOR VIEW EAST SIDE*

FIGURE 1-3
**ALTERNATIVE 1A: ILLUSTRATIONS**

Source: macdonald architects, 2008

*ALTERNATIVE 1A: VIEW FROM ROAD*



*ALTERNATIVE 1A: EXTERIOR VIEW WEST SIDE*

FIGURE 1-4
**ALTERNATIVE 1A: ILLUSTRATIONS**

Source: macdonald architects, 2008

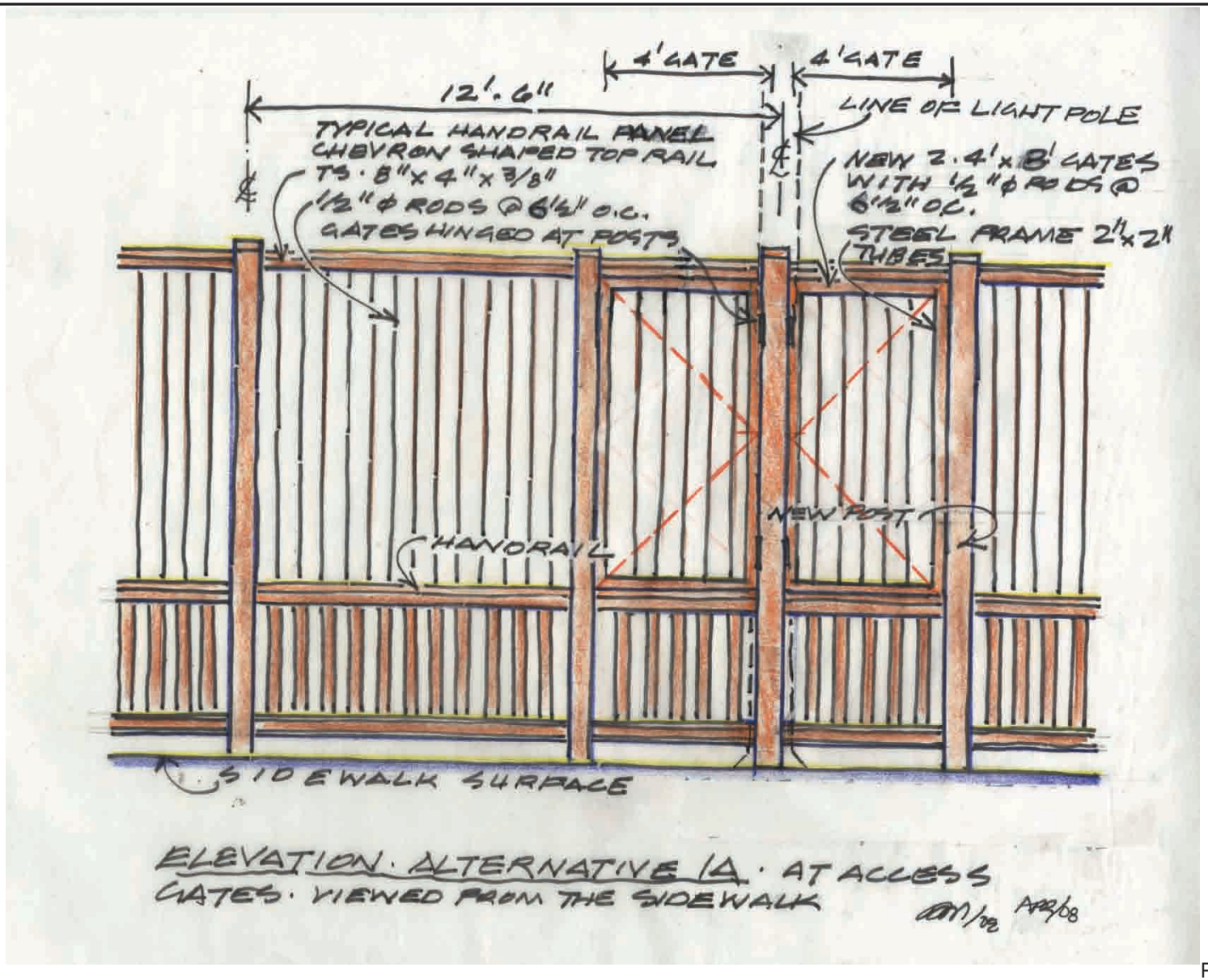



FIGURE 1-5
**ALTERNATIVE 1A: ELEVATION AT ACCESS GATES**

Source: macdonald architects, 2008

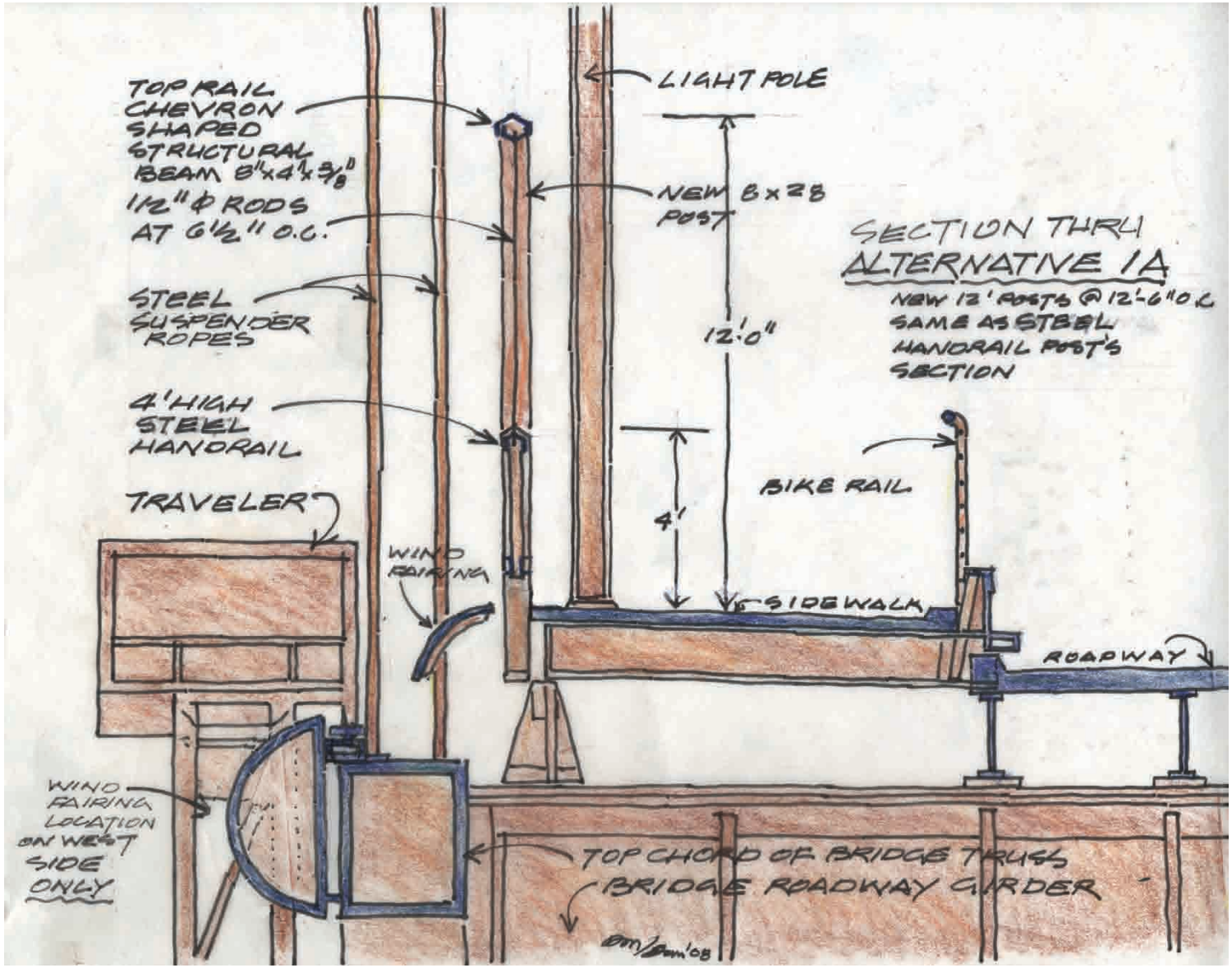



FIGURE 1-6
**ALTERNATIVE 1A: CROSS SECTION**

Source: macdonald architects, 2008

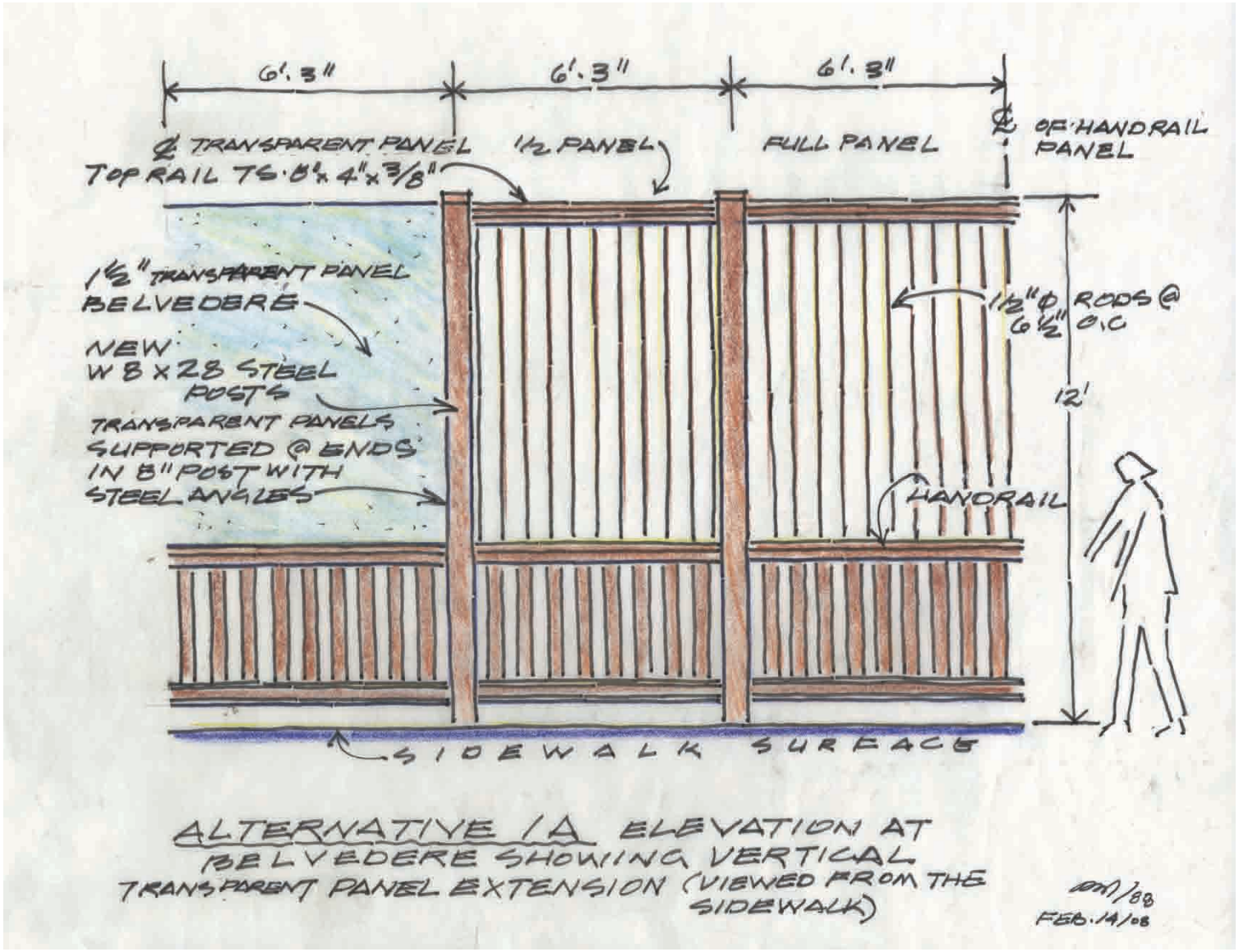
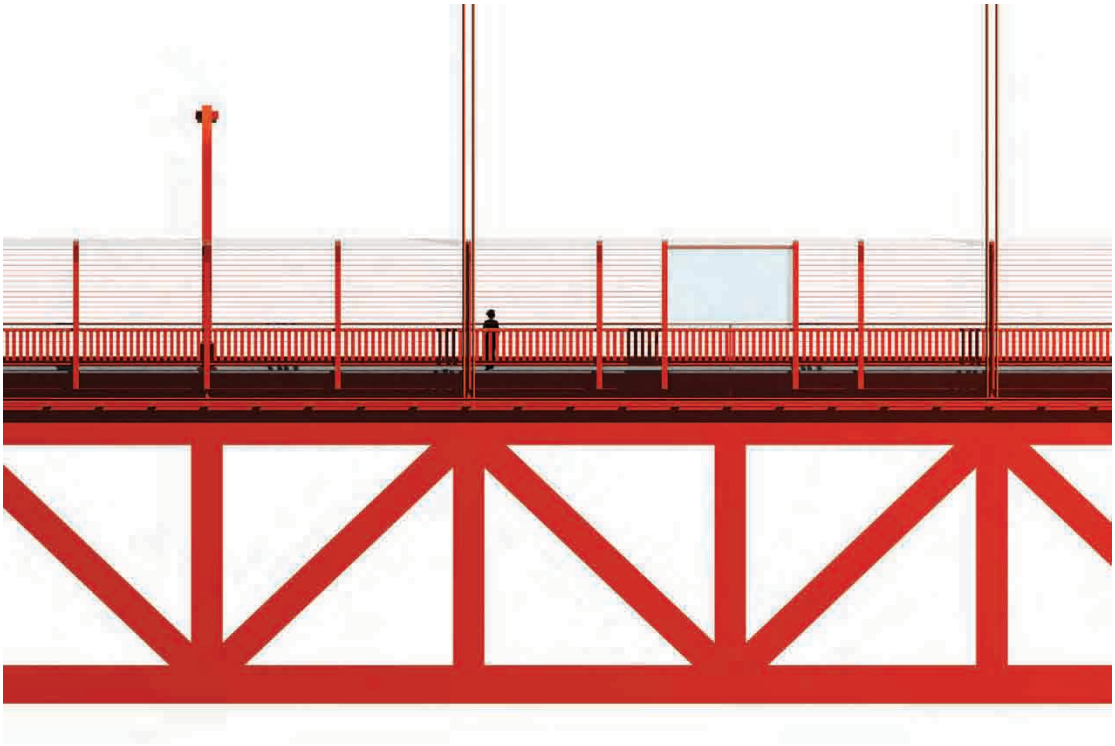
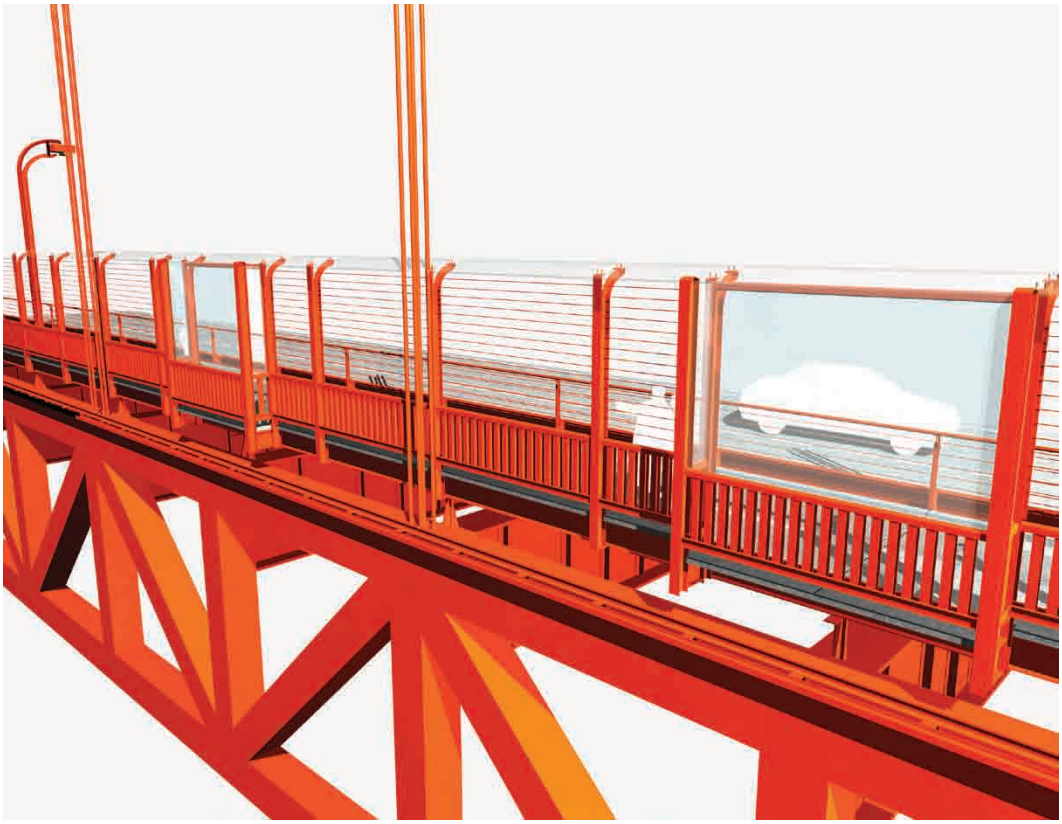



FIGURE 1-7
**ALTERNATIVE 1A: ELEVATION AT BELVEDERE**

Source: macdonald architects, 2008



*ALTERNATIVE 1B: ELEVATION EAST SIDE*



*ALTERNATIVE 1B: EXTERIOR VIEW EAST SIDE*

FIGURE 1-8
**ALTERNATIVE 1B: ILLUSTRATIONS**

Source: macdonald architects, 2008

*ALTERNATIVE 1B: VIEW FROM ROAD*

*ALTERNATIVE 1B: EXTERIOR VIEW WEST SIDE*

FIGURE 1-9
**ALTERNATIVE 1B: ILLUSTRATIONS**

Source: macdonald architects, 2008

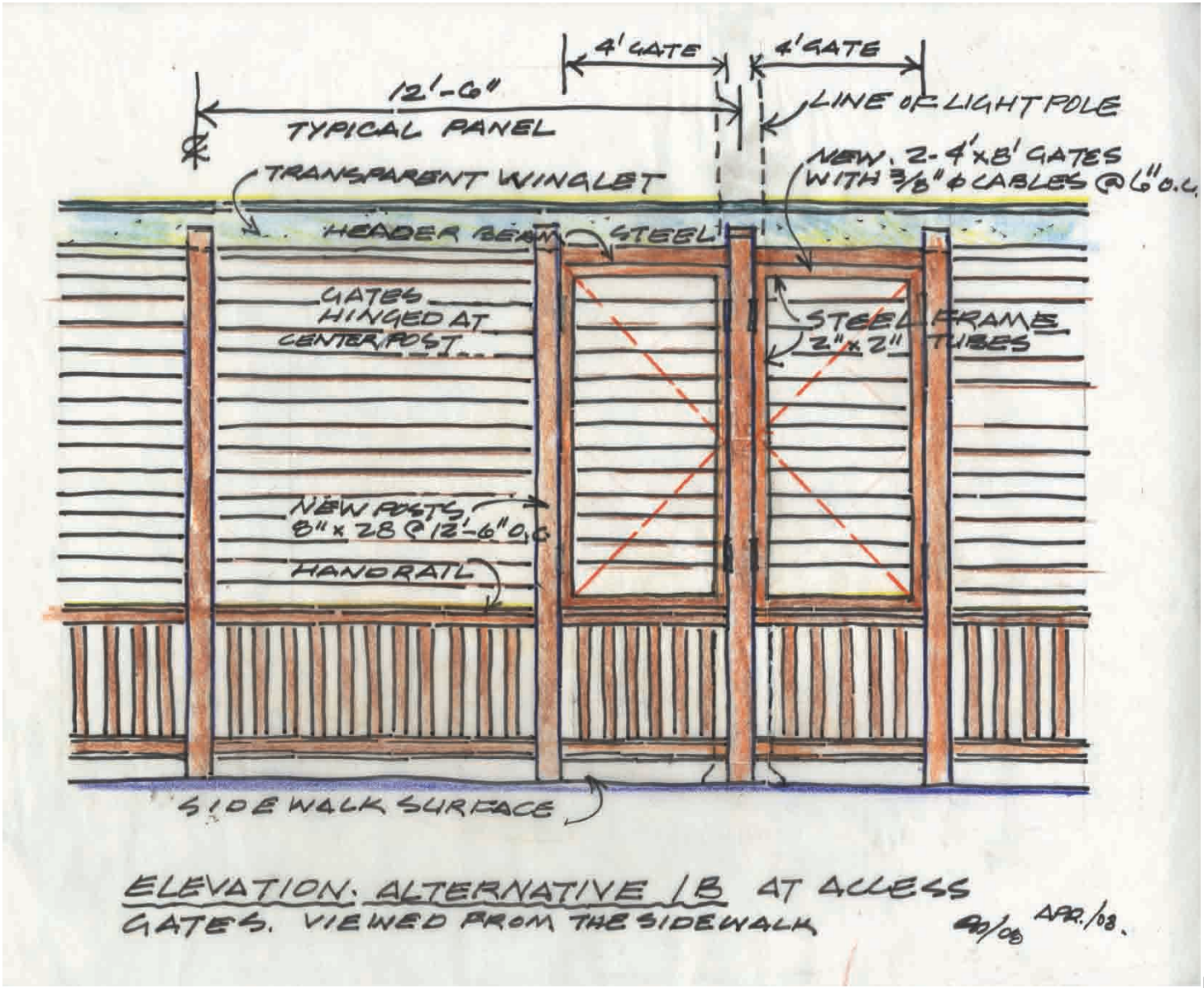



FIGURE 1-10
**ALTERNATIVE 1B: ELEVATION AT ACCESS GATES**

Source: macdonald architects, 2008

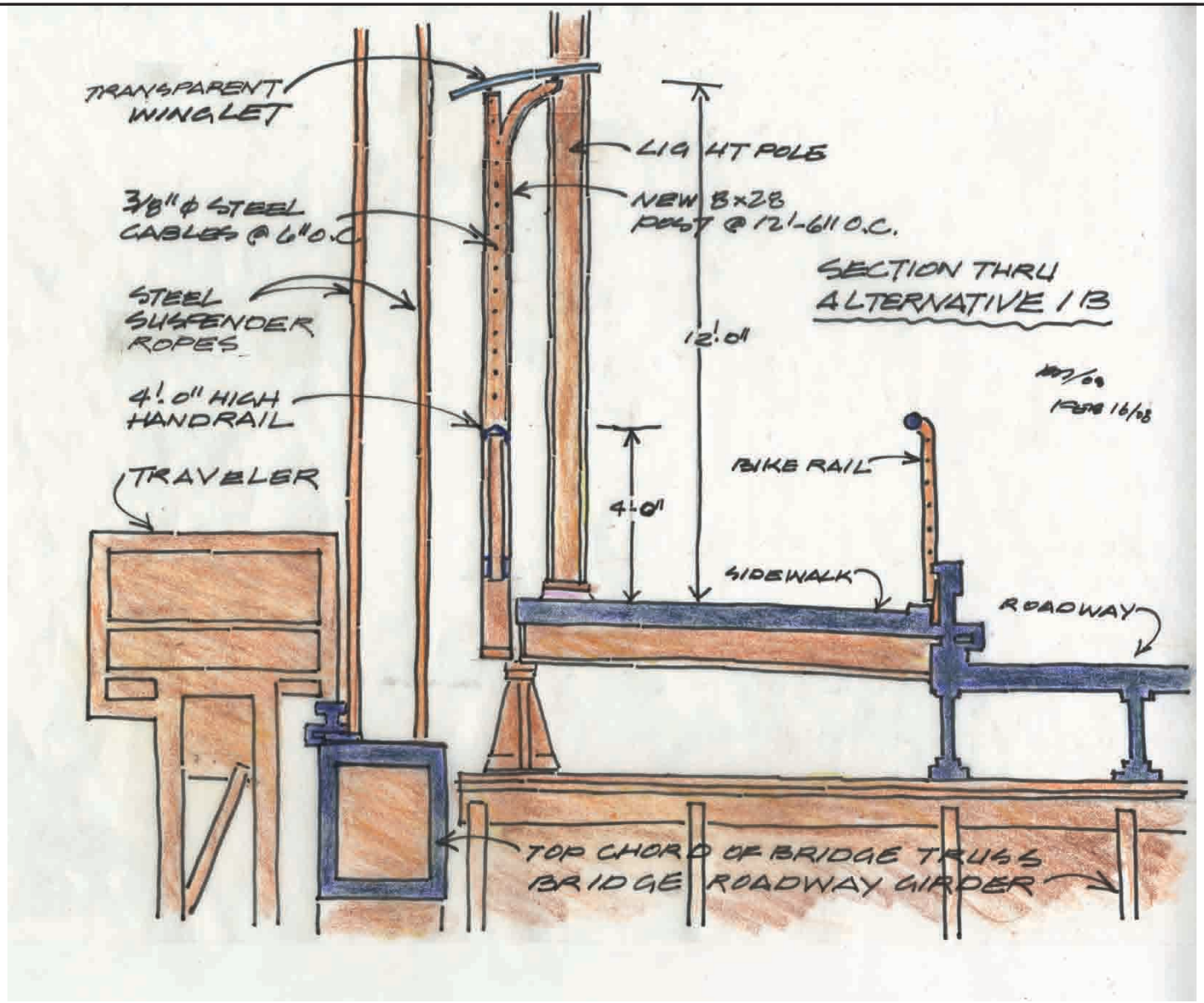



FIGURE 1-11
**ALTERNATIVE 1B: CROSS SECTION**

Source: macdonald architects, 2008

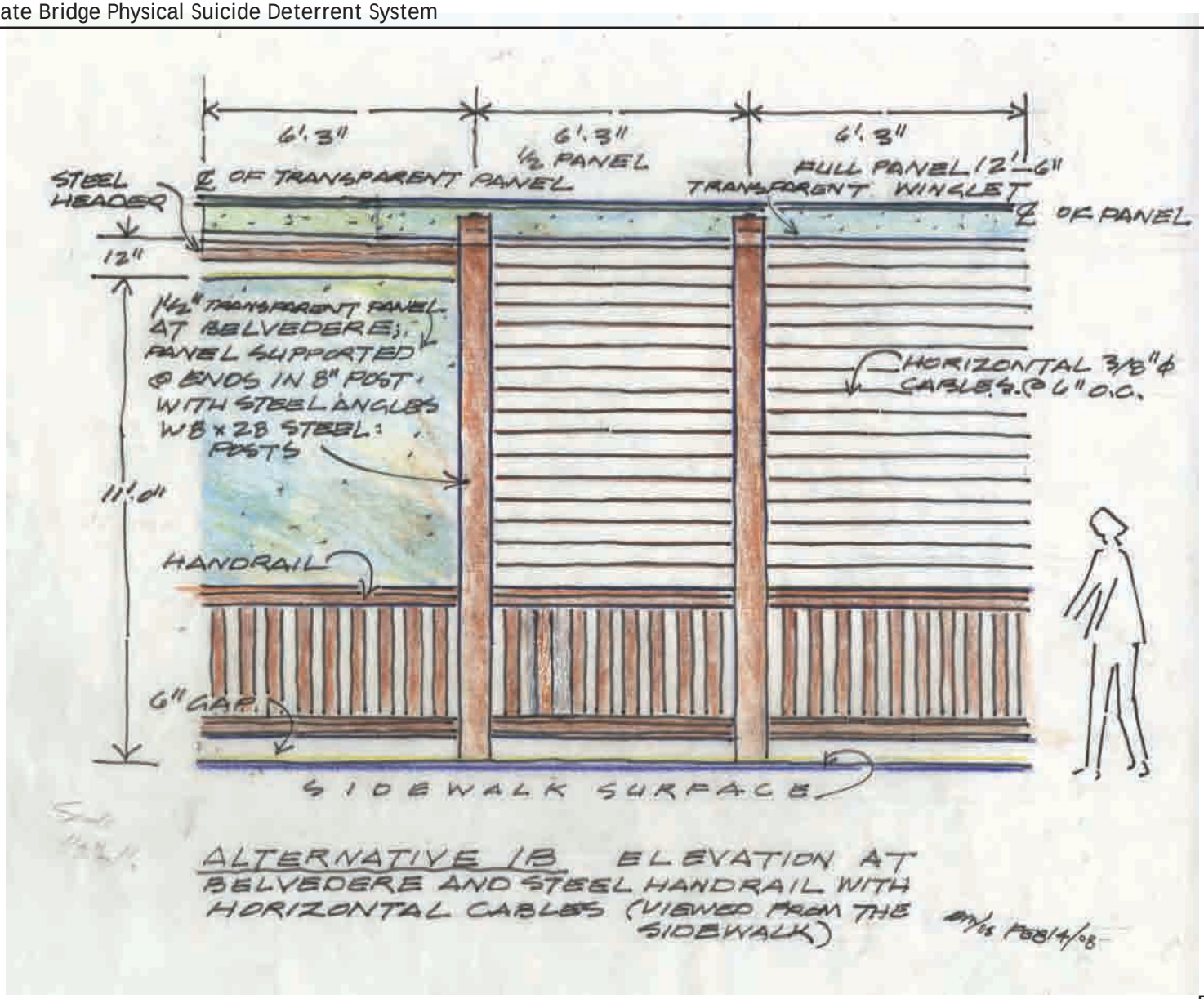
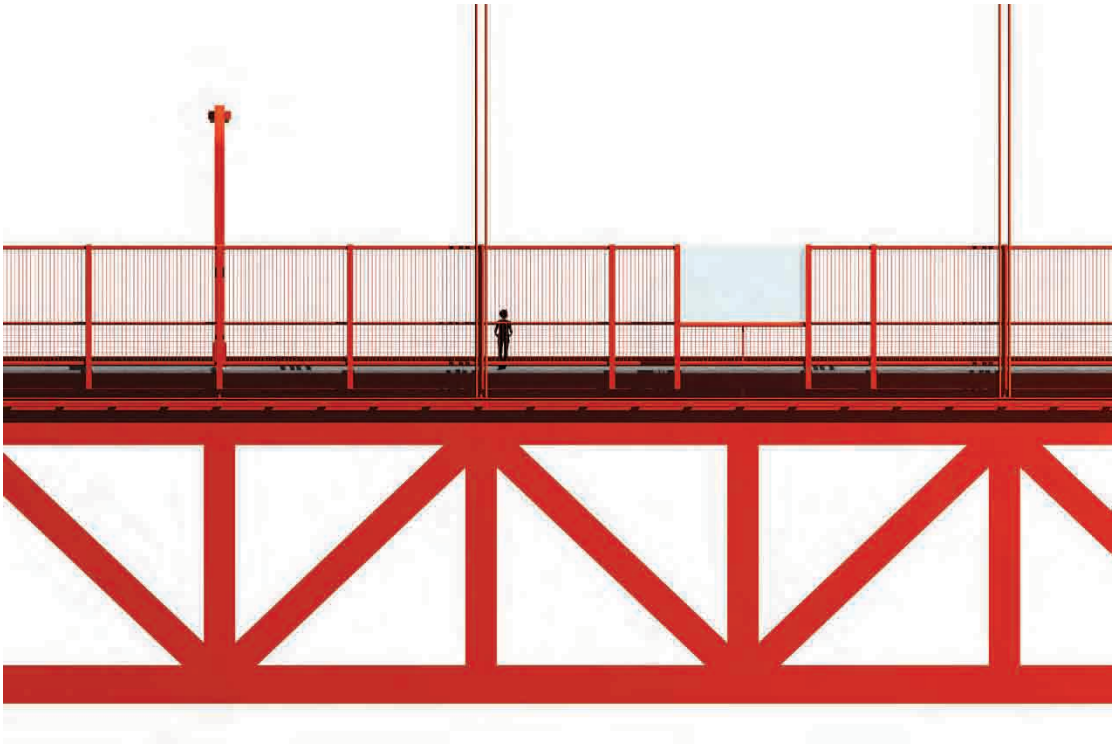
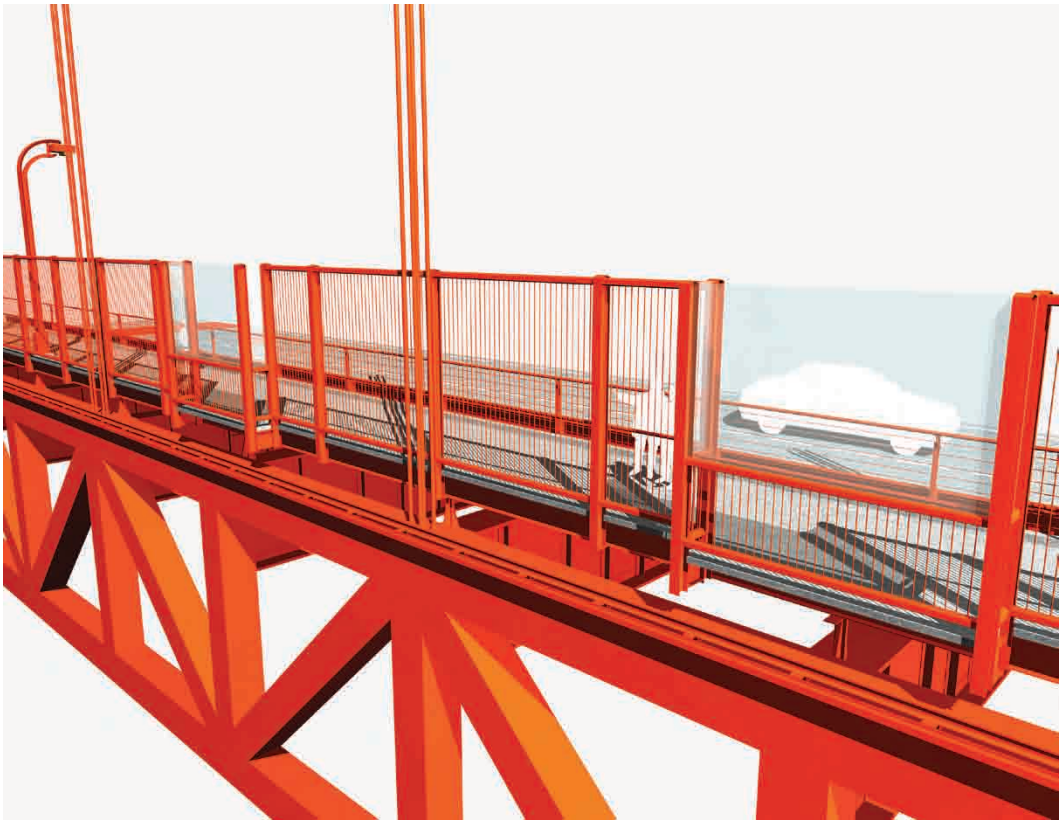



FIGURE 1-12
**ALTERNATIVE 1B: ELEVATION AT BELVEDERE**

Source: macdonald architects, 2008



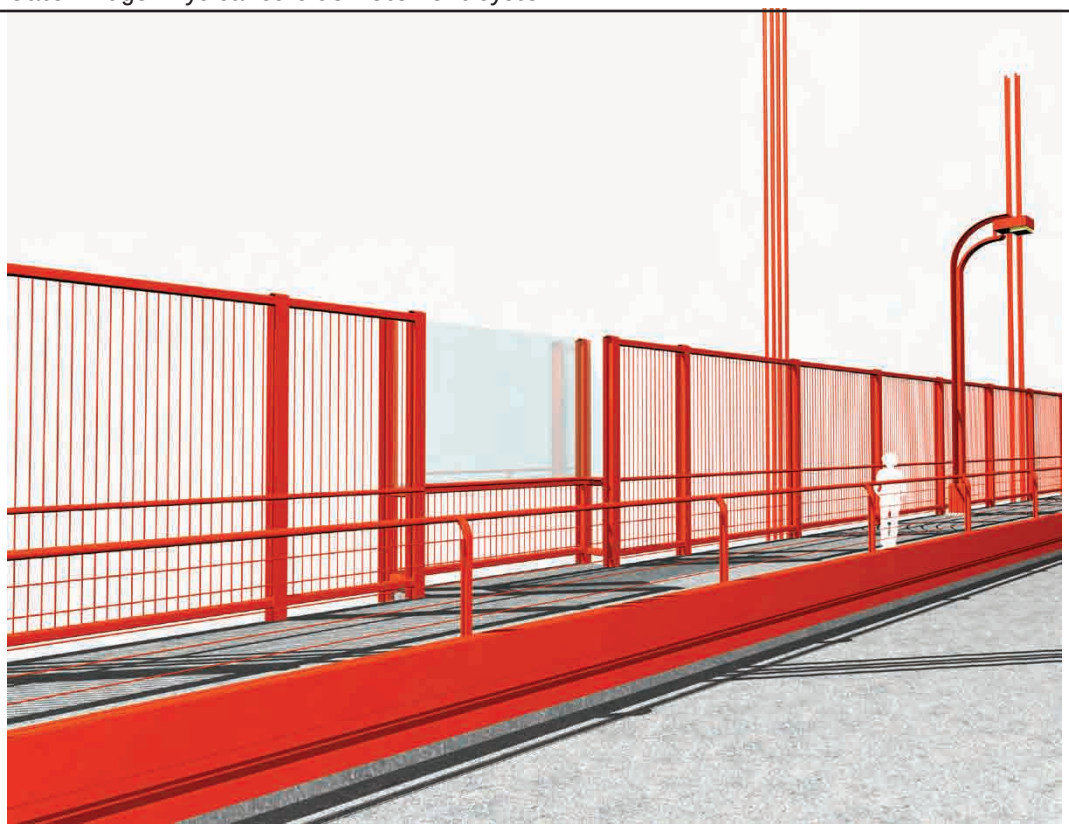
***ALTERNATIVE 2A: ELEVATION EAST SIDE***



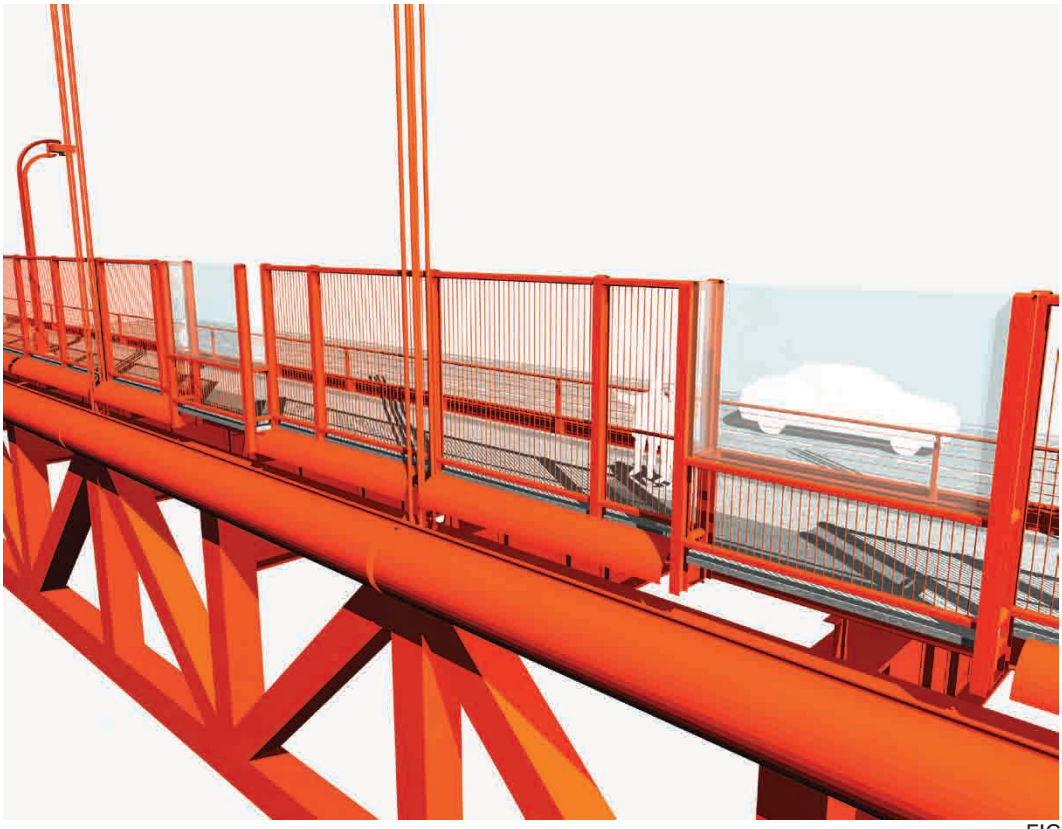
***ALTERNATIVE 2A: EXTERIOR VIEW EAST SIDE***

FIGURE 1-13
**ALTERNATIVE 2A: ILLUSTRATIONS**

Source: macdonald architects, 2008



***ALTERNATIVE 2A: VIEW FROM ROAD***



***ALTERNATIVE 2A: EXTERIOR VIEW WEST SIDE***

FIGURE 1-14
**ALTERNATIVE 2A: ILLUSTRATIONS**

Source: macdonald architects, 2008

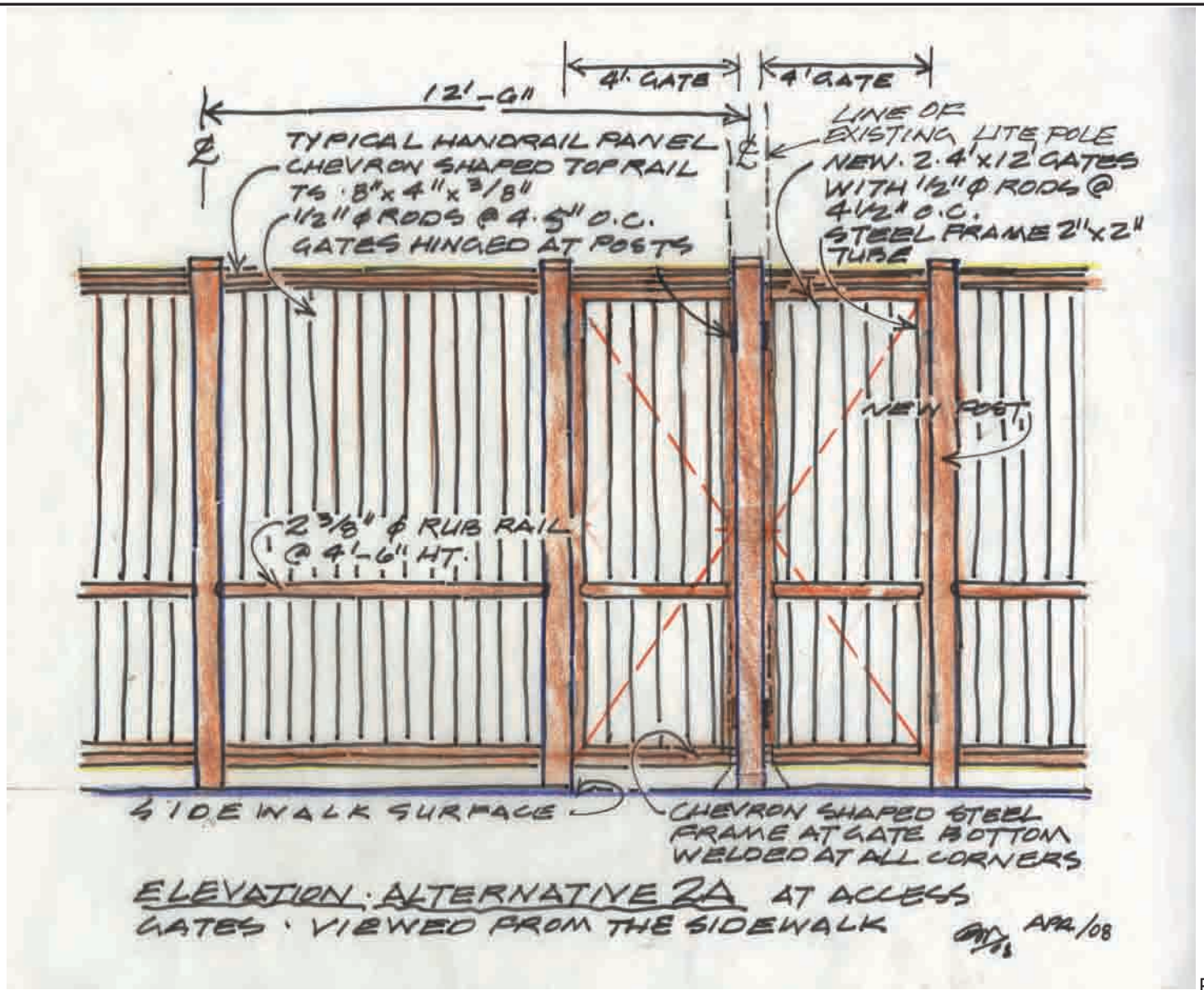



FIGURE 1-15

**ALTERNATIVE 2A: ELEVATION AT ACCESS GATES**

Source: macdonald architects, 2008

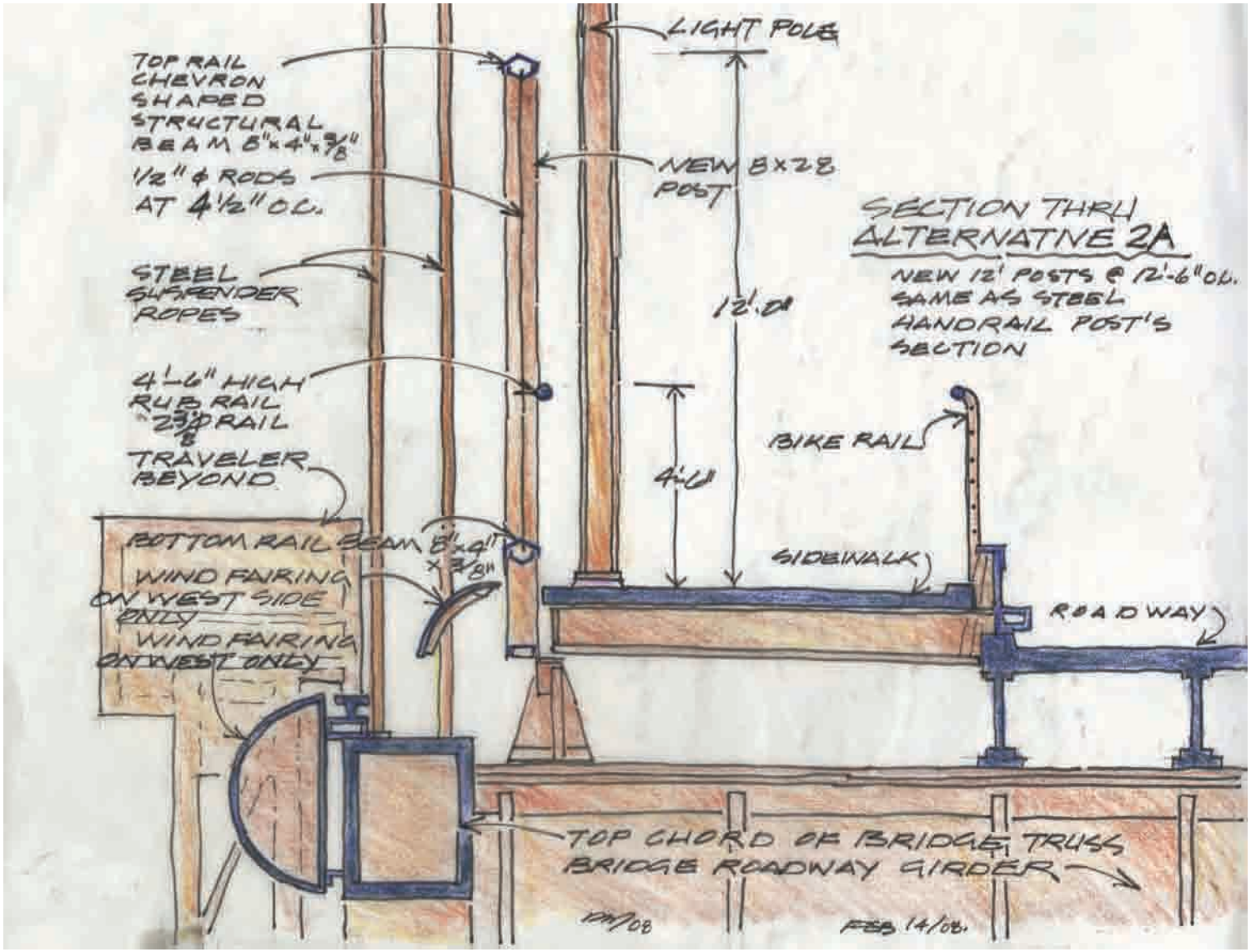



FIGURE 1-16
**ALTERNATIVE 2A: SECTION**

Source: macdonald architects, 2008

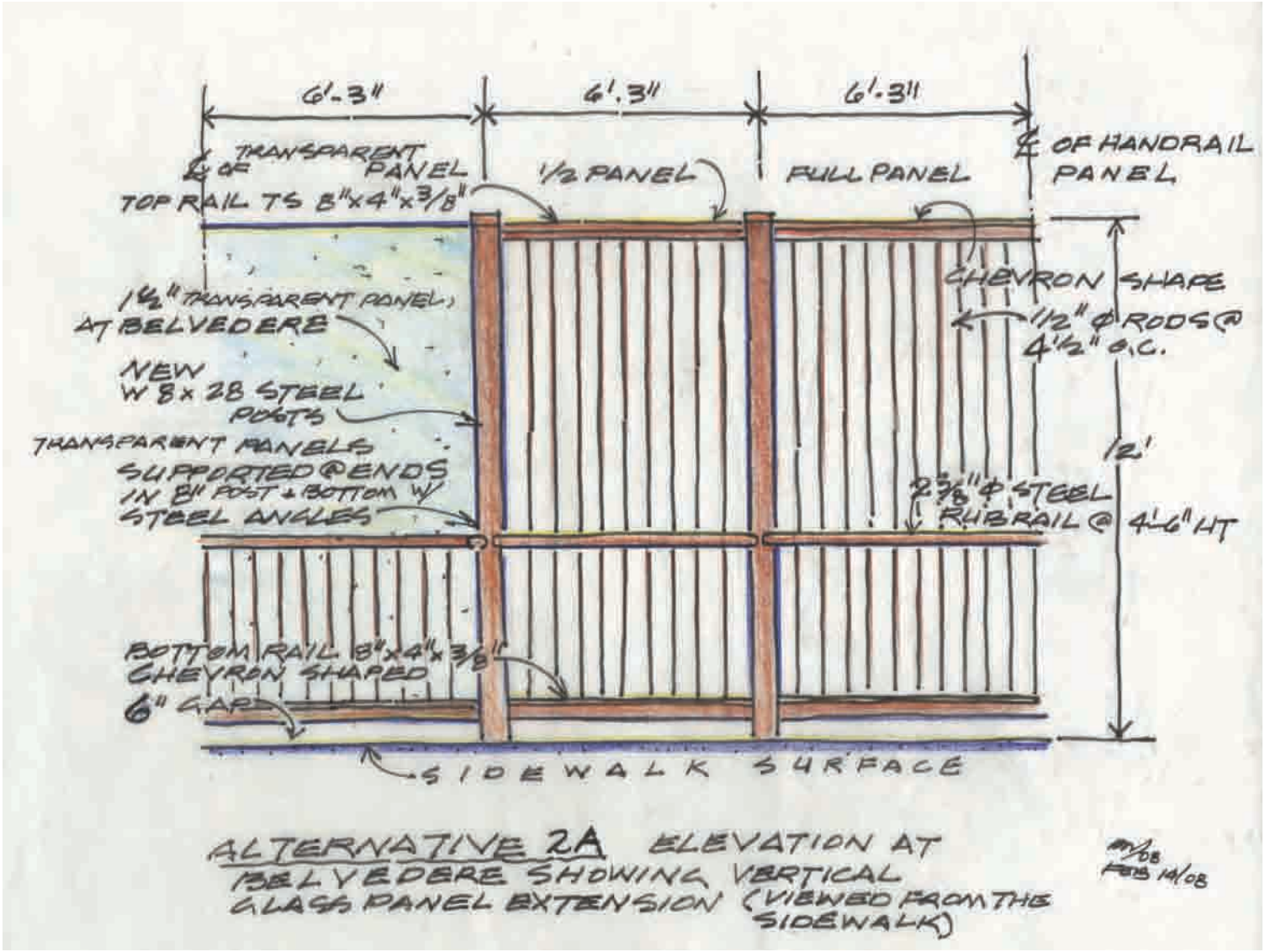
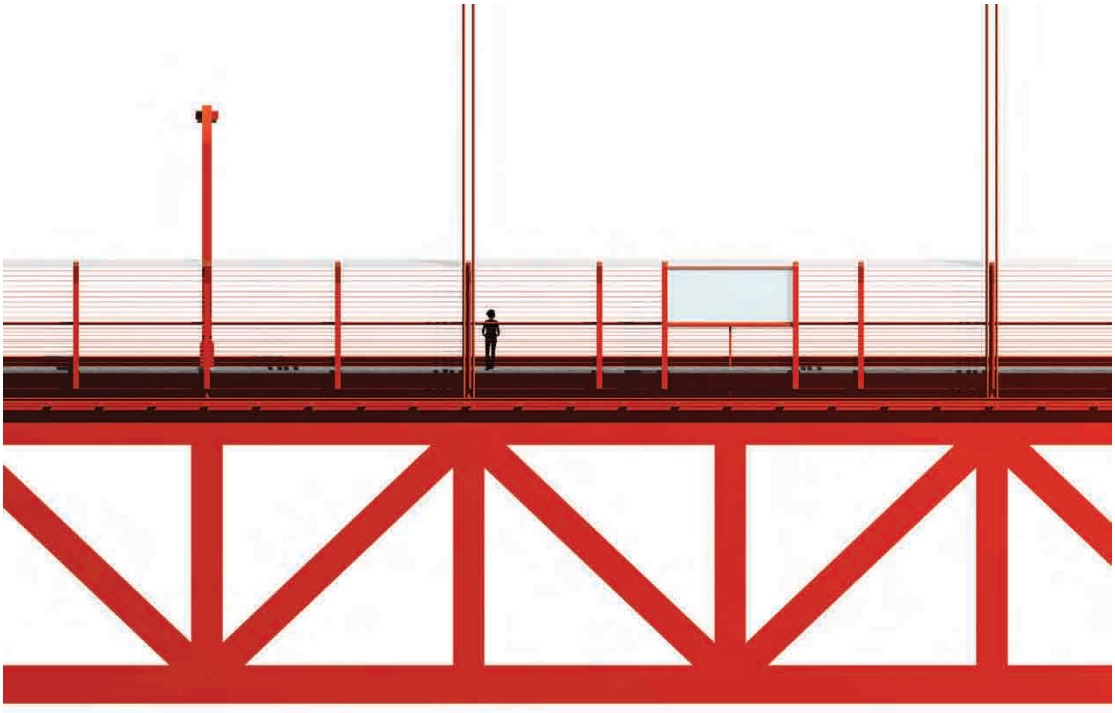



FIGURE 1-17
**ALTERNATIVE 2A: ELEVATION AT BELVEDERE**

Source: macdonald architects, 2008



*ALTERNATIVE 2B: ELEVATION EAST SIDE*

*ALTERNATIVE 2B: EXTERIOR VIEW EAST SIDE*

FIGURE 1-18
**ALTERNATIVE 2B: ILLUSTRATIONS**

Source: macdonald architects, 2008

***ALTERNATIVE 2B: VIEW FROM ROAD***

***ALTERNATIVE 2B: EXTERIOR VIEW EAST SIDE***

FIGURE 1-19
**ALTERNATIVE 2B: ILLUSTRATIONS**

Source: macdonald architects, 2008

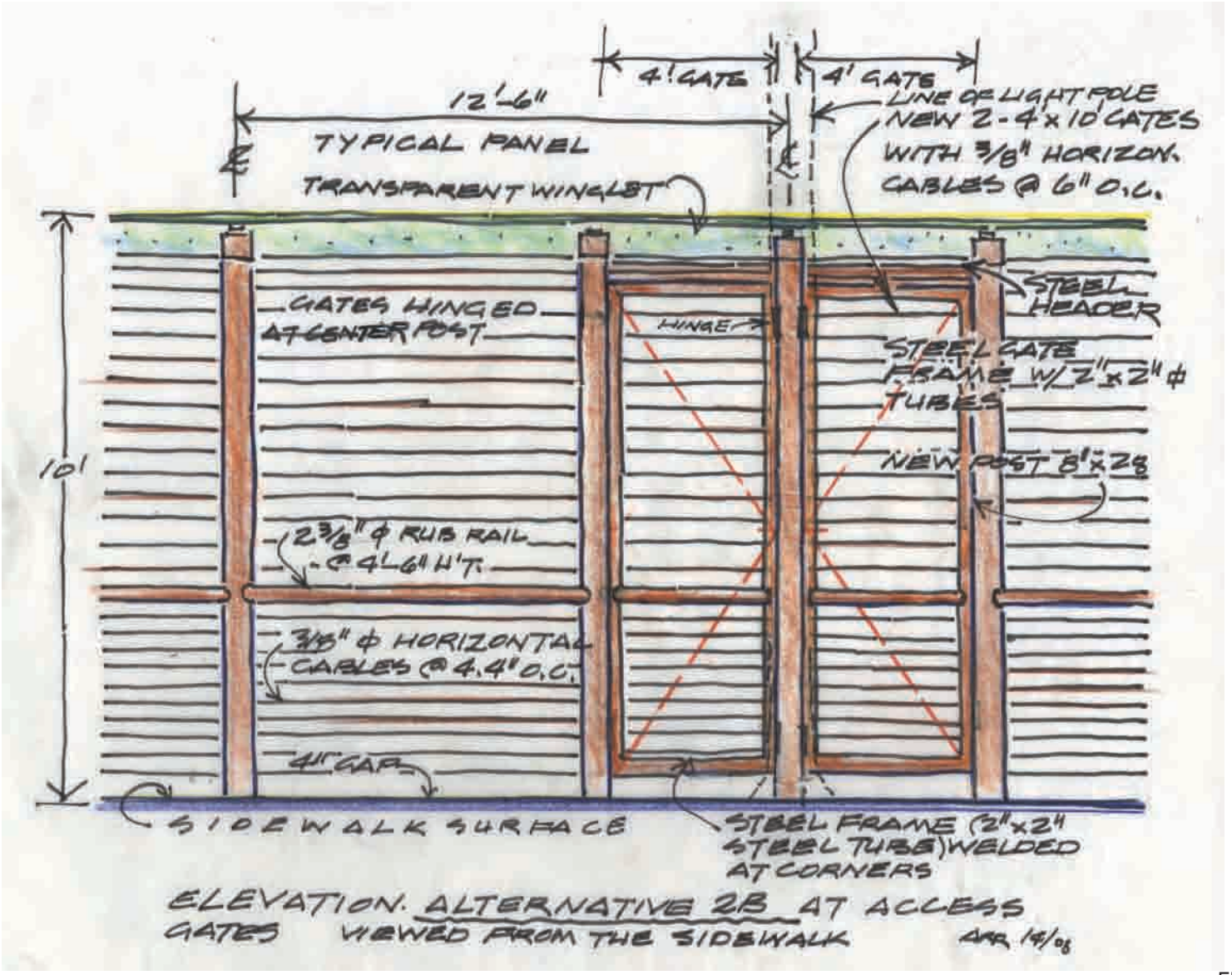



FIGURE 1-20
**ALTERNATIVE 2B: ELEVATION AT ACCESS GATES**

Source: macdonald architects, 2008

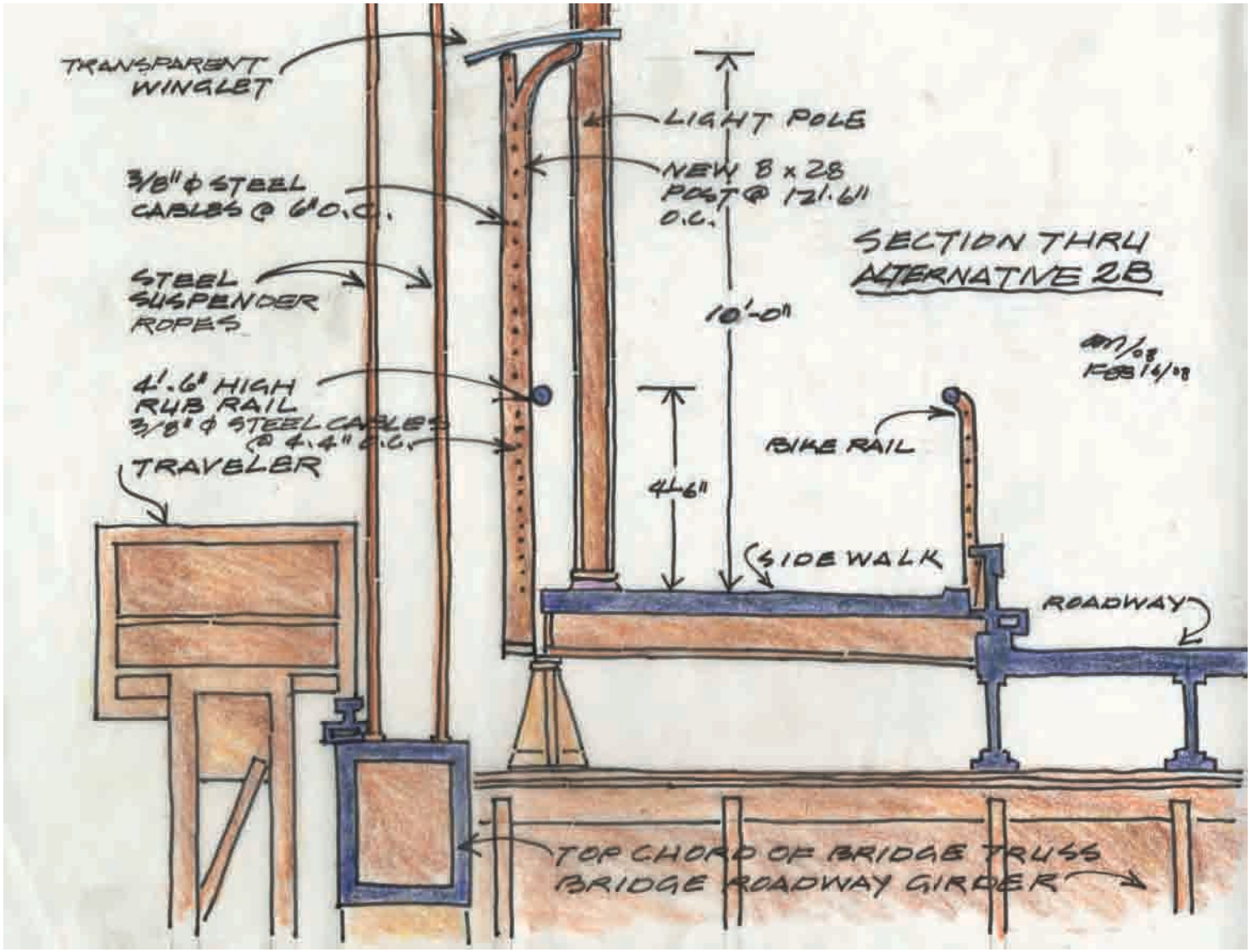



FIGURE 1-21
**ALTERNATIVE 2B: CROSS SECTION**

Source: macdonald architects, 2008

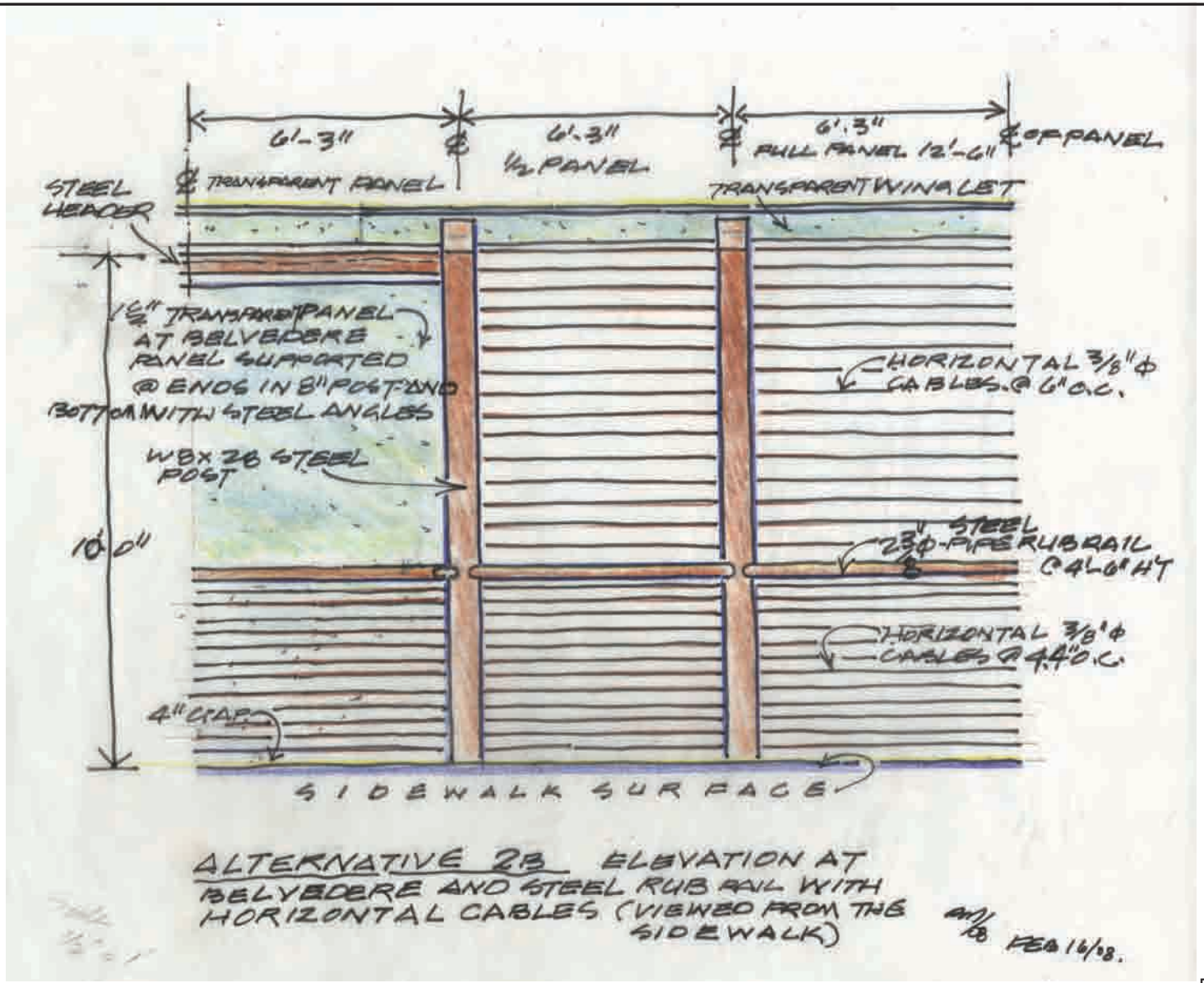



FIGURE 1-22

**ALTERNATIVE 2B: ELEVATION AT BELVEDERE**

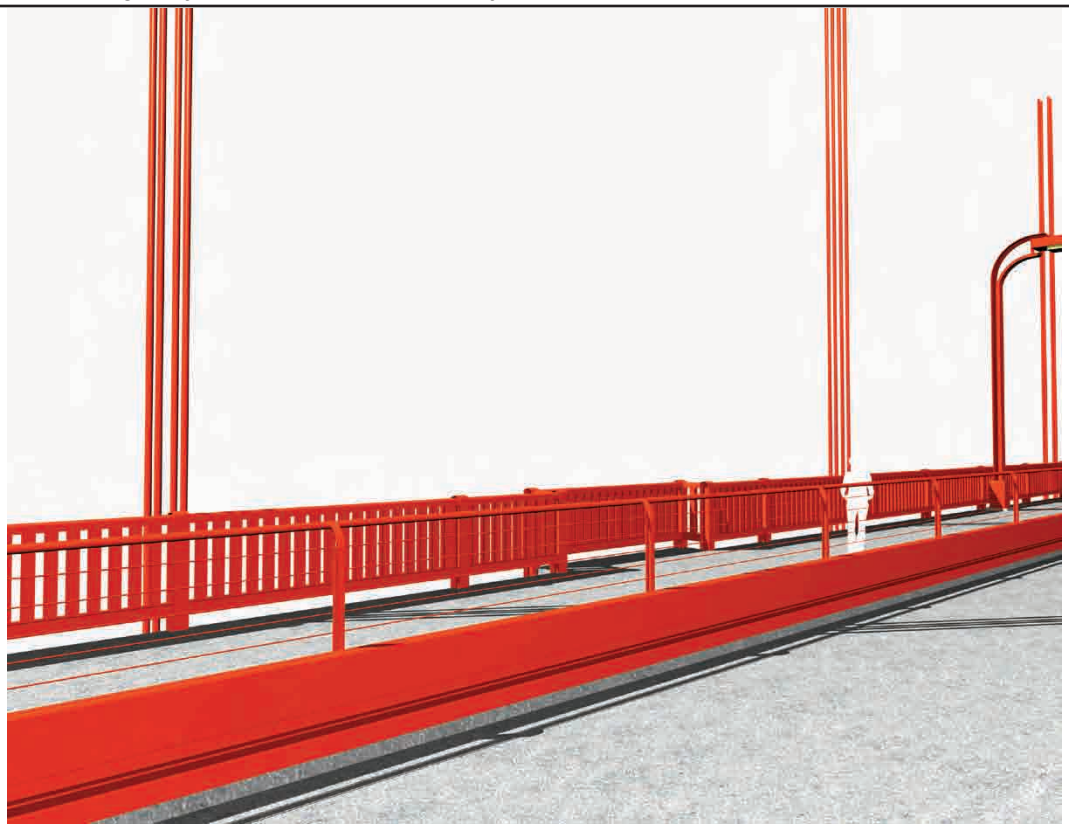
Source: macdonald architects, 2008

***ALTERNATIVE 3: ELEVATION EAST SIDE***

***ALTERNATIVE 3: EXTERIOR VIEW EAST SIDE***

FIGURE 1-23
**ALTERNATIVE 3: ILLUSTRATIONS**

Source: macdonald architects, 2008



*ALTERNATIVE 3: VIEW FROM ROAD*

*ALTERNATIVE 3: EXTERIOR VIEW WEST SIDE*

FIGURE 1-24
**ALTERNATIVE 3: ILLUSTRATIONS**

Source: macdonald architects, 2008

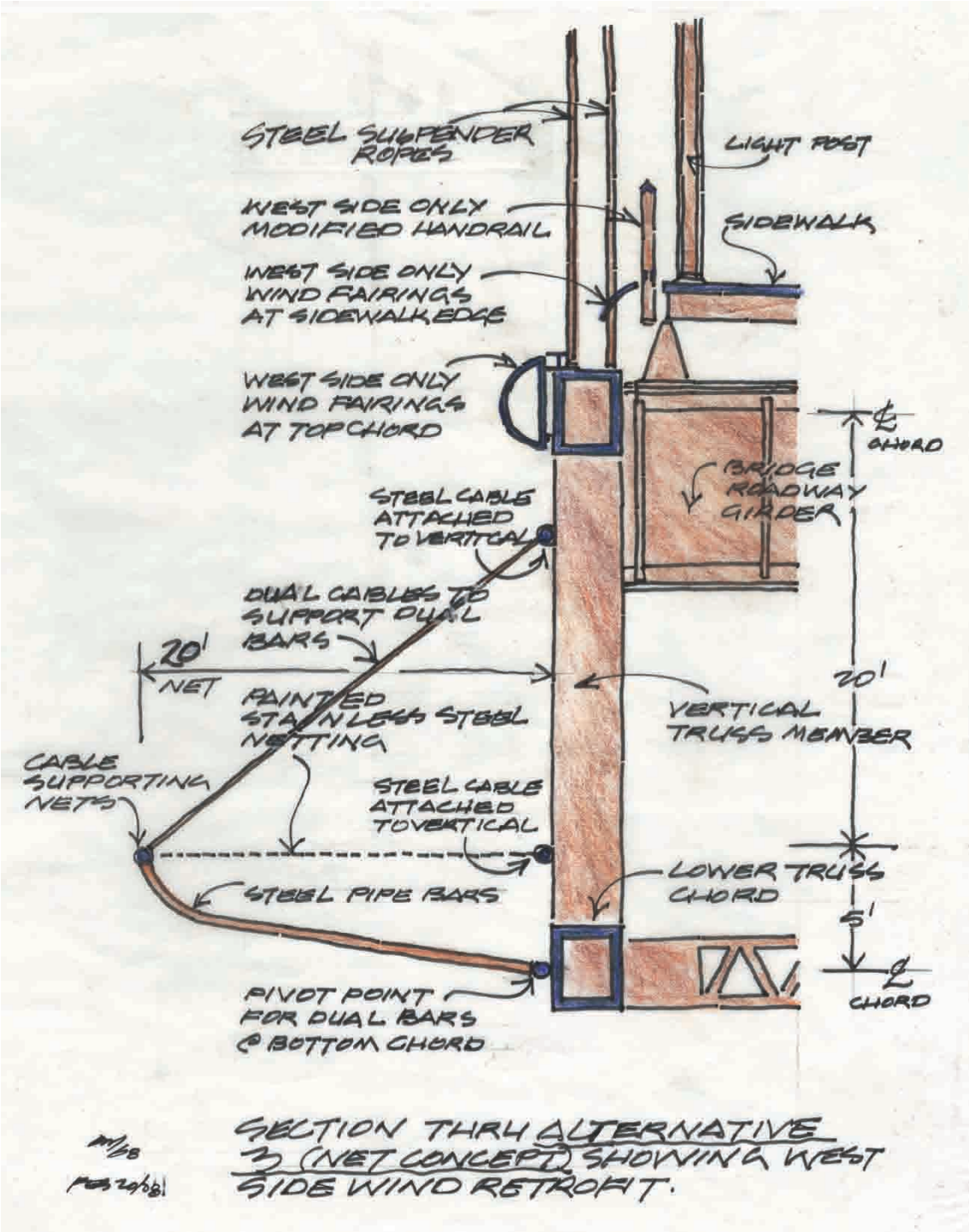



FIGURE 1-25
**ALTERNATIVE 3: CROSS SECTION**

Source: macdonald architects, 2008

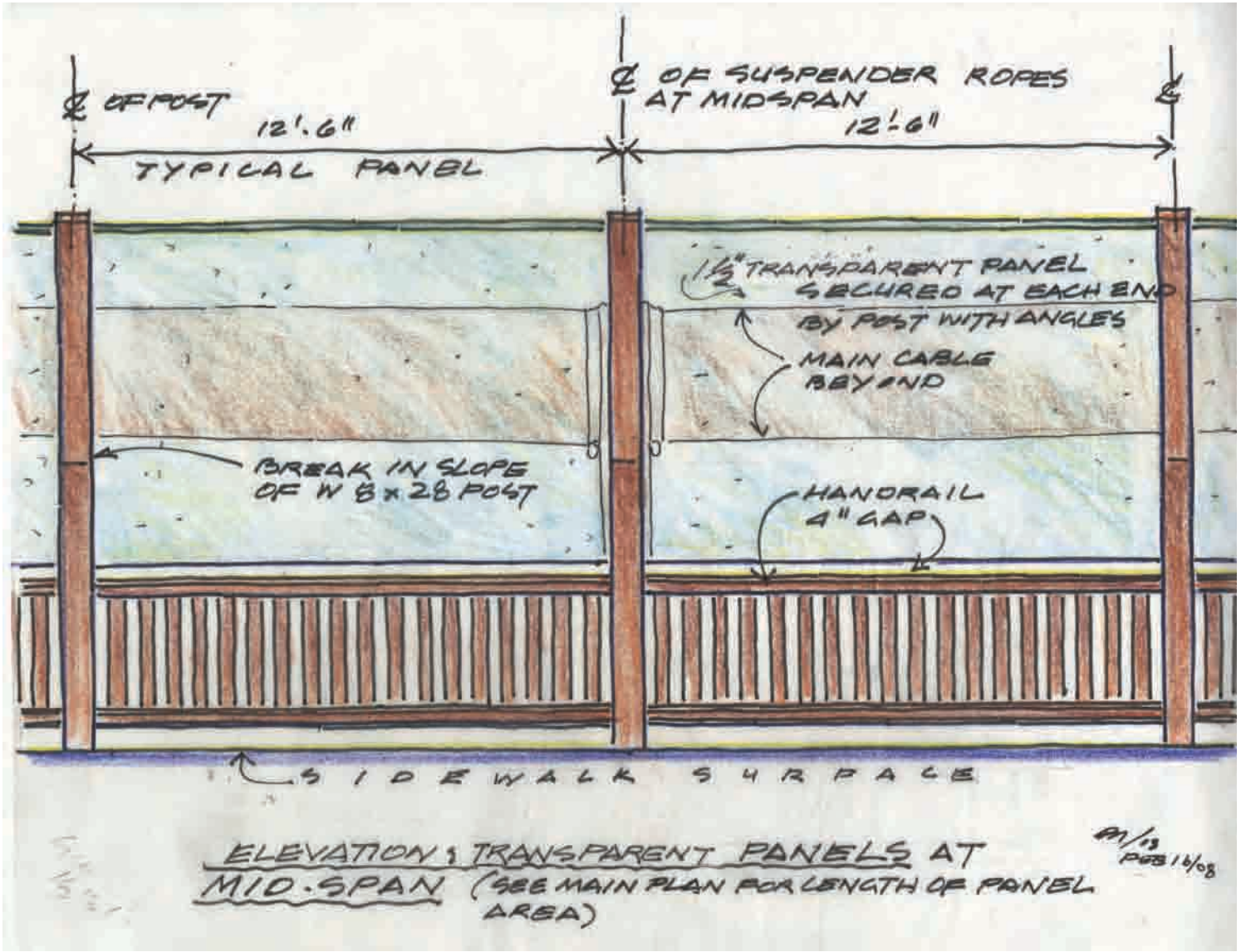



FIGURE 1-26
**ELEVATION OF TRANSPARENT PANELS AT MID-SPAN**

Source: macdonald architects, 2008

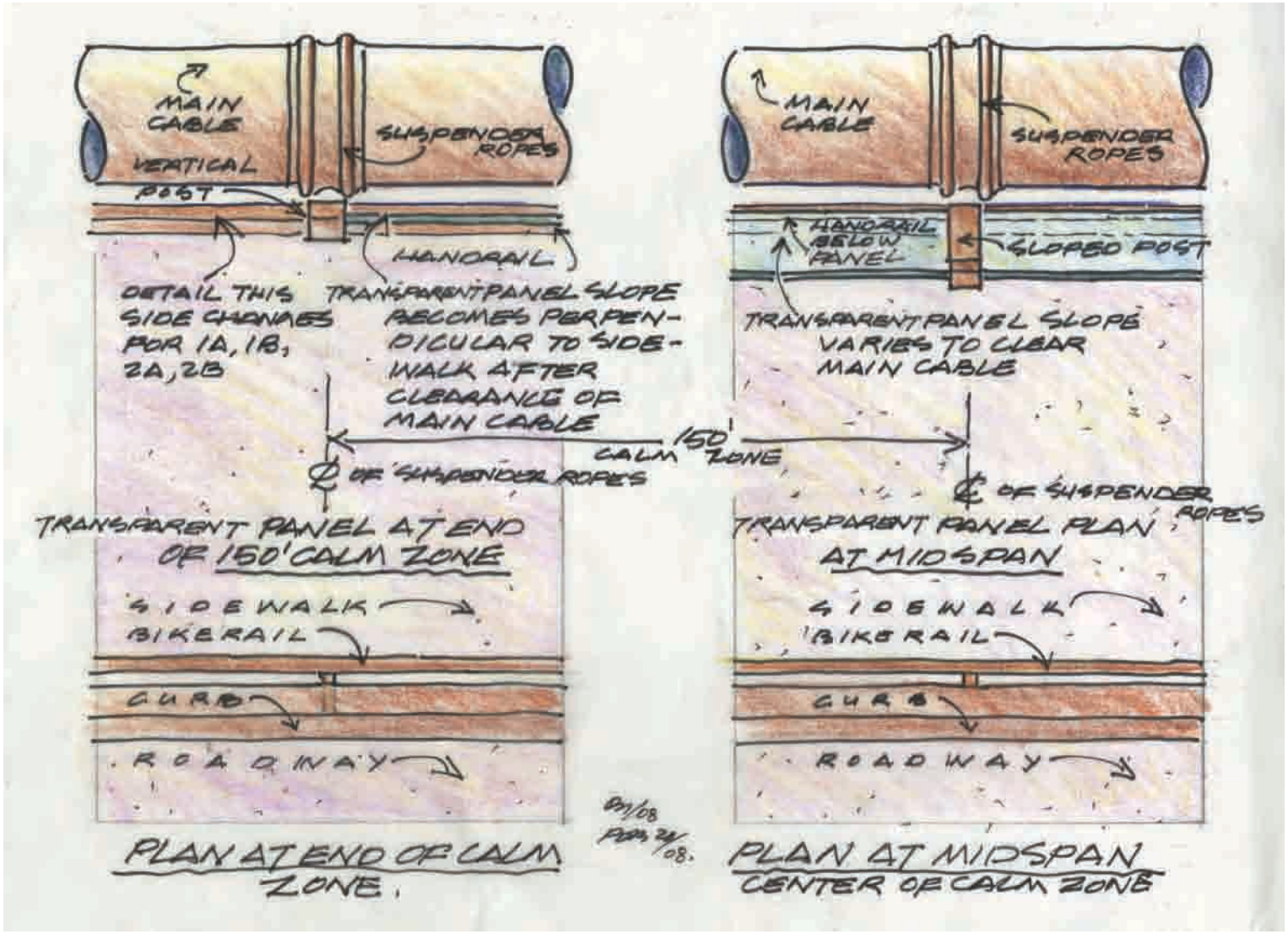



FIGURE 1-27
**PLAN AT MID-SPAN**

Source: macdonald architects, 2008

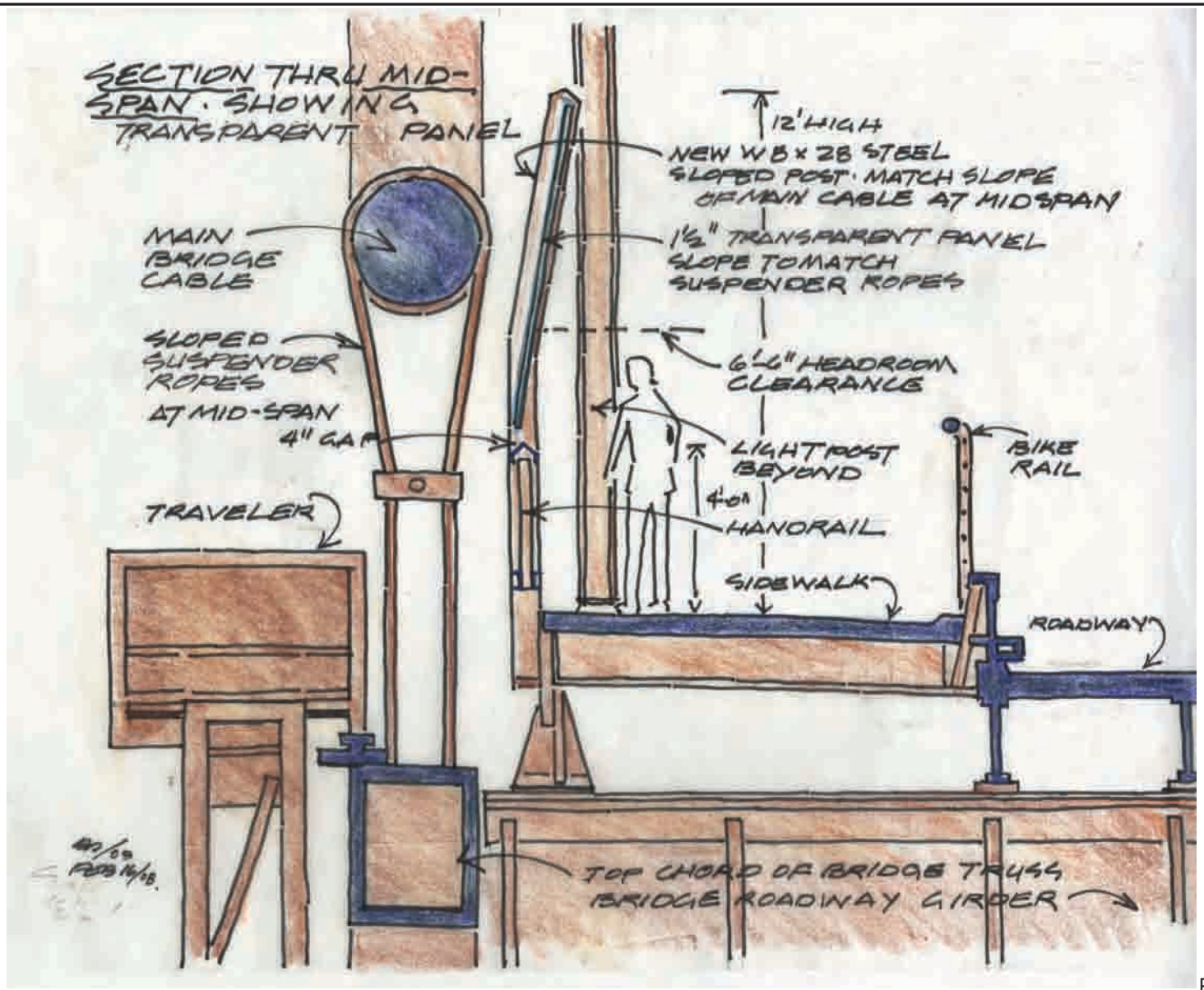



FIGURE 1-28
**MIS-SPAN CROSS SECTION**

Source: macdonald architects, 2008

# Appendix G

# U. S. Fish and Wildlife Service Species List

**United States Department of the Interior**
FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

June 24, 2008

Document Number: 080624020134

Jeffrey Lee, PE - Project Manager
Golden Gate Bridge, Highway & Transportation District
PO Box 9000
San Francisco, CA 94129

Subject: Species List for Physical Suicide Deterrent Project

Dear: Mr. Lee

We are sending this official species list in response to your June 24, 2008 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be September 22, 2008.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at www.fws.gov/sacramento/es/branches.htm.

Endangered Species Division

TAKE PRIDE IN AMERICA

# Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 080624020134

Database Last Updated: January 31, 2008

No quad species lists requested.

## County Lists

### Marin County

#### Listed Species

##### Invertebrates

*Haliotes sorenseni*
white abalone (E) (NMFS)

*Icaricia icarioides missionensis*
mission blue butterfly (E)

*Incisalia mossii bayensis*
San Bruno elfin butterfly (E)

*Speyeria zerene myrtleae*
Myrtle's silverspot butterfly (E)

*Syncaris pacifica*
California freshwater shrimp (E)

##### Fish

*Acipenser medirostris*
green sturgeon (T) (NMFS)

*Eucyclogobius newberryi*
critical habitat, tidewater goby (X)
tidewater goby (E)

*Oncorhynchus kisutch*
coho salmon - central CA coast (E) (NMFS)
Critical habitat, coho salmon - central CA coast (X) (NMFS)

*Oncorhynchus mykiss*
Central California Coastal steelhead (T) (NMFS)
Critical habitat, Central California coastal steelhead (X) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)

*Oncorhynchus tshawytscha*
California coastal chinook salmon (T) (NMFS)
Central Valley spring-run chinook salmon (T) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

## Amphibians

*Ambystoma californiense*
California tiger salamander, central population (T)

*Rana aurora draytonii*
California red-legged frog (T)
Critical habitat, California red-legged frog (X)

## Reptiles

*Caretta caretta*
loggerhead turtle (T) (NMFS)

*Chelonia mydas (incl. agassizi)*
green turtle (T) (NMFS)

*Dermochelys coriacea*
leatherback turtle (E) (NMFS)

*Lepidochelys olivacea*
olive (=Pacific) ridley sea turtle (T) (NMFS)

## Birds

*Brachyramphus marmoratus*
Critical habitat, marbled murrelet (X)
marbled murrelet (T)

*Charadrius alexandrinus nivosus*
Critical habitat, western snowy plover (X)
western snowy plover (T)

*Diomedea albatrus*
short-tailed albatross (E)

*Pelecanus occidentalis californicus*
California brown pelican (E)

*Rallus longirostris obsoletus*
California clapper rail (E)

*Sternula antillarum (=Sterna, =albifrons) browni*
California least tern (E)

*Strix occidentalis caurina*
northern spotted owl (T)

## Mammals

*Arctocephalus townsendi*
Guadalupe fur seal (T) (NMFS)

*Balaenoptera borealis*
sei whale (E) (NMFS)

*Balaenoptera musculus*
blue whale (E) (NMFS)

*Balaenoptera physalus*
finback (=fin) whale (E) (NMFS)

*Eubalaena (=Balaena) glacialis*
right whale (E) (NMFS)

*Eumetopias jubatus*
Critical Habitat, Steller (=northern) sea-lion (X) (NMFS)
Steller (=northern) sea-lion (T) (NMFS)

*Megaptera novaeangliae*
humpback whale (E) (NMFS)

*Physeter catodon (=macrocephalus)*
sperm whale (E) (NMFS)

*Reithrodontomys raviventris*
salt marsh harvest mouse (E)

## Plants

*Alopecurus aequalis var. sonomensis*
Sonoma alopecurus (E)

*Calochortus tiburonensis*
Tiburon mariposa lily (T)

*Castilleja affinis ssp. neglecta*
Tiburon paintbrush (E)

*Chorizanthe robusta var. robusta*
robust spineflower (E)

*Chorizanthe valida*
Sonoma spineflower (E)

*Delphinium bakeri*
Baker's larkspur (E)
Critical habitat, Baker's larkspur (X)

*Delphinium luteum*
Critical habitat, yellow larkspur (X)
yellow larkspur (E)

*Hesperolinon congestum*
Marin dwarf-flax (=western flax) (T)

*Layia carnosa*
beach layia (E)

*Lupinus tidestromii*

clover lupine [Tidestrom's lupine] (E)

*Streptanthus niger*
Tiburon jewelflower (E)

*Trifolium amoenum*
showy Indian clover (E)

## Candidate Species

### Invertebrates

*Haliotes cracherodii*
black abalone (C) (NMFS)

## San Francisco County

### Listed Species

### Invertebrates

*Haliotes sorenseni*
white abalone (E) (NMFS)

*Icaricia icarioides missionensis*
mission blue butterfly (E)

*Incisalia mossii bayensis*
San Bruno elfin butterfly (E)

### Fish

*Acipenser medirostris*
green sturgeon (T) (NMFS)

*Eucyclogobius newberryi*
tidewater goby (E)

*Oncorhynchus kisutch*
coho salmon - central CA coast (E) (NMFS)

*Oncorhynchus mykiss*
Central California Coastal steelhead (T) (NMFS)
Critical habitat, Central California coastal steelhead (X) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)

*Oncorhynchus tshawytscha*
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

### Amphibians

*Rana aurora draytonii*
California red-legged frog (T)

### Reptiles

*Caretta caretta*
loggerhead turtle (T) (NMFS)

*Chelonia mydas (incl. agassizi)*
green turtle (T) (NMFS)

*Dermochelys coriacea*
leatherback turtle (E) (NMFS)

*Lepidochelys olivacea*
olive (=Pacific) ridley sea turtle (T) (NMFS)

## Birds

*Charadrius alexandrinus nivosus*
western snowy plover (T)

*Diomedea albatrus*
short-tailed albatross (E)

*Pelecanus occidentalis californicus*
California brown pelican (E)

*Rallus longirostris obsoletus*
California clapper rail (E)

## Mammals

*Arctocephalus townsendi*
Guadalupe fur seal (T) (NMFS)

*Balaenoptera borealis*
sei whale (E) (NMFS)

*Balaenoptera musculus*
blue whale (E) (NMFS)

*Balaenoptera physalus*
finback (=fin) whale (E) (NMFS)

*Eubalaena (=Balaena) glacialis*
right whale (E) (NMFS)

*Eumetopias jubatus*
Critical Habitat, Steller (=northern) sea-lion (X) (NMFS)
Steller (=northern) sea-lion (T) (NMFS)

*Megaptera novaeangliae*
humpback whale (E) (NMFS)

*Physeter catodon (=macrocephalus)*
sperm whale (E) (NMFS)

*Reithrodontomys raviventris*
salt marsh harvest mouse (E)

### Plants

*Arctostaphylos hookeri ssp. ravenii*
Presidio (=Raven's) manzanita (E)

*Clarkia franciscana*
Presidio clarkia (E)

*Hesperolinon congestum*
Marin dwarf-flax (=western flax) (T)

*Lessingia germanorum*
San Francisco lessingia (E)

## Candidate Species

### Invertebrates

*Haliotes cracherodii*
black abalone (C) (NMFS)

## Key:

(E) *Endangered* - Listed as being in danger of extinction.
(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.
(NMFS) Species under the Jurisdiction of theNational Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
*Critical Habitat* - Area essential to the conservation of a species.
(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
(C) *Candidate* - Candidate to become a proposed species.
(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
(X) *Critical Habitat* designated for this species

## Important Information About Your Species List

### How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within,**or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

### Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

## Surveying

Some of the species on your list may not be affected by your project. A trained biologist or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.

For plant surveys, we recommend using theGuidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

## Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

## Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

## Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated ascritical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See ourcritical habitat page for maps.

## Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

## Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

## Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

## Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be September 22, 2008.

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