

---

# Bay Trail Sears Point Connector Feasibility Study

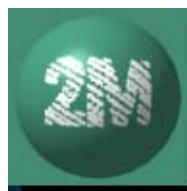
---



SONOMA COUNTY REGIONAL PARKS



February 14, 2018





## Bay Trail Sears Point Connector Feasibility Study

Prepared for:

**Sonoma County Regional Parks**

2300 County Center Drive, #120A

Santa Rosa, CA 95403

Tel: 707.565.2041

Fax: 707.579.8247

Prepared by:

**Questa**

Jeffrey H. Peters, Principal

Margaret Henderson, ASLA, Senior Landscape Architect

PO Box 133

Penngrove, CA 94951

Tel: (510) 236.6114

**2M Associates**

Patrick Tormay Miller, FASLA

Landscape Architecture. Planning. Horticulture

510-524-8132 (Berkeley)

Tel: (707) 895-2597 (Philo Gardens)

This Study was funded by the Association of Bay Area Governments (ABAG) and California State Coastal Conservancy grant from the California Proposition 84 "Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006" grant program..



## TABLE OF CONTENTS

<b>1. INTRODUCTION .....</b>	<b>1</b>
1.1 Goals .....	1
1.2 Data Reviewed .....	4
1.3 Public Outreach.....	4
<b>2. OWNERSHIP, LAND USE AND REGULATORY AUTHORITY .....</b>	<b>5</b>
2.1 United States Fish and Wildlife Service (USFWS) .....	7
2.2 US Army Corps of Engineers (Corps).....	10
2.3 Sears Point Restoration Project .....	11
2.4 California Department of Fish and Wildlife (CDFW) .....	11
2.5 California Department of Transportation (Caltrans) .....	12
2.6 State Lands Commission (SLC) .....	13
2.7 California Public Utilities Commission (CPUC) .....	14
2.8 The San Francisco Bay Trail.....	14
2.9 San Francisco Bay Conservation and Development Commission (BCDC).....	14
2.10 San Francisco Bay Regional Water Quality Control Board (RWQCB).....	15
2.11 Sonoma Marin Area Rail Transit (SMART) .....	15
2.12 Vallejo Sanitation and Flood Control District (VSD).....	15
2.13 Metropolitan Transportation Commission - SR-37 MOU Partnership.....	16
2.14 SR-37 Toll Road Proposal .....	16
2.15 State Route 37 Integrated Traffic, Infrastructure and Sea Level Rise Analysis.....	16
<b>3. ENVIRONMENTAL RESOURCES.....</b>	<b>19</b>
3.1 Biological Resources .....	19
3.2 Hydrology, Tides, Flooding, Sea Level Rise .....	19
<i>Tolay Creek</i> .....	20
<i>San Pablo Bay Tidal Inflow</i> .....	20
<i>Extreme Tides</i> .....	21
<i>Sea Level Rise</i> .....	22
3.3 Geology and Soils.....	22
<i>Seismicity</i> .....	23
3.4 Traffic and Transportation .....	24
<i>Overview</i> .....	24
<i>Planning Context</i> .....	24
<i>Regional Access</i> .....	24
<i>Transit and Multi-modal Access</i> .....	25
<i>Sonoma County Transit</i> .....	26



<i>Northwestern Pacific Railroad/Sonoma Marin Area Rail Transit</i> .....	26
<i>Bicycle and Pedestrian Collisions</i> .....	26
<i>Vehicle Collisions</i> .....	26
<i>Existing Site Access</i> .....	27
<b>4. TRAIL SEGMENTS AND PRELIMINARY ROUTE ALTERNATIVES</b> .....	<b>28</b>
4.1 Trail Segments .....	28
4.2 Trail Alternatives .....	31
4.3 Comparison of Construction Techniques .....	33
<i>Conventional Fill Levee Trail or Causeway</i> .....	34
<i>Helical Pile Boardwalk</i> .....	34
<i>Floating Boardwalk</i> .....	35
<i>Clearspan Bridge and Levee Improvements</i> .....	35
4.4 Comparison of Construction Methodologies, Impacts and Costs .....	36
<i>Environmental Considerations</i> .....	36
<i>Comparison of Construction Methodologies</i> .....	37
<b>5. PRELIMINARY DESIGN</b> .....	<b>39</b>
5.1 Preferred Plan and Stakeholder Recommendations .....	39
5.2 Construction Cost Estimate .....	41
5.3 Cost Analysis .....	43
<i>Preliminary Engineering Plans</i> .....	44
<i>Final Construction Plans</i> .....	45
<i>Accessibility Regulations</i> .....	45
<b>6. NEXT STEPS</b> .....	<b>47</b>
6.1 Project Review and Approval .....	47
6.2 CEQA/NEPA Review .....	48
6.3 Right of Way Agreements .....	49
6.4 Project Permitting .....	49
6.5 Final Design .....	51
6.6 Trail Construction .....	51
<b>7. REFERENCES</b> .....	<b>52</b>



## FIGURES

- 1-1 Study Area on SF Bay Trail Nine-County Map
- 1-2 Study Area on SF Bay Trail North County Map
- 1.3-1 NWP Excursion Feb 1941 at Sears Point.
- 2-1 Land Ownership
- 2.1-1 Napa-Sonoma Marshes
- 2.15-1 Recreation Options
- 2.15-2 Tolay Road and SMART Track
- 3.4-1 Collisions
- 3.4-2 Tubbs Island Trailhead
- 4.2-1 Trail Options

## APPENDIX

- A. Public Outreach
- B. Cost Estimates
- C. Preliminary Engineering Plans



## 1. INTRODUCTION

---

This study focuses on the feasibility and preliminary design plan for the Bay Trail Sears Point Connector. This connector trail will close an approximately 1- mile gap in the 500 mile San Francisco Bay Trail that loops around the perimeter of San Francisco and San Pablo Bays. Located in the vicinity of SR 121 and SR-37 at Tolay Creek, the Study evaluates options for connecting an existing Bay Trail segment (Eliot Trail), completed as part of the Sears Point Wetland Restoration Project, with the Tolay Creek/Tubbs Island (Tolay/Tubbs) trailhead and trail in the San Pablo Bay National Wildlife Refuge.

The study also examines options and provides design recommendations for a parking and trailhead staging area at Tolay Creek Road to serve trail users. The trail will be used by pedestrians, and bicyclists. This Study was authorized by Sonoma County Regional Parks Department (SCRPD), with a grant from SF Bay Trail Project via the State Coastal Conservancy to determine the preferred trail alignment and to provide preliminary right of way (ROW) and ownership information, engineering design concepts, and preliminary project costs, and an implementation strategy.

For regional context, the study area is shown on both **Figure 1-1**, the complete nine-County SF Bay Trail map, and **Figure 1-2**, the North Bay Trail portion of the SF Bay Trail.

### 1.1 Goals

---

The goal of this study is to determine feasible options for connecting existing segments of the San Francisco Bay Trail in a highly constrained and sensitive environment. The study identifies a preferred trail alignment and includes conceptual trailhead design, preliminary design/engineering plans for the trail to enable environmental review, and preliminary recommendations for trail construction methods and materials. Additionally, the study provides identification of potential impacts and mitigation measures to incorporate into the trail implementation, and provides recommendations for issues that may need to be resolved, including engineering and environmental review, Right of Way (ROW) and permitting. Several options were developed and also found to be feasible. These options, in addition to the identified preferred option, should continue to be studied and evaluated with any SR-37 corridor comprehensive transportation planning.



Figure 1-1: Study Area on SF Bay Trail Nine-County Map



Figure 1-2: Study Area on SF Bay Trail North County Map



## 1.2 Data Reviewed

Information contained in the following documents was reviewed and is reflected in the study:

- Record of survey maps of State SR-37 and County Roads
- UC Davis State Route 37 Integrated Traffic, Infrastructure and Sea Level Rise Analysis <http://hwy37.ucdavis.edu/>
- Caltrans District 4 Transportation Concept Report State Route 37 (January 2015)
- Sonoma County Bay Trail Corridor Plan (December 2005)
- State Route 37 Transportation and Sea Level Rise Corridor Improvement Plan (Draft) September 2017
- State SR-37 Corridor Planning California Case Study
- San Francisco Bay Trail Design Guidelines and Toolkit (June 2016)
- SMART Environmental Impact Reports, 2006
- Sears Point Restoration Project
- San Pablo Bay National Wildlife Refuge Climate Adaptation Plan, 2016
- San Pablo Bay National Wildlife Refuge Final Comprehensive Conservation Plan, 2011
- San Pablo Baylands: Ensuring a resilient Shoreline (Oct. 2017)
- Geotechnical Investigation – New Flood Control Levee Sears Point Tidal Restoration Project by Hultgren Tillis Engineers, June 2011
- Portions of As-Built levee plans, Elliot Levee, Ducks Unlimited, 4/14/2014

## 1.3 Public Outreach

In addition to individual outreach with key landowners and stakeholders, public outreach included a February 24, 2017, and November 17, 2017 stakeholder project presentation and review meeting, as well as a community workshop on August 30, 2017. The presentation, stakeholder representatives, and meeting minutes are contained in **Appendix A**.



**Figure 1.3-1: NWP Excursion Feb 1941 at Sears Point. Yes that IS a drawbridge and that is SR-37! All Photos in this series are by Robert Searle, 9199 Fircrest Lane, San Ramon, CA 94583. Nwpr.net**



## 2. OWNERSHIP, LAND USE AND REGULATORY AUTHORITY

---

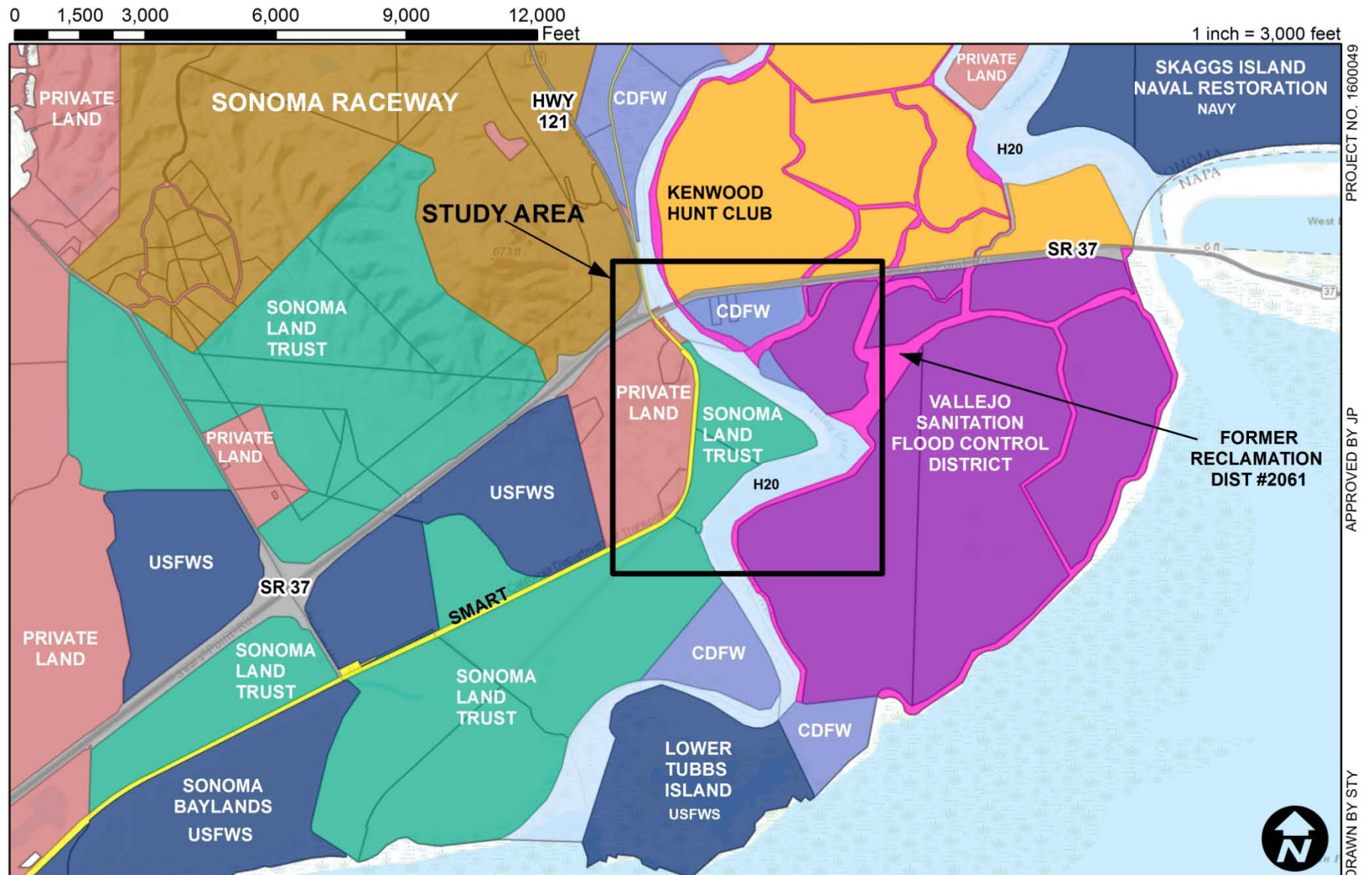
The study area (**Figures 1-1 and 1-2**) includes lands south of SR-37 from the signalized intersection of Highways 121 and 37 to the Tolay Creek/Tubbs Island (Tolay/Tubbs) Trailhead, and includes lands owned and/or managed by public and private entities including:

- Sonoma Marin Area Rail Transit (SMART)
- US Fish and Wildlife Service (USFWS)
- California Department of Fish and Wildlife (CDFW)
- Caltrans SR-37 (CT)
- Sonoma Land Trust (Sears Point Restoration Project) (SLT)
- 37 Wines
- Vallejo Sanitation and Flood Control District (Tubbs Island farming area) (VSFCD)

Property owners within the general vicinity of the Study Area are shown in **Figure 2-1**.

The study area is within the jurisdiction of multiple agencies that have regulatory authority and interest in the project. Within the regional context, the trail is identified as part of the SF Bay Trail. There are a number of regulatory challenges to constructing a new trail alignment within the study area. Depending upon the alignment selected, the trail would need to cross portions of Tolay Creek and upper Tolay Lagoon. These crossings would necessitate the placement of fill, construction of bridges/boardwalks, culverts or other land disturbance involving wetlands and sensitive habitat that would trigger regulatory review.

Local county level planning and regulatory agencies would be involved with any trail project that moves forward in the planning, environmental review and engineering design and approval process. This could include the Sonoma County Transportation Authority (SCTA) and Sonoma County Regional Parks and/or Transportation and Public Works Department. As a potential lead agency, Sonoma County Regional Parks could partner with Caltrans, CDFW and/or USFWS (federal Lead) for CEQA/NEPA review and permitting, preparation of project engineering plans, and construction implementation. For a project within the State Highway ROW, Caltrans may be the lead agency, or provide significant assistance to the local agency. Primary landowners and regulatory agencies are discussed in the next section.



**Figure 2-1: Land Ownership**



## 2.1 United States Fish and Wildlife Service (USFWS)

---

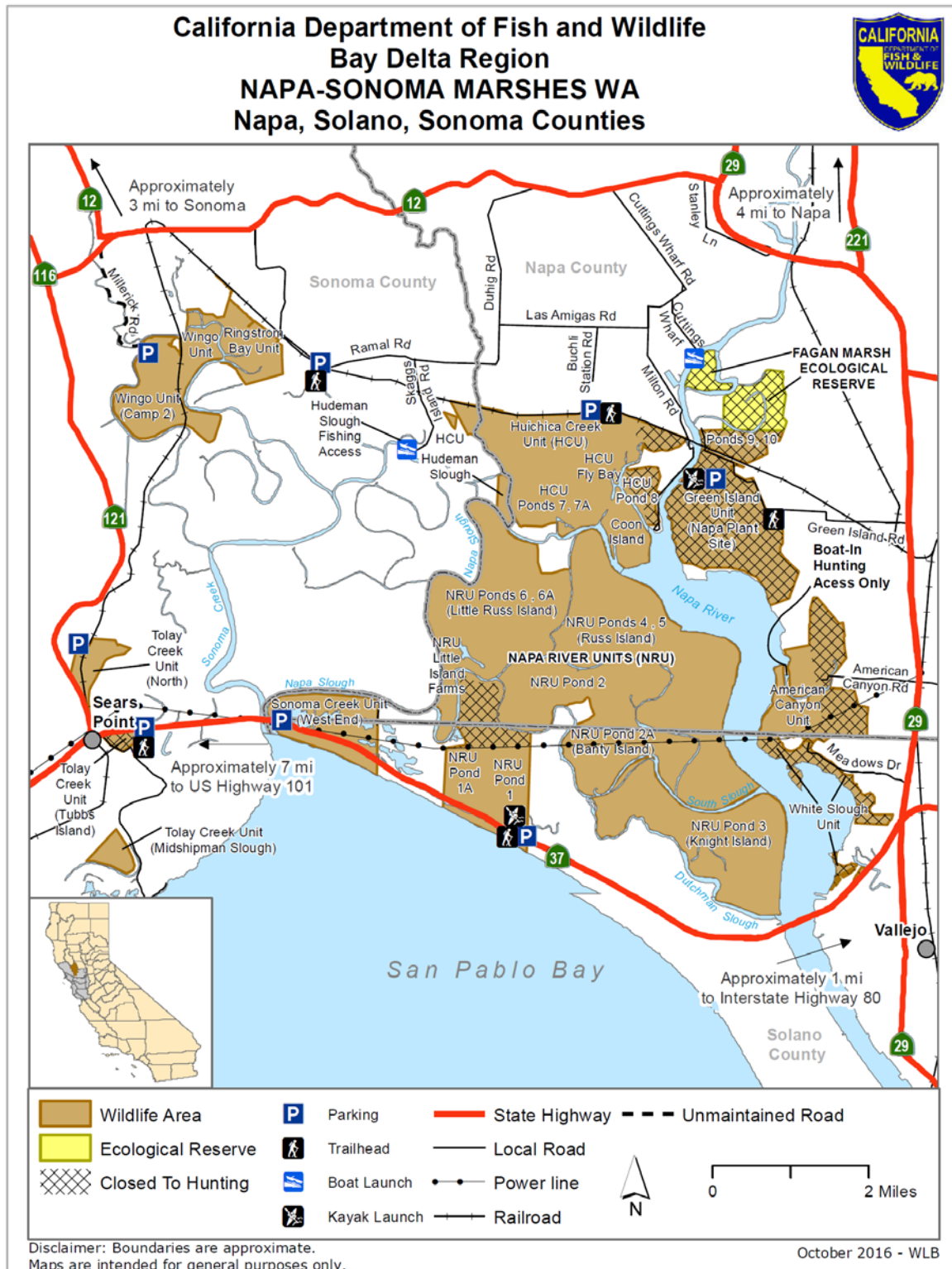
USFWS owns most of the land within the San Pablo Bay National Wildlife Refuge (Refuge), which is managed as part of The San Francisco Bay National Wildlife Refuge Complex. The Refuge includes over 19,000 acres of tidelands, open water, seasonal wetlands, tidal marsh, managed ponds and upland habitats. Management, more recently, has centered around tidal marsh restoration and planning, land acquisition, environmental education as well as the impact of potential sea level rise on the Refuge. The Refuge includes open water and mudflat habitats used by waterfowl and shorebirds utilizing the Pacific Flyway. Refuge actions include marsh restoration and management to increase the state and federally endangered salt marsh harvest mouse numbers in the Tolay Creek tidal wetland restoration area adjoining and southwest of the study area. Other endangered species, such as Ridgeway rails, will also benefit from the salt marsh restoration.

The Refuge has a stated mission to provide recreation opportunities that include wildlife viewing, wildlife photography, hiking, boating, fishing, and hunting. These recreation activities are regulated to allow for public enjoyment of the Refuge while still protecting wildlife and habitats.

### *Existing Facilities*

---

The trail segment on the east side of Tolay Creek, which extends from the South Tolay Creek Unit of the Napa-Sonoma Marshes Wildlife Area to the Lower Tubbs Unit in the Refuge, is managed by USFWS in a cooperative agreement with CDFW. The parking lot/trailhead is located 0.65 mile east of SR-37/121 intersection. From the parking lot, this trail follows along the Tolay Creek for 2.5 miles before reaching Lower Tubbs Island. The trail once circled Lower Tubbs Island, however, in 2014, the levee breached in two locations, making two sections of Lower Tubbs trail impassable. As of December, 2017, this levee breach has not been repaired.



Source: <https://www.wildlife.ca.gov/Lands/Places-to-Visit/Napa-Sonoma-Marshes-WA>

**Figure 2.1-1: California Department of Fish & Wildlife, Napa-Sonoma Marshes**



### *San Pablo Bay National Wildlife Refuge Final Comprehensive Conservation Plan (CCP) 2011*

In 2011, the San Pablo Bay National Wildlife Refuge Final Comprehensive Conservation Plan (CCP) was adopted, which provides long term guidance for management decisions and a framework for strategies to accomplish program goals. At the San Pablo Bay Refuge, the CCP reiterates the USFWS commitment to coordinate and provide public access in the study area:

#### ***Compatible Wildlife-Oriented Recreation***

*GOAL 7: Provide visitors and the local community with compatible wildlife-oriented outdoor recreation opportunities to enjoy, understand, and appreciate the resources of the Refuge.*

*Objective 7.1 Within five years of Plan completion, develop a visitor services plan that will expand compatible public use opportunities, including wildlife observation and photography.*

*Rationale: Wildlife observation and photography are identified in the 1997 Improvement Act as two of six priority public use on refuges. These uses are provided when deemed compatible with wildlife and habitat. Public access opportunities will be expanded from the current single access point to several, once restoration activities are complete. The Refuge units are located on a busy highway and acceleration and deceleration lanes will need to be constructed to provide safe access. Because the staff and office facilities are small, the public will be encouraged to participate in self-guided opportunities, such as trails (for hiking and bicycling) and kayak (non-motorized) access points. **The Refuge is also located near other public access opportunities (e.g. the San Francisco Bay Trail, Bay Water Trail, and CDFG lands) that will require coordination with these and other partners to create a consistent network of recreational options. Trails will also support the San Francisco Bay Trail and Bay Water Trail Plan goals of providing access around the entire bay.***

#### *Strategies*

- *Develop primitive access for recreational boaters (non-motorized, kayak, canoe) at Cullinan Ranch.*
- *Educate boaters on preventing the introduction of nuisance species.*
- *Develop a safe access point to Cullinan Ranch by constructing deceleration and acceleration lanes and a parking lot.*
- *Provide interpretive panels, informational signage and kiosks, photography points, and boardwalks at Cullinan.*
- ***Develop self-guided trails (for hiking, bicycling, boating) at Cullinan Ranch, Guadalupe, Sears Point, Skaggs Island, and Sonoma Baylands once these units are acquired.***
- ***Coordinate trail planning with regional plans such as the San Francisco Bay Trail and Bay Water Trail that implements bay-wide vision of public access around the Bay.***
- *Develop new entry road access to Sears Point (once acquired).*
- *Provide additional public access at Figueras. Establish an agreement with the City of Vallejo and/or Mare Island to allow access to the Figueras unit through their property.*
- ***Provide bike access at Sonoma Baylands, Sears Point, Cullinan, Skaggs Island, Tolay Creek, and Lower Tubbs Island units to provide SF Bay Trail linkage.***

The CCP further contains budget recommendations for implementation of projects within the Refuge, including \$350,000 for trails implementation. The Visitor Service Plan has not yet been completed, according to Melisa Amato of the USFWS.

The lands east of the SMART right of way to the boundary of CDFW land and the east side of Tolay Creek are within the approved Refuge boundary, including private lands not yet acquired by USFWS.

### *San Pablo Bay National Wildlife Refuge Climate Adaptation Plan (CAP), 2016*

The San Pablo National Wildlife Refuge Climate Adaptation Plan (CAP) sets forth climate adaptation framework for the Refuge. The goal of this climate adaptation plan is to use the best available information to (1) identify a suite of actions with the highest likelihood of achieving Refuge goals that are feasible and contribute to larger landscape conservation (e.g., *USFWS Tidal marsh Recovery Plan 2013*); (2) gain a better understanding of the projected impacts of climate change on refuge conservation targets; and (3) identify the suite of measures needed



to assess conservation progress and support an adaptive decision-making framework. The Plan has the following objectives:

- Identify an optimal set of strategies to reduce stress on Refuge conservation targets from climate change and other threats in the near (current to 2030) and long-term (2030-2100), including
  - Identifying priority conservation targets and associated conservation goals for the Refuge
  - Identifying priority threats to conservation targets, including climate change
  - Identify optimal set of strategies to reduce stress on conservation targets from climate change and other threats
  - Summarize abiotic factors of climate change and other threats for San Pablo Bay and how they stress ecological attributes of their conservation targets
- Use information from the near- and long-term objectives to develop a climate change adaption plan for the Refuge.

The Plan summarizes existing research and modeling for the Refuge, and provides ranked strategies for implementation to address climate change. As a result, the following strategies were ranked as the highest priority in the *near term*:

- Invasive plant management
- Land acquisition
- Raise Hwy 37 from Petaluma River to Mare Island
- Improve Tolay Creek tidal connection across Hwy 37

The following strategies were ranked as the highest priority in the *long term*:

- Land acquisition
- Invasive plant management
- Move refuge boundaries upland
- Raise Hwy 37 from the Petaluma River to Mare Island
- Tidal marsh restoration at Skaggs Island

## *Regulatory Review*

---

In addition to landowners and managers within the Study Area, USFWS also has regulatory review authority. Portions of Tolay Creek and Tolay Lagoon provide habitat for the endangered Ridgway's Rail, and portions of the adjacent Sears Point Restoration Project included habitat enhancement designed to support future populations of Salt Marsh Harvest Mouse. Consultation with USFWS, either under Section 7 (if a Corps of Engineers wetlands fill permit were required), or under Section 10, would be needed for any trail project. Consultation would include the development of avoidance, minimization, and mitigation measures to ensure protection of this species and its habitat. USFWS would be involved in project review and decision-making regarding lands that have potential endangered species habitat. Additionally, the USFWS would provide consultation to the Corps where any proposed trail alignment passes through and potentially threatens habitat for federally listed species that they have regulatory responsibility for.

## **2.2 US Army Corps of Engineers (Corps)**

---

The placement of any fill in freshwater, seasonal, and tidal wetlands, creeks and waters of the US within the study area is subject to regulation by the Corps of Engineers under Section 404 of the Clean Water Act. Trail construction that may cause a loss of wetland or substantial alteration of wetland functions and values will be



evaluated closely as part of the permit review and approval process. As noted previously, impacts to federally protected wildlife species trigger review and consultation by the US Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service, under Section 7.

Permits would be required associated with fill or disturbance of Corps jurisdictional wetlands. Potential wetlands impacts would likely be associated with creek crossings and bridges, including bridge abutments and wing-walls, and any boardwalk footings or other trail construction element involving wetland disturbance. Mitigation is typically required to ensure that these resources are adequately protected during construction, that there is no net loss of wetland and sensitive species habitat, and that water quality and endangered species are adequately protected. The mitigation issue is complicated at this site since a portion of the project area consists of mitigation lands for other near-by projects, which will then also require mitigation.

### **2.3 Sears Point Restoration Project**

---

Sonoma Land Trust (SLT) conserves, protects and restores scenic, natural, agricultural and open land throughout Sonoma County. SLT is a local, non-government, nonprofit organization (NGO) funded largely by membership contributions. It was founded in 1976. SLT works closely with private landowners, the Sonoma County Agricultural Preservation and Open Space District, Sonoma County Regional Parks, and other public agencies and nonprofit partners, and foundations.

Sonoma Land Trust, in cooperation with USFWS and CDFW, implemented the Sears Point Restoration Project. SLT acquired its first Baylands property along SR-37 in the 1980s. Other acquisitions followed, culminating in the purchase of the Dickson Ranch in 2004 and the North Point Joint Venture property in 2005. Together, these properties comprise the Sears Point Restoration Project, integrating agriculture with a segment of the Bay Trail and large scale habitat and tidal wetlands restoration. Today, most of the lands have been turned over to USFWS. This project included the reclamation of 955 acres of formerly diked lands to tidal marsh, improvement of tidal exchange, seasonal wetlands and upland enhancement, and completion of approximately 2 ½ miles of new Bay Trail, including an at-grade pedestrian crossing of the SMART rail tracks.

The eastern terminus of the existing trail (completed as part of the restoration) includes a trail turnaround, fencing, benches and interpretive signs. In addition, work in the vicinity included creation of a 10:1 fill wedge adjacent to the west levee of Tolay Creek (south of the levee).

### **2.4 California Department of Fish and Wildlife (CDFW)**

---

CDFW owns and manages lands in the Study Area as part of the Tolay Creek Unit of the Napa-Sonoma Marshes Wildlife Area. CDFW and USFWS have a Memorandum of Understanding which provides guidelines for management of northern San Pablo Bay wetlands, with a mutual goal of managing resident, migratory and endangered species while offering compatible wildlife dependent recreation opportunities such as hunting, fishing, hiking, wildlife observation, photography, environmental education and interpretation.

The Tolay Lake Unit encompasses approximately 436 acres, and includes the Tubbs Island section immediately south of SR-37, as well as the Midshipman Slough section west of Tolay Creek, and adjacent to the Sears Point Restoration Project. The Tubbs Island section is closed to hunting, but a parking area and interpretive signs are located at the SR-37 entry.

In addition to landowner status, CDFW has regulatory authority over activities to ensure conservation, protection, and management of California's fish, wildlife, and native plant resources as described in Sections 1600-1616 of the State Fish and Wildlife Code. To meet this responsibility, the law requires any person, state or local governmental agency, or public utility to notify the CDFW before beginning an activity that will substantially modify a river, stream, or lake. If the activity could substantially adversely affect an existing fish and wildlife resource, a Lake or



Streambed Alteration Agreement is required. The CDFW also has responsibility for overseeing and enforcing provisions of the California Endangered Species Act and for review of project proposals for potential impacts on riparian areas, wetlands, fish, and wildlife resources. This is most often completed as part of their role in CEQA review and comment, as a “Responsible Agency.”

### 2.5 California Department of Transportation (Caltrans)

---

Caltrans owns Highways 37 and 121, including right of way that extends into the Tolay Lagoon adjacent to the road on the south. The intersection of the two roads is signalized, and includes access to old SR-37, now called Tolay Creek Road, which is also within Caltrans right of way. SR-37 is a two-lane road within the study area, with limited shoulders adjacent to the lagoon. Portions of the road in this area are subject to flooding during seasonal strong storm events and extreme tides. As discussed in more detail subsequently, this flooding and periods of prolonged road closures will become much more serious over time with sea level rise.

As a landowner within the study area, some of the trail alignment options being evaluated are within the SR-37 right of way. Caltrans has a commitment to the provision of bicycle and pedestrian facilities (statewide) as part of a comprehensive approach to transportation planning. In addition to their planning and regulatory role, Caltrans also has a potential role as a project sponsor and approval agency, through their review and approval of environmental documents and engineering plans, if any part of the project had state and/or Federal Highway Transportation funding, which would proceed through their Local Assistance Program procedures.

Caltrans also participated in the Draft SR-37 Transportation and Sea Level Rise Corridor Improvement Plan (September 2017), discussed below, and is an active participant in this project.

#### *Draft SR-37 Transportation and Sea Level Rise Corridor Improvement Plan, September 2017*

---

The Draft SR-37 Plan, commissioned by the Metropolitan Transportation Commission (MTC) and its partners, the Solano Transportation Authority (STA), the Sonoma County Transportation Authority (SCTA), the

Transportation Authority of Marin (TAM) and the Napa Valley Transportation Authority (NVTA) prepared a Design Alternative Assessment (DAA) to plan and expedite the delivery of improvements on the SR-37 corridor to address the threat of SLR and traffic congestion.

The Corridor Plan is part of a process to identify near-term and long-term strategies for the corridor. Building on information gleaned from studies such as the Highway 37 Stewardship Study (completed 2012), the State

Route 37 Integrated Traffic, Infrastructure, and Sea Level Rise Analysis (UC Davis Study, completed 2014-15) and the Transportation Concept Report (TCR, completed 2015), the Draft SR-37 Plan discusses corridor context, issues, and alternative improvement strategies for SR-37.

Improvements to SR-37 (Section B) was identified as a priority segment for implementation for this Plan. Improvements to this area (Segment B include both interim measures, such as construction of a shoulder edge sea wall, and long-term solutions such as elevating the roadway on a structural causeway or on fill. These improvements are included as concepts in the corridor plan and the plan project area. Elements of the Plan that overlap with the Bay Trail gap closure include:

- The plan includes an option to provide a barrier-separated Class IV bicycle facility on SR-37, but does not address the pedestrian connection that would also be needed.
- Options for a bikeway within the SR-37 right of way do not specifically address connections to the existing Eliot or Tolay/Tubbs trail.



- Short term extension or realignment of SR-37-SR121 intersection, with roundabout or extended merge lanes east of railroad tracks. Lane merge and widening of SR-37 at this location would affect placement of a trailhead facility on Caltrans lands south of the roadway, and the trailhead would need to be shifted elsewhere.
- Park and Ride Facility on SR-37. Incorporating a park and Ride facility in the project vicinity could double as a trailhead staging area, and could facilitate transit service to the trail.

The draft concepts developed in the SR-37 Corridor Plan were incorporated into the Sears Point Connector Study.

### *Regulatory Review*

---

An Encroachment Permit will be required for any infrastructure on Caltrans lands not constructed by Caltrans. In addition, as mentioned above, if federal funding is used and managed under Caltrans' authority, then the project must comply with Caltrans Local Assistance Program requirements. For this project, this may require that the trail facilities be designed to Caltrans standards, per Chapter 1000 of the Highway Design Manual. Caltrans has a detailed encroachment permit approval process that includes engineering, traffic safety, and environmental review.

Any project within Caltrans right of way would be subject to Caltrans approval. Projects that exceed \$3 million (this project does) must go through PAED (Project Approval and Environmental Document) process, with an estimated one to three years needed for processing.

### **2.6 State Lands Commission (SLC)**

---

SLC holds jurisdiction over, and regulates land use of the State's sovereign lands, including all historic rivers, tidelands and submerged areas:

- 120 rivers, streams and sloughs;
- 40 non-tidal navigable lakes, such as Lake Tahoe and Clear Lake;
- Tidal navigable bays and lagoons; and
- Tide and submerged lands adjacent to the entire coast and offshore islands of the State from the mean high tide line to three nautical miles offshore.

In general, the State acquired sovereign ownership of tidelands when it became a state in 1850, and holds these lands in the Public Trust for purposes of waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation and open space. Ownership extends landward to Ordinary High Water (OHW) of lands as they existed prior to fill or alteration. As a result a lease is required for use of such lands for any proposed improvements. Lease agreements with SLC often require provision of public access.

In the Study Area, Tolay Creek was acquired by the California State Lands Commission in 1981 and is currently managed by the USFWS through a lease. The "upper" and "lower" lagoons along Tolay Creek are owned and managed by CDFW. USFWS and CDFW began restoration of portions of Tolay Creek beginning in the 1980s with the last major effort in 1999. The Eliot Trail levee and related improvements were constructed in 2015-2016.

Vallejo Sanitation and Flood Control District also maintains State lands Commission-owned levees within the study area.



---

## **2.7 California Public Utilities Commission (CPUC)**

---

The California Public Utilities Commission (CPUC) regulates railroad crossings, and associated rules regarding clearance. General Order 26-D dictates a minimum setback distance of 8'- 6", with a minimum setback recommendation of ten feet to any structure, and General Order 75-D contains regulations for at-grade private rail crossings. In addition, the minimum vertical separation from track to overhead structure is 22 feet, 6 inches, with additional clearance required for taller rail cars.

At-grade crossing improvements, such as the crossing of the SMART tracks at Old Tolay Road (a designated public crossing owned by Caltrans) typically consist of crossing warning signs, pavement stenciling, track improvements, and barrier fencing. In some situations, automatic signalization and lowering crossing arms are warranted. Factors considered for crossing improvements typically include train traffic volume and train speed; safety issues associated with sight distance, noise, and crossing history, anticipated volume of pedestrian use, and the feasibility of grade separation options. The opinion of the track owner and user is also considered in making a determination, by the CPUC (See also Section 2.11 on SMART).

In keeping with PUC policy, it is likely that future improvements to SR-37 will necessitate construction of an overpass over the SMART tracks to separate vehicular traffic from the track crossing (approximately 30 feet above the ultimate track elevation). Assuming a three percent highway grade, the causeway structure would need to be at least 900-1,000 feet long before returning to existing (or future) grade, approximately one-third of the SR-37 right of way within the Study Area. Connections or ramps will be needed at a maximum 5% grade (for accessibility) to connect bicycle and pedestrian facilities along the highway to bicycle and pedestrian facilities (on the ground) including the Bay Trail, Eliot Trail, Tolay/Tubbs Trail and facilities along SR-121.

---

## **2.8 The San Francisco Bay Trail**

---

The SF Bay Trail, administered by Association of Bay Area Governments (ABAG) and Metropolitan Transportation Commission (MTC) is a planned recreational corridor that, when complete, will encircle San Francisco Bay and San Pablo Bay with a continuous network of bicycling and hiking trails. It will connect the shoreline of all nine Bay Area counties, link 47 cities, and cross the major toll bridges in the region. To date, approximately 354 miles of the alignment – over 70 percent of the Bay Trail's ultimate length – have been completed. The Eliot Trail and the Tolay/Tubbs Trail are designated Bay Trail segments.

ABAG and MTC have an interest in the project as a partner and potential funding source. The Bay Trail Plan was prepared in consultation with local governments, and is periodically amended and updated in consultation with them.

---

## **2.9 San Francisco Bay Conservation and Development Commission (BCDC)**

---

BCDC, a state agency, was established in 1965 to protect and manage activities that affect San Francisco Bay. BCDC's responsibilities include providing maximum feasible public access to and along the shoreline of the Bay consistent with the BCDC's policies on Public Access, as well as regulating all filling and dredging in San Francisco Bay and new development within the first 100-feet inland from the Bay to ensure that the limited amount of shoreline area suitable for high-priority water-oriented uses is reserved for ports, water-related industries, water-oriented recreation, airports, and wildlife areas.

The McAtter-Petris Act (California Government Code 66600 – 66682) is the key legal provision under California state law that preserves San Francisco Bay from indiscriminate filling and to regulate shoreline public access. The McAtter-Petris Act requires that any person or governmental agency wishing to place fill in, or to extract materials exceeding \$20 in value from, or make any substantial change in use of any land, water, or structure within the area of BCDC's jurisdiction must secure a permit from the Commission. BCDC administers the *San*



*Francisco Bay Plan* for the long-term use of the Bay, reviews applications for projects that fall within BCDC jurisdiction.

BCDC has project jurisdiction over Tolay Creek to the northerly line of SR-37, and any projects in this area will require a permit, with regulatory review of fill and public access.

## **2.10 San Francisco Bay Regional Water Quality Control Board (RWQCB)**

---

The RWQCB is responsible for regulating surface water and groundwater quality in the San Francisco Bay Area to address water quality issues. As part of the California Environmental Protection Agency, the RWQCB administers water rights, water pollution control, and water quality functions for the state, conducts planning, permitting and enforcement activities, and is responsible for implementation of the federal Clean Water Act and the state Porter-Cologne Act. The RWQCB reviews proposed development actions for consistency with the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), which includes provisions for Beneficial Uses, such as habitat restoration and recreation.

The RWQCB will need to issue a Section 401 Water Quality Certification for any trail project component that involves wetlands or Waters of the United States fill. Typically, a detailed soil erosion control and either a water quality protection plan or Stormwater Pollution Prevention Plan (SWPPP) is required to be prepared as part of the Section 401 application or separately for any construction project disturbing over 1 acre of land. This can also be used in support of any National Pollution Discharge Elimination System (NPDES) stormwater general permit issued by the State Water Resources Control Board.

## **2.11 Sonoma Marin Area Rail Transit (SMART)**

---

Sonoma-Marin Area Rail Transit (SMART) is the voter-approved passenger rail and bicycle-pedestrian pathway project located in Marin and Sonoma counties. SMART also owns former Northwest Pacific (NWP) rail right of way between the Ignacio Wye in Novato and Lombard in Napa County, which is used by the North Coast Rail Authority (NCRA) for freight service. These are SMART freight tracks along the southern portion of the Study Area. Freight service occurred on this line until 2001 and was resumed in 2013.

Approximately two miles west of the Study Area, there is an existing pedestrian/rail crossing equipped with flashers on the Eliot Trail near Reclamation Road (CPUC Number 005H-29.57-D, Federal Railroad Administration/DOT Number 498703E).

In addition, there are two existing at-grade crossings of roadways in the vicinity of the study area:

- Tolay Creek Road (Federal Railroad Administration/DOT Number 498707G) is a public crossing that is in the federal system but not listed in the state (California Public Utilities Commission) database. The crossing does not have crossing arms, lights or other signal improvements. It is anticipated that additional crossing improvements (similar to the nearby Eliot Trail crossing improvements) would be required as part of project implementation. The maximum speed of crossing is listed at 25 MPH.
- SR-37 (FRA/DOT and CPUC 498708N) is the public crossing of SR-37. It is equipped with advance warning symbols, pavement markings, signs, lights and crossing arms. The maximum speed of crossing is listed at 25 MPH.

## **2.12 Vallejo Sanitation and Flood Control District (VSD)**

---

East of Tolay Creek, the lands south of SR-37 are owned and/or managed by VSD, including levees on the east side of the creek, some of which are under the jurisdiction of the State Lands Commission (described above). VSD lands east of this levee are utilized for beneficial reuse of municipal biosolids (farmed as oat hay), and are



generally at a lower elevation than adjacent Tolay Creek. The levee protecting these lands is the designated Tolay/Tubbs Trail managed by USFWS, and allows public access by foot or (non-motorized) bicycles with interpretive signs for environmental education.

VSD permits Refuge and public access under an informal agreement with the Refuge. Portions of the Tolay/Tubbs Trail are in poor condition, are overgrown, and not maintained. As a result, some trail users have been reported to use the adjacent VSD service road to access the lower Tolay area. VSD has indicated that a fence or buffer is needed to preclude access to biosolids reuse areas.

### 2.13 Metropolitan Transportation Commission - SR-37 MOU Partnership

---

In December 1, 2015, the Congestion Management Agencies (CMA) of Marin, Napa, Solano and Sonoma Counties agreed to form a partnership through a Memorandum of Understanding (MOU) to develop an expedited funding, financing and project implementation strategy for the reconstruction of SR-37 to withstand rising seas and storm surges while improving mobility and safety along the route.

A policy committee was formed consisting of elected officials representing Solano, Sonoma, Napa and Marin counties. Solano Transportation Authority (STA) provides administrative services for the committee.

This committee secured funding from the Metropolitan Transportation Commission to prepare a Project Initiation type document to address reconstruction options (*SR-37 Transportation and Sea Level Rise Corridor improvement Plan*). The committee has also reviewed a proposal by United Bridge Partners to reconstruct SR-37 as a private toll road.

### 2.14 SR-37 Toll Road Proposal

---

United Bridge Partners (UBP), a private joint venture consisting of an investment firm and bridge design/build contractor has proposed to reconstruct and operate SR-37 as a toll road at no cost to the public. The proposal includes Caltrans' relinquishment of the right of way to Sonoma and Solano Counties for implementation. UBP would acquire additional right of way if needed, as well as secure all regulatory permits, conduct environmental assessment, and fund project construction and operation. The UBP proposal includes addition of two vehicle lanes and future construction of a structure to address Sea Level Rise. The proposal also indicates that bicycle and pedestrian facilities would be provided as part of the project, and that an interchange would be constructed at the SR121-SR-37 junction. Details have not been provided regarding connections to the existing trails at the Sears Point Restoration site or the Tolay/Tubbs trail.

### 2.15 State Route 37 Integrated Traffic, Infrastructure and Sea Level Rise Analysis

---

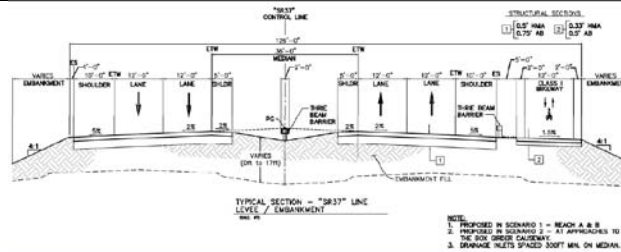
The UC Davis Road Ecology Center, under the direction of Fraser Shilling, has been conducting research to address long term issues associated with Sea Level Rise (SLR) along SR-37. The study includes predicting when shoreline ecosystems and infrastructure will be affected by SLR and storms; assessing vulnerability of highway segments along the corridor; identifying adaptive measures to address SLR; costs, benefits and impacts of potential actions, and a stakeholder process to facilitate future implementation.

The study includes data regarding tidal action and overtopping at Tolay Lagoon, within the study area, and explores a range of adaptive structural scenarios for SR-37 reconstruction. These are shown in **Figure 2.15-1**. Each of the options includes provision of bicycle and pedestrian facilities, but does not address local trail connections to the SF Bay (Eliot or Tolay /Tubbs) trails.



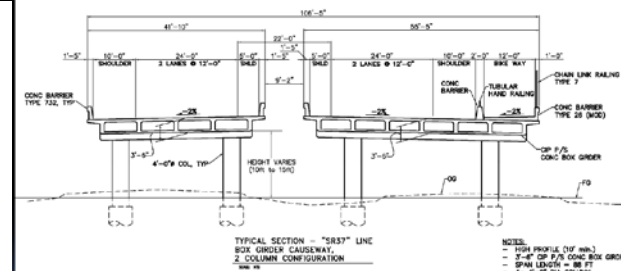
**Figure 2.15-1: SR-37 Reconstruction Options**

Berm/Embankment



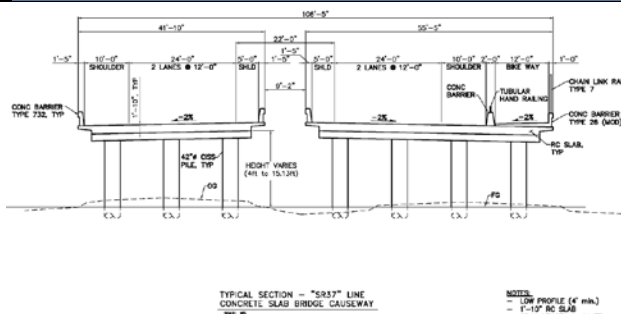
Two lanes w/ shoulder  
12 ft wide bikeway  
Height of fill varies

Causeway (over land)



3.5 ft deep box girder  
88 ft span length, 4.0 ft diameter columns  
Two lanes w/ shoulder, 12 ft wide bikeway

Slab/Bridge



22" thick slab, 44 ft span length, 3.5 ft diameter columns  
Two lanes w/ shoulder, 12 ft wide bikeway

Source: UC Davis Road Ecology Center, 2016



**Figure 2.15-2: Tolay Lagoon, Tolay Road, and SMART Tracks, as seen from Eliot Trailhead facing Northwest**



### 3. ENVIRONMENTAL RESOURCES

---

#### 3.1 Biological Resources

---

Lower Tolay Creek and the Upper Tolay Lagoon are located south of SR-37 in the approximate center of the Refuge. Historically, Tolay Creek was part of a series of tidal sloughs that surrounded marsh islands. The Creek historically received freshwater input from Tolay Lake and upper Tolay Creek and other intermittent streams in the southern Sonoma Mountains. During the early 20<sup>th</sup> century, much of the area west and east of Tolay Creek and south of SR-37 were leveed and drained for farming. Prior to 1999, the 3.2-mile reach of Lower Tolay Creek south of SR-37 consisted of a fallow field with large cracks in the ground that created mosquito habitat (Takekawa et al. 2005). Lower Tolay Creek was strengthened and channelized over time, and the majority of the surrounding marsh was lost. The extent of tidal influence also decreased as a result of siltation in the upper reaches of the creek (Ducks Unlimited Inc. 1997a). Prior to restoration, human activities had dramatically altered the landscape of Tolay Creek, decreasing the size of the tidal flood plain and associated marsh (Takekawa et al. 2005).

Tolay Creek was acquired by the California State Lands Commission in 1981 and is currently managed by the USFWS through a lease. The “upper” and “lower” lagoons along Tolay Creek are owned and managed by CDFW. USFWS and CDFW began restoration of portions of Tolay Creek beginning in the 1980s with the last major effort in 1999. Their efforts have been focused on providing habitat for shorebirds, waterfowl, and sensitive species through restoration of tidal hydrology, along with public recreation amenities.

The Upper Tolay Lagoon area consists mostly of shallow water at high tide, and mud flats and scattered patches of cordgrass with some pickleweed exposed at low tide. In addition, cordgrass and pickleweed have colonized on the lower slopes of all of the levees and along Highway 37. As such, the present biological use is primarily for shore birds and waterfowl. The real biological value of this area is its potential to provide a full range of tidal marsh habitat in the future, including low marsh, (eventually) high marsh, and open water along the evolving Tolay Slough channel and upper lagoon. The Sears Point Restoration Project for the Upper Tolay Lagoon area specifically targeted several protected species, including salt marsh harvest mouse, Ridgeway rail, and black rail. The open water and tidal creek channel areas contain little vegetation, except for pacific cordgrass and patches of big bulrush (*Scirpus robustus*). The higher salt marsh areas along the roadway and levee toes are expected to be dominated by pickleweed but are also populated by saltgrass, jaumea, marsh rosemary, big bulrush, Pacific cordgrass, alkali heath, fat hen, California bee plant (*Scrophularia californica*), bristly ox tongue (*Picris echinoides*), yarrow (*Achillea millefolium*), and coyote brush.

Since the completion of restoration actions in 1999, sediment deposition has resulted in mudflats at low tide. Invasive plant cover has declined from 38 percent (1998) to 2 percent (2002) (Takekawa et al. 2002). Following a major winter storm event in 2005, the upper lagoon exhibited mudflats at low tide for the first time since restoration in 1999. Additional sediment was noticeably deposited following the heavy winter of 2016-2017. Channels are now forming, Pacific cordgrass is more rapidly colonizing the mudflats, and thousands of shorebirds and waterfowl are observed here during winter and migratory periods (Perlmutter et al. 2010). California Ridgeway rails were observed in the Lagoon in 2016.

#### 3.2 Hydrology, Tides, Flooding, Sea Level Rise

---

The Trail Feasibility Study area is influenced by two hydrologic systems, 1) freshwater discharges from the Tolay Creek watershed via lower Tolay Creek, and 2) saline, tidal inflow that makes its way up to the upper lagoon from San Pablo Bay.



## Tolay Creek

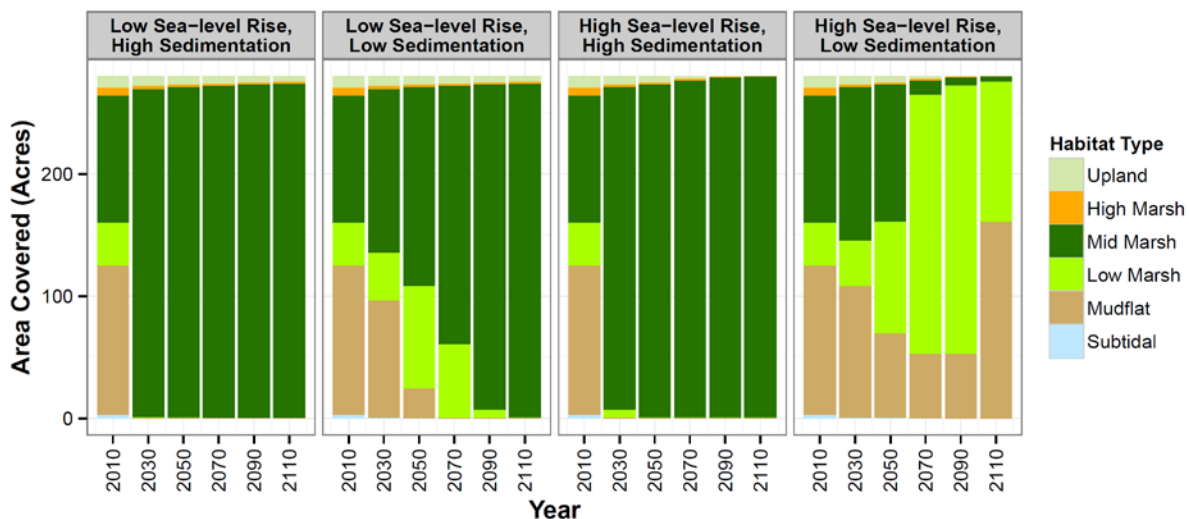
Tolay Creek is a 12.5-mile long creek that drains a watershed to the north and northwest of SR-37, of approximately 8.5 square miles, including the hillslopes of the Sonoma Raceway and Tolay Lake Regional Park. Tolay Creek discharges through a concrete bridge structures under SR 1210 (Arnold Drive) and then again under SR-37 via a 40-foot constricting culvert into the Upper Tolay Lagoon. Tolay Creek originates above Tolay Lake in the foothills west of Lakeville Highway and east of Arnold Drive, but is joined by a complex agricultural drainage system on the bay lowlands and farm fields north of SR-37, including the north branch and east branch ditches, which also connect to Sonoma Creek near Noble Road and SR-37, about one mile east of the SR 121/SR-37 intersection.

Incision or lowering of the natural channel bottom of Tolay Creek upstream of SR-37 has occurred, associated with increased runoff and erosion and resultant changes to watershed hydrology from farming and ranching activities, as well as from settlement of the bayland area associated with diking and drainage of the lands for farming beginning in the late 19<sup>th</sup> century.

From CAP:

**Tolay Creek.** *Suspended sediment concentrations for this site were 150 mg/L for low and 300 mg/L for high. Most of the site under current conditions is modeled as low-marsh with some mid-marsh. Given these assumptions, marsh habitat at this site is relatively resilient given a low rate of sea-level rise. Under this SLR scenario and low sediment, low and mid-marsh increases over time and is almost completely converted to mid-marsh by 2090, while under a high sediment assumption the site is completely converted to mid-marsh by 2030 and remains so through 2110.*

*Given a high rate of SLR, mid marsh at this site increases rapidly under the high sediment assumption becoming almost completely mid-marsh by 2030 and remaining so through 2110. However, by 2110 most mid-marsh is replaced by low-marsh or mudflat under the low sediment assumption.*



Tolay Creek projected elevation-derived composition of future habitats showing the amount of habitat in acres within the site at five different time periods under four combinations of sea-level rise and sediment scenarios.

## San Pablo Bay Tidal Inflow

Following the breaching of the levees on the edge of San Pablo Bay in 1999 as part of the Sears Point Restoration Project, most of the Feasibility Study Area (the Upper Tolay Lagoon) is now subject to twice daily tidal inundation. However, because of distance to the bay and the size of the Tolay Channel, significant tidal muting occurs. The



Tolay Creek Channel is likely not large enough to convey full tidal flows into the Upper Lagoon, and as a result the channel appears to be scouring. Approximate stillwater mean tide heights that are not corrected for any muting or local factors, and based on the tide gage for Mare Island Straights are provided below.

**Table 3.2-1: Tidal Datums for San Pablo Bay**

Tidal Datum	Description	Elevation <sup>1</sup> (feet, NAVD88)
MHHW	Mean higher high water	6.29
MHW	Mean high water	5.72
MTL	Mean tide level	3.56
MLW	Mean low water	1.39
MLLW	Mean lower low water	0.43

<sup>1</sup> Mare Island Strait gauge (NOAA, 9415218)

Because the lowlands area had settled 2 to 3 feet below mean sea level following the baylands diking and farming activities of the late 19<sup>th</sup> and 20<sup>th</sup> century, the study area immediately after restoration mostly consisted of open standing water, even at low tide. Gradual sediment deposition on the Upper Tolay Lagoon bottom from Tolay Creek and from sediments suspended in the tidal inflow has now raised the bottom elevation to about +1 to +3 feet NAVD88 such that at low tide, the area is now a combination of mud flat, with exposed and scattered patches of cordgrass and some areas of pickleweed. The Tolay Creek channel has also now re-established itself and the channel through the lagoon areas, as well as other smaller tidal marsh distributary channels that are clearly visible on recent aerial photography.

In addition to the twice daily tides summarized by the mean tide data above, the project area, including the Eliot and Tolay/Tubbs levees, Tolay Road, and SR-37 are also subject to periodic extreme tides. An extreme tide is a temporary, or short- to medium-term increase in sea level above the predicted astronomical tide levels as a result of changes in atmospheric pressure, wind, or freshwater inflows. The study area is subject to periodic storm driven or atmospheric extreme tides as well as extreme or King Tides.

### Extreme Tides

The term “King Tide” is used to describe especially high tide events associated with the alignment of the sun and moon and the resultant exceptional gravitational pull on the Earth’s oceans. Typically one or two King Tides occur each year. When astronomical King Tides occur coincident with atmospheric or storm-related tides and wind-driven waves, even higher extreme tide heights and tidal flooding can occur.

Based on LiDAR elevation data, the southern shoulder elevation of the south side (east travel direction) of SR-37 between SR 121 and the Tolay/Tubbs trailhead levee is at an elevation of about 8.2 to 8.3 at its lowest point, with the paved travelway road surface elevation at about elevation 8.5 to 9.2. The King Tide extreme tidal events of the El Niño winter of 2015-2016 and the several coincidental occurrences of extreme astronomical and atmospheric driven tides resulted in water levels at or near highway top of shoulder elevations several times during these



winters. Periodic extreme tides in excess of +7.0 NAVD88 can be expected to occur almost annually in this area, especially as Tolay Creek scours and enlarges over time, and conveys full tidal volume into the Upper Lagoon.

---

### Sea Level Rise

Over time, sea level rise will raise the heights of all tides. Gradual sea level rise has the potential to increase the heights of extreme tides and the depth and duration of Bay coastal flooding. Using the BCDG guidance of a 16-inch (1.4-foot) rise in sea level by 2050 (the typical 25-30 year design life of a trail project), trail surface elevations should have minimum elevations of 14 feet NAVD88 to be resilient. Trail surface elevations lower than this can employ adaptive management technologies, such as being designed for easy topping and elevating. More substantial structures that have longer economic lives and are more costly and difficult to raise or replace should have minimum surface elevations above 14 feet NAVD88. Elevation 14.0 is also the design elevation of the Eliot Trail Levee System. Mid- to long-term improvements of the SR-37 corridor in this area will be above elevation 16 feet NAVD88, according to the SR-37 Transportation and Sea Level Rise Corridor Plan, permanent roadway.

---

### 3.3 Geology and Soils

The Study Area is located at the southern or Bay edge of the Sonoma Mountains and the southwest end of Sonoma Valley. The hills immediately west of Upper Tolay Lagoon are underlain by siltstone, sandstone, and conglomerate of the Upper Petaluma Formation (Graymer, Jones, and Brabb, 2002). The toe slopes of these hills consist of predominantly clayey recent alluvial fan deposits. Undocumented artificial fill has been placed over these soils to create the surface for SR-37, and Old Tolay Road in this area.

The Upper Tolay Lagoon area is predominantly underlain by recent fine grained estuarine deposits (Bay Mud and marsh deposits). These areas were diked, drained, and reclaimed for dry land hay farming in the late 19th century. They were restored to tidal action in the mid to late 1990s as part of the Sears Point Restoration Project. Underlying the recent Bay Muds and marsh deposits at depth are older alluvial deposits, or Older Bay Mud.

Drainage of the farmlands, combined with oxidation of organic matter present in the former marshland soils, resulted settlement, such that these former farmlands were several feet below sea level at the time of restoration. In addition to being strongly saline, the soils are also very acidic with soil pH levels commonly in the range of 4.5 to 5.0, resulting from the oxidation of sulfide compounds that accumulated in the historic poorly drained tidal marshlands. The result of the high salinity and soil acidity is that these soils are typically very corrosive.

The depth of the Bay Muds along SR-37 underlying the study area are not fully known, but based on the 2011 Hultgren-Tillis Engineers Geotechnical Investigation, likely exceed 60 feet to underlying, more consolidated Older Bay Mud. Total depth likely shallows as the alluvial fans and upland toe slopes of the mountains forming the Sears Point range are approached.

Following restoration of tidal action in the Lagoon area adjacent to SR-37, fine grained sediment deposition has occurred. The Lagoon area, which was shallow open water immediately after tidal restoration even at low tide, is now a tidal mud flat with patches of cordgrass and other low marsh plants.

In general, from a trail construction standpoint, the soil conditions in the Feasibility Study area are very poor. For construction purposes, the portions of the Study Area that have native soils consisting of soft, often organic rich, poorly consolidated, poorly drained silty clays (Bay Mud) provide especially poor foundation support for trails, bridges, boardwalks, roads and parking areas. The Bay Mud has very poor bearing strengths and most areas are highly expansive. They are prone to consolidation settlement and may have interbedded sands that are



susceptible to liquefaction during earthquake-induced ground shaking. This will be a consideration in pedestrian bridge/boardwalk foundation design.

The soils are especially soft and compressible where they occur in former or historic drainage sloughs and drainage ditches that were filled in for farming, or have sediment deposition associated with tidal marsh restoration. Where trail structures are proposed to cross over such areas, they will require special structures and treatment, such as over-excavation and placement of engineering geotextiles, and/or the import of thick section of granular aggregate base, with design allowances for settlement. These areas should be avoided wherever possible in the specific placement of boardwalk piles or pier structure. Bridge and boardwalk piers are best founded in the more consolidated older Bay Muds, making pier depths typically in the 60- to 70-foot range, or possibly deeper.

In some areas adjacent to the Bay Mud and along Tolay Road, 4 to 8 or more feet of imported fill have been placed over these soils to raise the surface above the tidal zone and improve drainage. In some cases, the fill may not have been carefully engineered or compacted and may be subject to additional settlement or deformation under heavy loads. This fill should be properly re-engineered (including potential over-excavation and replacement or re-compaction of previously placed fill) and any trail section over undocumented fill areas should include placement and compaction of an adequate thickness of aggregate base to reduce settlement and deformation of the underlying soils that may damage the overlying paved trail surfaces, and parking areas

## Seismicity

---

The Study Area is not located within an Alquist-Priolo Earthquake Fault Zone Boundary, and there are no faults zoned as active earthquake faults by the State of California Geological Survey as an active earthquake fault within it. Any constructed project trail facilities are therefore considered unlikely to be subject to surface fault rupture.

However, the Study Area is located in the California Building Code's Seismic Zone 4, the most seismically active zone. A number of recognized active faults are located nearby the Study Area and are expected to experience surface fault rupture resulting in seismically induced ground shaking during the lifespan of the Project. Faults recognized as active by the State of California and zoned pursuant to the Alquist-Priolo Earthquake Fault Zoning Act include:

- Rodgers Creek fault, <1 mile to the northeast;
- Hayward fault, 10 miles southeast;
- West Napa fault, 10 miles northeast;
- Green Valley fault, 19 miles to the southeast
- San Andreas Fault, 20 miles to the west.
- Concord fault, 22 miles to the southeast;
- Greenville Fault 26 miles to the southeast;
- Maacama Fault, 34 miles to the northwest;
- and the Calaveras Fault, 35 miles to the southeast;

The project site area is located in close proximity to the active Rodgers Creek fault (less than 1 mile). During an earthquake generated on this or other active faults as listed above, strong ground shaking may occur at the project site. The Peak Ground Acceleration (PGA) has been estimated by the United States Geological Survey. At the project site the PGA is estimated to be 0.814 g (81.4 % of the acceleration due to gravity). Due to the presence of deep poorly consolidated soils at the subject site, this acceleration will be attenuated, causing more extreme



ground shaking than would be expected at a site underlain by bedrock or shallow soils. Ground shaking could cause extensive damage to site improvements.

Liquefiable soils, such as sands and silty sands, interbedded with the Bay Mud and other underlying soils, may be susceptible to seismically induced settlement following ground shaking events. Liquefaction and settlement of underlying soils could cause damage to site improvements including boardwalk and bridge structures and paved trail surfaces.

The final engineering design for the trail projects will need to include the completion of a detailed site and project specific geotechnical investigation that includes depths to firm soil and information on the properties of the soils including seismic response and design recommended actions.

### 3.4 Traffic and Transportation

---

This section provides an overview of existing traffic and transportation conditions in the project study area along with the potential effects of the proposed Bay Trail Sears Point Extension Project on SR-37 traffic. The analysis provides a general overview of existing conditions and considers the impacts of construction and operational traffic, as well as traffic generated by increased public visitation to the project. The review considers the proposed project options and draws technical data from the *Sears Point Wetland and Watershed Restoration Project Draft Environmental Impact Report/Environmental Impact Statement, August 2009*; the *Sonoma County General Plan 2020*, and the *Caltrans SR-37 Transportation Concept Report (2015)*, among other referenced studies.

#### Overview

---

The project site is located in the Sears Point Area along the San Pablo Bay shoreline adjacent to the intersection of State Route 121 (SR-121)/State Route 37 (SR-37). Access to the project site is provided via SR-37. Walking and bicycling opportunities along SR-37 are limited. While bicycle access on the non-freeway portions of SR-37 is legal, few cyclists use the highway as it is a high-speed, dangerous condition, includes continuous rumble strips, and has three bridges with very narrow (less than two feet wide) shoulders – the Petaluma and River, Sonoma Creek, Napa River bridges. Currently there are no pedestrian facilities along SR-37. The proposed Bay Trail Sears Point Extension would connect existing segments of Bay Trail which are located along the shoreline south of SR-37; the Eliot Trail and the Tolay Creek Trail.

#### Planning Context

---

The *Sonoma County General Plan 2020* identifies the following transportation improvements in the project area:

- Bay Trail Sears Point - A Class I multi-use trail
- Tolay Creek/Tubbs Island (Tolay/Tubbs) Trail
- Class II bike lanes are proposed on SR-37
- Class II bike lanes are proposed on Lakeville Road
- Class II bike lanes are proposed on SR 121/Arnold Drive
- A Class I Multiuse Trail is proposed as part of the State Route 37 Transportation and Sea Level Rise Corridor Improvement Project

#### Regional Access

---

Regional access to the Project site is provided by US Highway 101 (US 101) and SR-37 from the west, by US Interstate 80 (I-80) and SR-37 from the east and by Lakeville Road and/or SR 121 from the north.



**US-101** is a principal north-south interstate freeway that connects Sonoma County and the project site to the Bay Area and points beyond. SR-37 extends east from US-101 in the city of Novato (Marin County) to the project site.

**I-80** is a principal east-west interstate freeway that connects the city of San Francisco and the Bay Area to the Sacramento Region and points beyond. SR-37 extends west from I-80 in the city of Vallejo (Solano County) to the project site.

**SR-37** is a key transportation corridor that links four North Bay counties - Marin, Sonoma, Napa and Solano. SR-37 extends for 21 miles along the northern shore of San Pablo Bay linking US-101 in Novato (Marin County), with Interstate 80 (I-80) in Vallejo (Solano County). West of the project site, from US-101 to the signalized SR-121 intersection at Sears Point, SR-37 is a four-lane expressway. East of Sears Point/SR-121, it is a conventional two-lane highway with a posted speed limit of 55 mph, wide shoulders with stamped rumble strips, and a median barrier as it crosses the Napa-Sonoma marshlands. SR-37 is located in an environmentally sensitive zone and is subject to tidal influences, major flood events, and sea level rise. The route is an important inter-county commute route on weekdays, recreational route on weekends, and as the primary parallel route north of the Richmond-San Rafael Bridge – SR-37 serves as a State Recovery Route.

**SR-121** is a two-lane rural principal arterial that begins at SR-37 at Sears Point and extends north-south to Schellville in the Sonoma Valley where it meets SR-116 and overlaps with SR-12. In the vicinity of the project SR-121 provides primary access to the Sonoma Raceway. SR-121 has two 12-foot travel lanes and approximately 8-foot shoulders.

**Lakeville Highway** is a two-lane rural principal arterial that extends between the city of Petaluma (Sonoma County) and SR-37 to the west of the project site. Lakeville Highway has two 12-foot travel lanes and variable width shoulders generally ranging from 2 – 6 feet.

**Sears Point Road** is a short private one-lane east-west frontage road that extends along the south side of SR-37. It forms the southern leg of the signalized SR-37/SR 121 intersection. Sears Point Road is gated approximately 100-feet west of its intersection with SR-37, and provides residential and commercial access to Paradise View Vineyards.

**Tolay Creek Road** is a short one-lane east-west frontage road that extends along the south side of the SR-37. Tolay Creek Road begins at the intersection of SR-37/SR 121 and extends east from Sears Point Road along the south side of SR-37 for approximately 550-feet to an at-grade crossing with the NWP rail line, where it then turns south and extends for another 400-feet or so along the western bank of Tolay Creek.

**Noble Road** is a gated private road located off of SR-37 approximately 1.5 miles east of the SR-37/SR-121 intersection. Noble Road provides access to the Sears Point Farming Company, the Black Point Sports Club, and agricultural operations on the north and south sides of SR-37. A break in the median and a center turn lane accommodate turning movements to and from Noble Road from SR-37. U-turns are prohibited at this location and “No U-Turn” signs are posted.

**Skaggs Island Road** is a gated road located on the north side of SR-37 approximately 3.9 miles east of the SR-37/SR-121 intersection. A break in the median and left and right turn lanes accommodate turning movements to and from Skaggs Island Road from SR-37. Overhead street lights and an overhead revolving intersection beacon are provided. Skaggs Island Road is the closest legal turn around location for vehicles leaving the trailhead that would like to go west.

### [Transit and Multi-modal Access](#)

---

Transit access and multi-modal transportation facilities play a vital role in providing transportation choices for people across Sonoma County. Convenient transit connections with basic infrastructure and amenities that are



integrated into the transportation system have the potential to extend trip ranges for bicyclists and pedestrians who would use the Bay Trail. Currently there are no direct public transit connections provided along SR-37 between the communities of Novato and Vallejo.

### Sonoma County Transit

---

Route 38 – Sonoma Valley to San Rafael provides fixed route north-south weekday service between the Sonoma Valley and the San Rafael Transit Center. Route 38 travels along SR-121 and SR-37 adjacent to the project site. However, no stops are provided on SR-121 south of SR-116 or along SR-37. The addition of transit stops in the Sears Point area would allow for a ‘Transit-to-Trails’ connection.

### Northwestern Pacific Railroad/Sonoma Marin Area Rail Transit

---

A segment of the Northwestern Pacific Rail Line (NWP), which is owned by the Sonoma Marin Area Rail Transit District (SMART), traverses the study area. The rail line generally runs from west to east between the Ignacio Wye in Novato and Lombard, the railroad junction just east of the city of American Canyon in Napa County. However, the rail line turns north-south in the project study area as it emerges from the bay lands and heads towards Napa. The rail line parallels Tolay Creek and crosses Tolay Creek Road and SR-37 at grade approximately 500-feet east of the SR-37/121 intersection. Freight service was recently resumed on the rail line, currently approximately 6 – 8 trains serving half a dozen customers operate on the line weekly, and the potential for passenger service in the corridor is currently being studied.

### Bicycle and Pedestrian Collisions

---

Bicycle and pedestrian collisions in the study area were documented and mapped using the University of California’s Safe Transportation Research and Education Center (SafeTREC) Transportation Injury Mapping System (TIMS). The TIMS System utilizes data reported by the Statewide Integrated Traffic Records System (SWITRS). The SWITRS database is maintained by the California Highway Patrol. SWITRS is the standard used to document and analyze crash statistics by law enforcement, cities, counties, transportation professionals, and other agencies throughout California. It should be noted that due to their nature, it is widely believed that many pedestrian and bicycle crashes go unreported, especially for solo incidents, and those that do not result in visible injury or property damage.

There was one (1) bicycle and no (0) pedestrian collisions recorded during the 10-year analysis period of January 1, 2006 – December 31, 2015. The recorded bicycle collision occurred on SR-37 west of SR 121. It occurred in November in the evening commute period during dusk/dark, and resulted in injury to the bicyclist.

### Vehicle Collisions

---

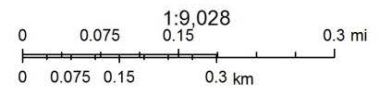
Vehicle collision data for the 10 year period of January 1, 2006 – December 31, 2015 was documented and mapped for a one-mile radius around the study area using the University of California’s Safe Transportation Research and Education Center (SafeTREC) Transportation Injury Mapping System (TIMS). A heat map diagram of motor vehicle collisions not involving bicyclists or pedestrians was prepared to demonstrate highest concentration collision locations (**Figure 3.4-1**). 191 vehicle collisions were recorded during the 10 year period. The majority of collisions occurred in within the zone of influence of the SR-37/SR 121 intersection. Two collisions were recorded in the vicinity of the main gate to Sonoma Raceway. No collisions were recorded in the immediate vicinity of the driveway for the Tolay/Tubbs Trailhead.

## Collision Location Map



## Legend

- A - Non-Collision
- C - Other Motor Vehicle
- D - Motor Vehicle on Other Roadway
- G - Bicycle
- I - Fixed Object
- J - Other Object

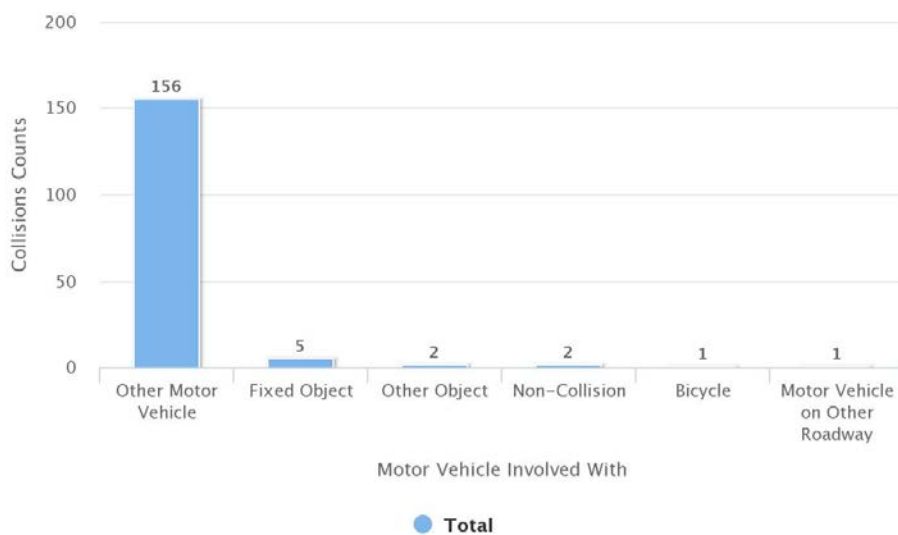


Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand),

Made by: SWITRS GIS Map at TIMS (<https://tims.berkeley.edu>), SafeTREC, UC Berkeley  
Copyright © 2017 UC Regents; all rights reserved.

## Collision Summary

Summary of collision counts on HWY 37 from 01/01/2006 to 12/31/2016



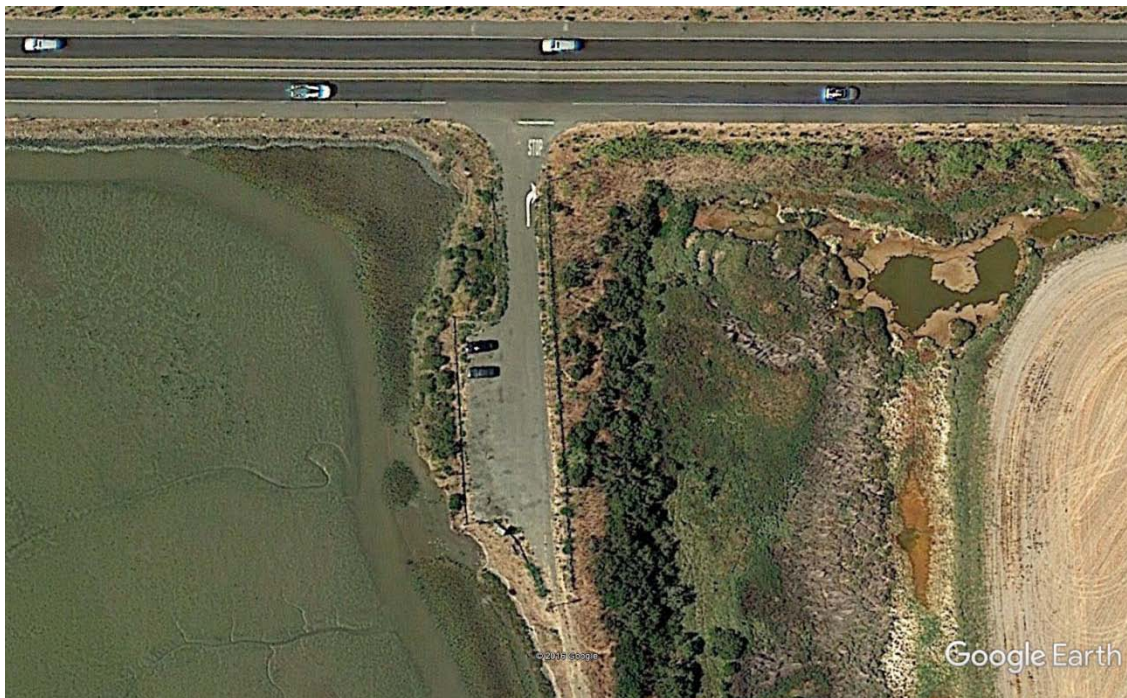
Source: TIMS (<http://tims.berkeley.edu>), accessed 12/18/2017



## Existing Site Access

Access to the project site is at the existing CDFW trailhead, which is located on the east side of SR-37 approximately 0.75 miles east of the SR-37/SR 121 intersection. The Tolay/Tubbs trailhead is part of the U.S. Fish and Wildlife Service's (USFWS) San Pablo Bay National Wildlife Refuge and provides access to the Tolay/Tubbs Trail. The Tolay/Tubbs Trail is an unpaved segment of the Bay Trail; it follows Tolay Creek and loops around Lower Tubbs Island. The Eliot Trail, part of the Sears Point Restoration Project, is accessed by a trailhead south of SR-37 at Restoration Road, approximately two miles west of the study area.

With the median barrier on SR-37, the existing trailhead parking lot only accommodates right turns in and right turns out. Parking stalls are not marked, however the parking area can accommodate approximately 10 – 12 pull-in parking spaces, and an additional 5 – 7 spaces along the edge of the parking lot behind the pull-in spaces.



**Figure 3.4-2. Tubbs Island Trailhead**



## 4. TRAIL SEGMENTS AND PRELIMINARY ROUTE ALTERNATIVES

---

The Study Area was divided into six geographically different trail segments for trail planning and analysis purposes, including preliminary engineering design and environmental screening, and cost estimation. These six segments were then mixed and matched to form four (4) different trail alignment options for completion of the connection between the Eliot Trail and the Tolay/Tubbs Trail. The six segments are summarized below. Trail options are discussed in the next section.

### 4.1 Trail Segments

---

**Segment 1 Tolay Creek Road (1,100 L.F.).** This segment would be needed to make a complete connection combined with Segments 2, 3, or 4 and would be a part of all four alignment options to provide connectivity to future bicycle and pedestrian facilities along SR-37 and SR 121. It consists of an L shaped trail alignment that follows the edge of old Tolay Creek Road on the west side of Upper Tolay Lagoon, where it would cross an arm of the lagoon that abuts the toe of the SMART railroad embankment. This crossing would necessitate an elevated boardwalk or bridge. The northern arm of this segment would be located on existing fill (including portions of the old SR-37) immediately adjacent to SR-37. Except for the boardwalk, the trail would be on new engineered fill placed on top of existing fill to elevate the trail above anticipated sea level rise of 2050. This segment also includes vehicle access improvements to the public crossing of the SMART railroad tracks immediately adjacent to SR-37, and a 4-5 car parking lot located on Caltrans property across (east of) the rail crossing. All of the trail alignment options would utilize this segment to make a complete Bay Trail connection.

**Segment 2 Highway 37 Corridor (3,320 L.F. along HWY 37, plus Tolay/Tubbs Trail Improvements).** This segment parallels SR-37 on its south side between the west end of Tolay Creek (Segment 1) and the Tolay/Tubbs Trailhead parking area (Segment 6). The segment begins on the west side of Tolay Creek, with two-60 foot long clearspan bridges crossing this tidal channel. East of Tolay Creek, Three design alternatives could be considered for this alignment: 1) fill placed against or buttressing the existing Highway embankment, 2) a pre-engineered aluminum or fiberglass boardwalk founded on helical (corkscrew) piles, and/or 3) a pre-engineered aluminum boardwalk on floating devices, (e.g., a floating or pontoon bridge or boardwalk). Based on preliminary soils information, the helical or screw piles would be about 70 feet long, with 20 foot spacing.

In addition to the three design alternatives, either of the boardwalk structures could be located within the approximately 75 foot wide Caltrans Right of Way, or just outside of it on CDFW lands.

The buttress fill would be a levee with a minimum crest elevation of 14 feet (NAVD 88), 12 feet wide, with a 3:1 slope on the highway side, and a 5:1 to 10:1 slope on the lagoon side. The flatter levee outboard slopes would provide additional ecotone or transition habitat, important at high tide events. Because of concerns that fill placed against the existing highway embankment may damage this embankment, which is located on historic fill placed on Bay Mud, and that the levee would experience ongoing settlement problems, geofoam core blocks should be considered for the levee core in replacement of traditional engineered soil fill. Geofoam blocks consist of Expanded Polystyrene (EPS) that are only about 1% of the weight or density of soil backfill (about 1 pound per cubic foot vs. 100 lbs/CF).

**Segment 3 Tolay Lagoon East of Eliot Trailhead (1,760 L.F. Tolay Lagoon Crossing, plus Tolay/Tubbs Trail Improvements).** This segment would cross the open water and partially vegetated mudflats of the middle part of Upper Tolay Lagoon beginning at the Eliot Trailhead and then immediately eastward to connect to the Tolay/Tubbs section of the Bay Trail south of the Trailhead at Segment 6. The connection would consist of a long boardwalk crossing through the middle part of the Upper Tolay Lagoon. Because of concerns over flow blockage and tidal flow velocities in this area, the design concept would utilize a helical pile and pre-engineered aluminum or fiberglass boardwalk similar to that envisioned for the SR-37 helical pile boardwalk option. A floating boardwalk



is not being considered. The design would include 70 foot length helical piles, with piles at 20-foot spacing. Every other set of 2 piles (bents) would have a third, battered (angled) pile to provide lateral support, along with cross bracing of the pier pipes.

**Segment 4. Tolay Lagoon South of Eliot Trailhead (1,960 L.F. Low Berm and Tolay Crossing Improvements, plus Tolay/Tubbs Trail Improvements).** This segment is similar to segment 3, but would cross the open water and partially vegetated mudflats of the middle part of Upper Tolay Lagoon beginning south of the Eliot Trailhead and then immediately eastward to connect to the Tolay/Tubbs section of the Bay Trail south of the Trailhead. A portion of this segment would utilize a low berm or low elevation narrow levee before heading eastward to the Tolay/Tubbs Levee and Bay Trail connection. The low berm is at an elevation of 9 or 10 foot NAVD 88, but is only 6 foot wide, too narrow to elevate the levee section or build a multi-purpose trail on fill. However, construction (small) equipment via the low berm access for pile installation and setting in place the pre-engineered boardwalk could result in less disturbance and potentially lower installation costs than for a boardwalk structure constructed over open water and mudflat.

The placement of the Segment 4 alignment further south than the more direct Segment 3 alignment is a tradeoff between total improved trail distance that uses some existing topographic features that reduce construction costs vs. a reduction in length by shortening the trail length and crossing mudflat further to the north, nearer Segment 3.

**Segment 5 Eliot to Tolay/Tubbs Trail - Creek Connection, Low Elevation Berm (3,740 L.F. Low Berm and Tolay Creek Crossing plus Tolay/Tubbs Trail Improvements).** This segment would connect the Eliot Trailhead to the Tolay/Tubbs Trail along the berm east of the Eliot Trail terminus, with a short boardwalk or bridge crossing of Tolay Creek and Tolay Lagoon at its most narrow point. Unlike Segment 4, the majority of this segment would be constructed on top of a low, narrow berm or levee before starting the cross water boardwalk on helical piles at the most narrow point, the pinch point. As noted above, the low berm is at an elevation of 9 or 10 foot NAVD 88, but is only 6 foot wide, too narrow to elevate the levee section or build a multi-purpose trail on fill. However, the berm could be improved enough to form a construction access route for use in installing helical piers that would support a boardwalk structure on top of the berm. The structure would be at elevation 14 NAVD88, therefore still affording use of the underlying berm as wildlife escape refugia during extreme tides. The boardwalk would continue to a narrow section of Tolay Creek, which would be connected to the Tolay/Tubbs Trail with a clearspan bridge constructed over the Creek. Segment 5 would result in the least amount of impacts to lagoon wetlands habitat.

**Segment 6. Tolay/Tubbs Levee Trail Improvements (3,900 LF).** This segment consists of improvements to the existing Tolay/Tubbs Trail (Bay Trail) managed by USFWS, including grading and fill placement to level, widen, and elevate the existing primitive trail. All trail options would utilize this segment. The primitive trail needs to be improved (graded and gravel surfaced) to provide a year round, accessible multi-use trail.

**Table 4.1-1** provides a summary of the six segments. Each segment would connect the Eliot Trail (within the Sears Point Restoration Project) to the Tolay/Tubbs Trail and trailhead. A new trailhead parking area and trail access would be provided at the terminus of Tolay Creek Road to facilitate access in the vicinity of the SR121/SR-37 signalized intersection. All trail segments would include improvements to the trailhead and trail in all options to meet accessibility regulations. Levee repairs due to erosion and storm surge are also needed along portions of this levee.

**Table 4.1-1. Potential Trail Segments**

<b>Segment 1: Eliot Trail Connection to Tolay Creek Road 1,100 LF</b>
<i>Option A</i> <ul style="list-style-type: none"> <li>• Fill/Berm on east side of SMART ROW</li> <li>• Upland trail improvements across private lands</li> <li>• Improve existing public at-grade rail crossing at Tolay Creek Road (within Caltrans ROW)</li> <li>• Trail/trailhead improvements on east side of Tolay Creek Road (4-5 vehicle parking)</li> </ul>
<i>Option B</i> <ul style="list-style-type: none"> <li>• Clearspan bridge of west arm of Upper Tolay Lagoon</li> <li>• Upland trail improvements across private lands</li> <li>• Improve existing public at-grade rail crossing at Tolay Creek Road (within Caltrans ROW)</li> <li>• Trail/trailhead improvements on east side of Tolay Creek Road (4-5 vehicle parking)</li> </ul>
<i>Option C</i> <ul style="list-style-type: none"> <li>• Boardwalk with helical piles – west arm of Upper Tolay Lagoon</li> <li>• Upland trail improvements across private lands</li> <li>• Improve existing public at-grade rail crossing at Tolay Creek Road (within Caltrans ROW)</li> <li>• Trail/trailhead improvements on east side of Tolay Creek Road (4- to 5-vehicle parking)</li> </ul>
<b>Segment 2: SR-37 Corridor (3,320 LF)</b>
<i>Option A</i> <ul style="list-style-type: none"> <li>• Segment 1 improvements</li> <li>• Upland trail construction on fill from trailhead to Tolay Creek</li> <li>• 120 LF (two-12' x 60 LF) bridges over Tolay Creek</li> <li>• Engineered Buttress Fill within SR-37 ROW and adjacent to road shoulder</li> <li>• Segment 6 improvements</li> </ul>
<i>Option B</i> <ul style="list-style-type: none"> <li>• Segment 1 improvements</li> <li>• 120 LF (two-12' x 60 LF) bridges over Tolay Creek</li> <li>• 3200 LF Fixed Pier fiberglass boardwalk on helical piles within SR-37 ROW</li> <li>• Segment 6 improvements</li> </ul>
<i>Option C</i> <ul style="list-style-type: none"> <li>• Segment 1 improvements</li> <li>• 120 LF (two-12' x 60 LF) bridges over Tolay Creek</li> <li>• 3,200 LF Floating aluminum boardwalk within SR-37 ROW, including ramps at Tolay Bridge and Tubbs/Tolay levee</li> <li>• Segment 6 improvements</li> </ul>
<i>Option D</i> <ul style="list-style-type: none"> <li>• Segment 1 improvements</li> <li>• 120 LF (two-12' x 60 LF) bridges over Tolay Creek</li> <li>• 3,200 LF Floating boardwalk outside SR-37 ROW</li> <li>• Segment 6 improvements</li> </ul>
<b>Segment 3: Tubbs Island Trail and Tolay Lagoon Boardwalk (1,760 LF)</b>
<ul style="list-style-type: none"> <li>• Segment 1 improvements</li> <li>• 1,760 LF Fiberglass boardwalk across Tolay Lagoon east of Eliot Trailhead to existing Tolay/Tubbs levee, ramps and other improvements</li> <li>• Segment 6 improvements</li> </ul>
<b>Segment 4: Tubbs Island Trail, Tolay Lagoon Fixed Boardwalk and Levee Improvements (1,960 LF)</b>
<ul style="list-style-type: none"> <li>• Segment 1 improvements</li> <li>• 700 LF Fixed Pier fiberglass boardwalk over existing low berm southeast of Eliot trailhead</li> <li>• 1,260 LF Helical pile boardwalk across Tolay Lagoon to existing levee and bridge/ramp</li> <li>• Segment 6 improvements</li> </ul>



**Segment 5: Tubbs Island Trail improvements, Tolay Creek Bridge and Levee Improvements (3,740 LF)**

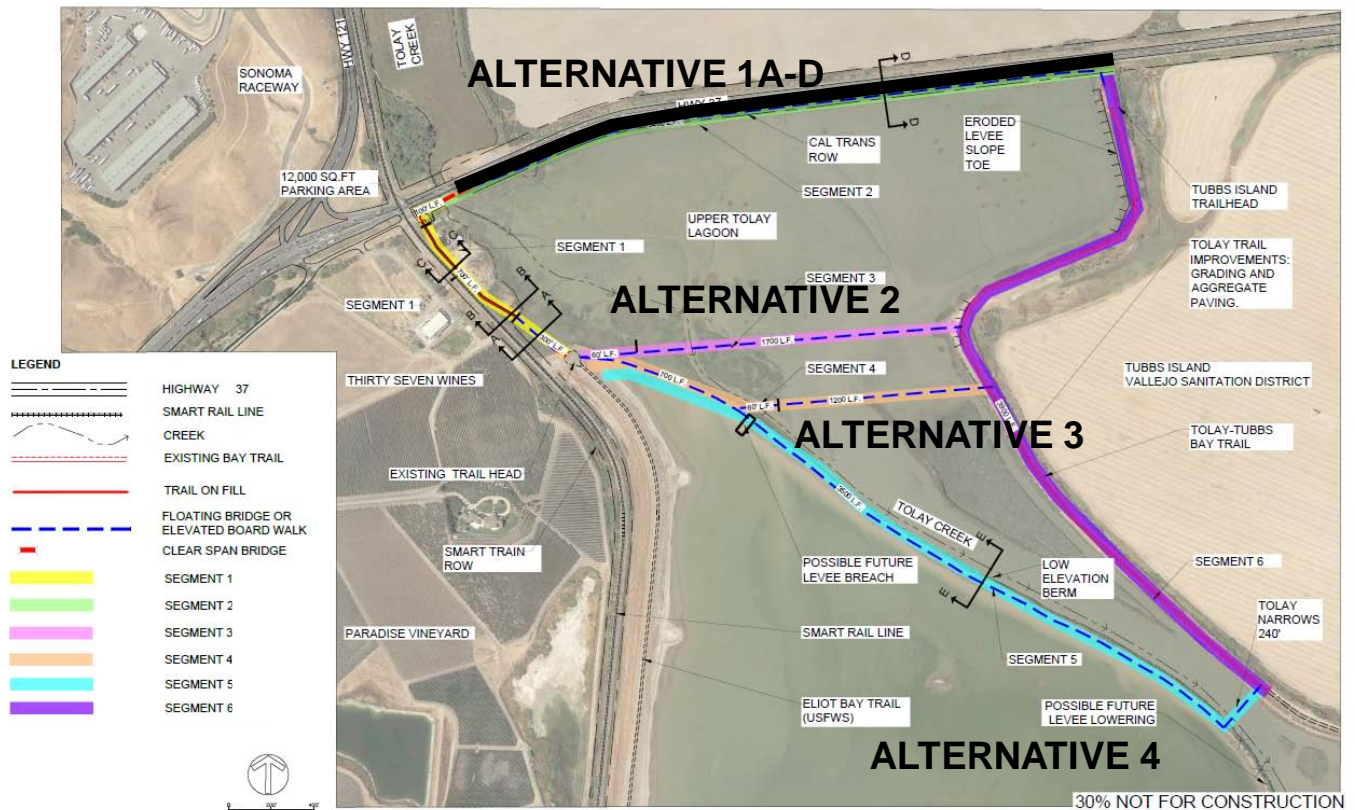
- Segment 1 improvements
- 3,500 LF Fixed Pier fiberglass boardwalk over existing low berm southeast of Eliot trailhead
- 240 LF (four 60 LF) fiberglass bridges crossing Tolay Creek at narrows to existing levee
- Segment 6 improvements

**Segment 6: Tubbs Island Trail Improvements (3,900 LF)**

- Accessibility Improvements to Tolay/Tubbs Trailhead and Bay Trail

## 4.2 Trail Alternatives

As noted above, the six individual trail segments initially evaluated were then combined to create four options that connect the Eliot Trailhead with the Tolay/Tubbs Trail.



**Figure 4.2-1: Trail Alternatives**

All Alternatives include Segments 1 and 6. More detailed descriptions of the Alternatives and their design elements are presented below. Preliminary Engineering Plans which provide construction details are presented in **Appendix C**.

### Alternative 1

Alternative 1 would include an 1,100 foot long north-south connection to Highway 37 from the Eliot Trail terminus and an approximately 3,200 LF crossing of Upper Tolay Lagoon, paralleling Highway 37. A large portion of the crossing would be through tidal mud flat (open water at high tide) although low marsh vegetation is becoming established immediately adjacent to the toe of the Highway 37 fill embankment, especially in the vicinity of the Tolay Creek 40' culvert outfall where sediment from the Tolay Creek watershed is being deposited.



As well as the north/south connection to Highway 37, there are four design alternatives to achieving this 3,200 LF segment paralleling Highway 37:

- 1A.) A buttress fill structure placed against, but elevated above Highway 37, with a 14 foot wide gravel trail on top of this levee-like structure.
- 1B.) A series of 12 foot wide by 20 foot long pre-engineered fiberglass boardwalk structures linked together and founded on 70' deep helical piers;
- 1C.) a series of 10' wide by 22' long aluminum deck panels supported on flotation devices – a floating boardwalk;
- 1D.) Alternative 1D is a 12' wide elevated boardwalk and similar to Alternative 1B, except that the boardwalk would be located approximately 40-50 south of the Highway 37 road embankment toe. This is outside of Caltrans Right of way and within the San Pablo Bay Wildlife Preserve.

The first 120 feet of all four Alternatives would cross Tolay Creek using two, pre-engineered 12' wide x 60' long fiberglass bridge structures. This would overspan the existing 40'-50' wide Tolay Creek channel downstream of the existing 40' long Tolay Creek concrete culvert, and allow for possible future widening of the Highway 37 culvert. Enlargement of the Tolay Creek opening under Highway 37 to improve Tolay Creek hydrological connectivity was considered a very high and near term priority in the San Pablo Bay National Wildlife Refuge Climate Adaptation Plan. (Point Blue Conservation Science, Dec. 30<sup>th</sup>, 2016).

Additional information for this alternative includes:

**Alternative 1A –Buttress Fill.** Because of the presence of soft compressible soils (estimated 60 foot deep, young bay muds) and potential stability impacts of placing earthen fill against the Highway 37 shoulder embankment, the use of light weight EPS geofoam blocks as levee core fill may be appropriate. This would minimize issues associated with levee settlement, in addition to mitigation impacts on the state highway.

The existing Highway 37 roadway elevation in the area between the Highway 121/ Arnold drive intersection and the Tolay/Tubbs trail Levee is between 8.5 and 9.2 (NAVD 88). This section of roadway is at significant risk of frequent tidal flooding associated with sea level rise (SLR).

The buttresses fill levee Alternative would have a levee fill of 14.0' NAVD 88 and as such it would provide interim SLR protection for several decades. Levee improvements along Tolay Creek and widening and elevating the Tolay Creek Bridge would also likely be needed.

The buttress fill levee could have an outboard or southern slope out-sloped at 3:1, 5:1, or even 10:1. This slope would provide marsh transition zone or ecotone habitat between the low marsh and upper levee uplands, as well as providing a narrow zone of high marsh habitat that may transform to low marsh with sea level rise. Assuming a typical minimum levee fill section of about 10 feet in thickness, the additional width of the out sloped fill section would be 30 feet (3:1), 50 feet (5:1) and 100 feet (10:1). Using 3,320 Lineal feet of buttress fill length, and a 20 foot fill foot print in addition to the Outslope footprint area, the total approximate wetlands fill footprint of the buttress fill options are as follows:

- **3:1 Outslope** – 166,000 sq. ft. (3.81 acres)
- **5:1 Outslope** – 232,400 sq. ft. (5.34 acres)
- **10:1 Outslope** – 398,400 sq. ft. (9.14 Acres)

**Alternative 1B - Elevated Fiberglass Boardwalk on Helical Piers.** Alternative 1B consists of 3,200 LF of an elevated boardwalk structure. The boardwalk would link 155 individual pre-engineered 12' wide by 20' long fiberglass units. The boardwalk would have a 42 inch high railing (both sides) with 3"x12" fiberglass reinforced plastic (FRP)



decking. It would be founded on a series of 60-80 foot long helical piers. The minimum top elevation of the boardwalk deck would be +14 feet NAVD 88. Every other set of 2 vertical helical piers would have a third pier inserted at an angle or batter to provide lateral stability interspersed with C-channel cross bracing. Two, 30-40 fast long boardwalk ramps are envisioned to provide a transition connection to either the Tolay Creek Bridge or the Tolay/Tubbs Levee.

**Alternative 2:** Alternative 2 would cross Tolay Lagoon to reach the existing Tolay/Tubbs levee directly east of the Eliot Trailhead. The first 60 feet of this 1,700 LF lagoon crossing would be made with a 12' wide fiberglass clear span bridge structure, and the remaining distance would utilize a series of 12' wide by 20' long fiberglass boardwalk units founded on 70' to 80' long helical piers. Transition ramp structures would be used to connect the bridge and boardwalk units to the levee tops. The top of the structures would be at an elevation of 14 feet NAVD 88, the same elevation as the Eliot Trailhead, to provide resiliency to sea level rise. However, during final design it may be determined that a higher elevation is needed.

As with Alternative 1, Segment 1 (Tolay Rd. trail construction and new Trail head Parking area) and segment 6 (improvements to Tolay/Tubbs Trailhead and Trailhead parking area and SMART rail crossing) are also included with this Alternative.

**Alternative 3:** Alternative 3 is similar to Alternative 2, but would cross Tolay lagoon approximately 500 feet south of the Eliot Trail head with the water crossing approximately 1,100 LF of the lagoon. The first 700 LF of this Alternative would use an elevated boardwalk narrow, placed above a low elevation berm as described in more detail in the description of Alternative 4. The lagoon crossing would consist of 1100 LF of elevated fiberglass boardwalk on helical piers. The first 120 feet of this would consist of two 12' x 60' foot clear span fiberglass bridges to minimize structure impacts on tidal flow and sediment transport.

**Alternative 4:** Alternative 4 would utilize one 14' wide fiberglass boardwalk on helical piers placed above the 3,600 LF low elevation berm located along the west and south sides Tolay lagoon. The crossing of Tolay lagoon and Tolay Creek would occur at its narrowest, southern point, and would be accomplished using four 14' x 60' clear span fiberglass bridges founded either on drilled displacement auger piles or helical piers. As with all other options, Alternative 4 would also require the improvement of about 3,900 LF of the existing primitive Tolay/Tubbs Trail to a 12 foot wide trail with a fine crushed aggregate or gravel surface.

This Alternative is the longest and least direct connection between the Eliot Trailhead and Tolay/Tubbs Trailhead. It is also the most scenic, noise free, and natural of the Alternatives, but also bisects the lagoon habitat. This Alternative was explored for cost reasons (among others) in that the open water lagoon crossing is the narrowest and, by using clear span bridge structures, would be the least impactful on tidal flow, sediment transport, and construction equipment access.

As with Alternative 1, Segment 1 (Tolay Rd. trail construction and new Trail head Parking area) and segment 6 (improvements to Tolay/Tubbs Trailhead and Trail head parking area and SMART rail crossing) are also included with this Alternative.

### 4.3 Comparison of Construction Techniques

---

This section describes the construction techniques that could be used to construct the trail. In all cases, trail structures, such as a bridge or floating boardwalk, would have a minimum width of 12 feet, be elevated above extreme tides and above the 100-year (plus 1.5 feet sea level rise) flood event (minimum elevation 14 feet NAVD), and be designed to support light weight maintenance or emergency response vehicles such as a golf cart or ATV-style vehicle. For cost consideration reasons and considering the very poor soil conditions, it is not designed to be pickup truck or emergency vehicle rated, but could be revised to include this capability.



## Conventional Fill Levee Trail or Causeway

---

This work would consist of scarification, grading and recompaction of the existing roadway and fill piles along Old Tolay Creek Road and additional compacted engineered fill on top of this to approximately elevation 14 NAVD88. Trail width would be 12 feet minimum. Final alignment and possible ROW acquisition will need to be negotiated with SMART, Sonoma Land Trust, and private property owners.

This construction technique could also be used along the south side of SR-37. A geofoam levee trail core could be used instead of a conventional engineered soil levee core in this Alternative. Geofoam consists of expanded polystyrene (EPS) or extruded polystyrene (XPS) manufactured into large lightweight blocks. The blocks are somewhat similar in appearance to Styrofoam blocks, but are much stronger. They have closed, gas-filled interior cells that are lightweight. They can vary in size but are often 36 inches x 50 inches in lengths from 12 to 16 feet.

Geofoam provides a lightweight void fill, but is less flexible in differential settlement than a geocell. The top of the geofoam filled structure and the shoulder and 3:1 side slopes of the levee would have a separator blanket with engineered soil and aggregate base fill placed on top of it, and would have a flexible paved trail surface, such as stabilized 3/8-inch aggregate base.

The use of lightweight Geofoam core as levee fill material solves some of the levee settlement issues associated with engineered fill placement over soft compressible Bay Mud. This may avoid the need to preload or surcharge fill placement over a two-year construction cycle and minimize settlement issue and the need to place additional aggregate base on the trail surface from time to time to address settlement and differential settlement problems.

The total thickness of the geofoam filled levee structure and the overlying conventional fill would have to be engineered to make sure the entire structure is not buoyant in extreme tides, and additional anchoring may be required. The height, cross-sectional footprint and total wetland fill impacts would be similar to the buttress fill Alternatives, although (since less soil would need to be imported and placed) construction-related impacts would be less.

Geofoam blocks are widely used in highway construction in California, and were recently used as the levee core material for portions of the levees constructed as a part of the Cullinan Ranch restoration project along SR-37 near Vallejo.

## Components

---

Clearing/grubbing and over-excavation of existing soil/Bay Mud and placement of engineered fill, geotextile and flexible paving or stabilized aggregate base to the 2050 sea level rise expectation (elevation 14 feet NAVD).

Replacement with geofoam core, engineered fill, geotextile and flexible paving or stabilized aggregate base.

Trail top width 12 feet with 2- 1.5-foot shoulders.

48-inch galvanized woven mesh and T-post field fence along trail shoulder at select locations, or physical barrier depending on proximity to highway.

## Helical Pile Boardwalk

---

A lightweight, pre-engineered boardwalk or causeway could be utilized to elevate the trail above extreme tides and flood waters. The boardwalk could be constructed using either lightweight fiberglass or aluminum. Since the boardwalk would cross wetlands and the footings would be within soft, compressible Bay Mud, special attention will be needed in design of the foundation support system.



The geotechnical investigation completed for the adjacent Sears Point Restoration Project indicated that soft organic rich, clayey soil extend to depths of up to 60 feet, so helical pier design would need to reflect these conditions.

To minimize construction impacts, the design would need to utilize a series of prefabricated clear-span structures in lengths of 20 feet, installed by small crane from the previously completed section using a technique called “top-down construction.” The helical earth anchor foundation could be installed using a small excavator.

Preliminary foundation and structural recommendations must be completed, with a comprehensive geotechnical investigation and structural analysis as part of the development of final construction plans. The geotechnical investigation could include a soil boring along the trail alignment to confirm depth to underlying consolidated layer (older Bay Mud) capable of supporting the helical piers.

### *Components*

---

Construction of elevated boardwalk on helical piers (screw piers) and using fiberglass or aluminum super structure and decking and hand rail. This could be pre-engineered and pre-assembled in 20-foot lengths and craned in place from previously completed deck platform, or assembled in place using hand tools from pre-cut and pre-drilled members. For cost estimation purposes, helical piles are assumed to be 70 feet. This structure could be designed to be emergency vehicle rated at additional cost.

Top elevation of boardwalk would be 14 feet NAVD 88, width 12’ to 14’.

### *Floating Boardwalk*

---

Instead of having a boardwalk structure founded on helical piers, a lightweight aluminum boardwalk structure could use a series of floats for support, somewhat like a “pontoon bridge.” The floats would be located at the ends of each 18- to 24-foot section. The boardwalk superstructure, decking, and railings would otherwise be similar to the other boardwalk options, using lightweight aluminum or fiberglass for the superstructure, decking and railings. However, the floating pier style of boardwalk would need an anchoring system and a system to restrain the depth of the structure so that they do not rest unevenly on the mud of the lagoon bottom.

Typical widths of floating pre-engineering docks are 10 feet.

### *Components*

---

- Installation of pre-engineered/prefabricated aluminum floating boardwalk
- Boardwalk structure to be 12 feet wide with railings in 18- to 24-foot lengths.
- Helical pile elevated boardwalk and ramp section may be needed from Tolay Road and Tolay Creek Bridge at SR-37 with ramp section connection at or near the trailhead parking area.

### *Clearspan Bridge and Levee Improvements*

---

A clearspan bridge would be utilized for crossing of Tolay Creek and the trail connection north of Eliot Trail.

Typical lengths would be 40 to 60 feet.

### *Components*

---

- Prefabricated clearspan bridge with abutments (300 ft. maximum length)



Typical Trail Cross sections with preliminary design details are shown in **Appendix C** (Note: not all trail sections are illustrated).

#### 4.4 Comparison of Construction Methodologies, Impacts and Costs

Each of the segments has advantages and disadvantages in terms of environmental impacts, initial construction costs, engineering difficulty/feasibility, and durability and long-term maintenance needs and costs.

**Table 4.4-1. Opportunities and Challenges of Corridor Alternatives**

<b>Alt. 1: Highway 37</b>	
<b>Opportunity</b>	<b>Challenge</b>
<ul style="list-style-type: none"> <li>• Within Caltrans ROW</li> <li>• Direct connection</li> <li>• Least Habitat disruption</li> <li>• Potential SLR resilience- benefit</li> </ul>	<ul style="list-style-type: none"> <li>• Longest water crossing</li> <li>• Highway noise and traffic</li> <li>• Within Caltrans ROW—need to coordinate with SR-37 plans</li> <li>• Poor user experience</li> </ul>
<b>Alt. 2: Eliot Trailhead (E) Lagoon</b>	
<b>Opportunity</b>	<b>Challenge</b>
<ul style="list-style-type: none"> <li>• Shorter Bridge/Boardwalk</li> <li>• Better user experience</li> <li>• Portion of boardwalk on berm</li> </ul>	<ul style="list-style-type: none"> <li>• Bisects habitat</li> <li>• Navigability challenge</li> <li>• Within CDFW/USFWS ROW</li> <li>• Second longest water crossing</li> </ul>
<b>Alt. 3: Eliot Trail (S) Lagoon</b>	
<b>Opportunity</b>	<b>Challenge</b>
<ul style="list-style-type: none"> <li>• Trail away from highway</li> <li>• Better user experience</li> <li>• Boardwalk primarily on berm</li> </ul>	<ul style="list-style-type: none"> <li>• Bisects habitat</li> <li>• Navigability challenge</li> <li>• Within SLT/USFWS ROW</li> <li>• Third longest water crossing</li> </ul>
<b>Alt. 4: Tolay Creek Narrows</b>	
<b>Opportunity</b>	<b>Challenge</b>
<ul style="list-style-type: none"> <li>• Best user experience</li> <li>• Least wetlands/water crossing</li> <li>• Easiest construction (on Berm)</li> <li>• Maintains navigability to Tolay Lagoon</li> <li>• Indirect route to SR-37/SR121 trailhead</li> </ul>	<ul style="list-style-type: none"> <li>• Requires longest improvements to Tolay/Tubbs levee</li> <li>• Proximity to endangered species; permitting issues</li> <li>▪ SLT/USFWS ROW</li> </ul>

#### Environmental Considerations

The Alternatives were presented at a stakeholder’s meeting as well as in individual consultation with CDFW and USFWS. Each agency expressed concerns with habitat impacts associated with implementation of any trail connection, due to potential habitat impacts that may occur in the future as the lagoon transitions to tidal marsh. If implemented, USFWS indicated that Segment 3 would be preferred, since it has the shortest boardwalk segment. Melisa Amato, Wildlife Refuge Specialist, states:

*In general, the refuge would prefer no trail because Tolay Lagoon will become tidal marsh habitat with listed species in the future and trail users affect listed species. However, since you are asking about which option we prefer, it would be an option that included the shortest floating boardwalk/bridge segment without any additional trail on top of fill (Segment 3).*



*Tolay Lagoon is accreting sediment and developing low marsh vegetation and we hope to see pickleweed coming in soon as well. So presumably we'll have a good marsh in Tolay Lagoon in the next 5 years. We would love to see the Tolay watershed reconnected with the north side of Hwy 37 and so we don't want to put a trail in that would preclude that from happening in the future (fill adjacent to Hwy 37). I realize our 2011 CCP identified certain goals, but we have more recent planning documents that identify priority restoration actions in light of sea level rise that identify improving Tolay Creek tidal connection across Hwy 37 as one of our highest priority near-term actions (2016 San Pablo Bay NWR Climate Adaptation Plan). So you would want to build a trail that is going to be resilient to sea level rise (floating) and does not prevent reconnecting Tolay Creek to the north of the highway.*

Greg Martinelli, Wildlife and Lands Program Manager for CDFW, indicated that he initially considered the most feasible Alternatives to be Segments 1 and 2 (Alternative 1), but wanted additional design and biological impact information.

Each of these agencies, as landowners as well as regulatory permitting agencies responsible for oversight regarding endangered species, would be closely involved in trail implementation in this area.

### Comparison of Construction Methodologies

---

These are summarized in **Table 4.4-2**, Comparison of Construction Methodologies.

**Table 4.4-2: Comparison of Construction Methodologies**

Rankings*	Relative Cost	Long Term Maintenance	Durability	Biological Resources Issues	Engineering Feasibility	Sea Level Rise	Flood Hazard	Hydrology Issues	Score	Average
<b>TRAIL TYPE</b>										
<b>Earth Berm</b>										
Geotextile and Fill	5	3	3	1	4	1	1	1	<b>19</b>	<b>2.71</b>
Geofoam Core and Fill	4	3	3	1	4	1	1	1	<b>18</b>	<b>2.57</b>
<b>Fixed Aluminum Boardwalk</b>										
w/Helical Pier	2	3	3	3	3	5	5	5	<b>29</b>	<b>4.14</b>
<b>Floating Boardwalk</b>										
Aluminum w/wood decking	1	4	3	2	4	5	3	2	<b>27</b>	<b>3.86</b>

\* Rankings range from 1 (least desirable) to 5 (most desirable); Cost: 1 = most expensive, 5 = least expensive



## 5. PRELIMINARY DESIGN

---

### 5.1 Preferred Plan and Stakeholder Recommendations

---

All potential trail alignment Alternatives were presented at the first Stakeholder Meeting (February 24, 2017) and the Community Workshop (August 30, 2017). At that time there was no clear consensus among meeting participants as to the preferred Alternative.

Both Greg Martinelli (CDFW) and Melisa Amato (USFWS- San Pablo Wildlife refuge) cautioned about the regulatory challenges of crossing current jurisdictional wetlands/waters of the US and likely future endangered species habitat, including portions of which are utilized as biological mitigation lands for other projects in the vicinity. Mr. Martinelli indicated he would likely consider more favorably the Alternatives along SR-37, (Alternative 1) especially if in Caltrans Right of Way, but needed additional information including biological/wetlands impacts before he could make a recommendation. He also expressed some interest in further exploring the buttress fill option including placing fill on the outboard slope in Tolay Lagoon to create an ecotone. Melisa Amato favored use of Segment 3 (Trail Alternative 2 - crossing Tolay Lagoon directly east of the Eliot Trailhead) but again emphasized concern over a trail crossing wetlands with developing habitat areas and need for regulatory permit approval from the United States Fish & Wildlife Services' Endangered Species office.

Julian Meisler (Sonoma Land Trust) and several members of the Sonoma County Bicycle Coalition indicated a preference for Alternative 2 or 3 (crossing mid-Tolay Lagoon), since they provide a better user experience than along noisy SR-37, and commented that Alternative 4 (crossing at the narrow point of Lagoon further south) although more scenic, was too far out of the way (too long). Other members in attendance at Stakeholder Meeting #1 noted that the buttress fill Alternative would provide interim sea level rise protection of SR-37 and should continue to be considered and incorporated into SR-37 corridor transportation planning work.

Participants at the Community Workshop did not express a preference for any Alternative, except to support a separate Class 1 trail to connect the two existing trails, and to provide a trail that is not in SR-37, and noted the noise and safety concerns of Alternatives along SR-37. A meeting participant noted that any ecotone created as part of a buttress fill Alternative may be too close to SR-37 to be valuable. Rick Parmer (former CDFW biologist) recommended evaluating how each Alternative would differ as to impacts on target restoration species. The discussion was that Alternatives 2 & 3, crossing mid Tolay Lagoon, would likely impact slowly developing Ridgeway Rail and/or Black Rail habitat while the buttress fill Alternative that provides some ecotone may be of some benefit to Salt Marsh Harvest Mouse by providing high ground escape refugia during periods of extreme tides. This may become a more important benefit over time with sea level tide.

More refined and better illustrated trail Alternatives, along with project design and construction costs and wetland fill impact estimates were provided to meeting participants at Stakeholder Meeting #2 (Nov. 17, 2017). This included **Table 5.1-1 – Impact Table**. The consultant team and Regional Parks staff noted that Alternative 2 (crossing Tolay Lagoon directly east of the Eliot Trailhead) represented a favorable user experience and was both the least costly Alternative and Alternative with relatively few wetlands impacts. The team noted that all Alternatives were relatively costly because of the length of required structural trail solutions in a challenging engineering environment but all could be feasibly constructed.

**Table 5.1-1. Impact Table**

<b>Alternative</b>	<b>Length over Wetlands LF</b>	<b>Temp. Distance Sq. ft.(ac.)</b>	<b>Shadow Fill Sq. ft.(ac.)</b>	<b>Wetlands Fill Sq. ft.(ac.)</b>
1A. Buttress Fill – 3:1 Outboard	3,320	199,200 (4.57)	NA	166,000 (3.81)
5:1 Outboard	3,320	265,600 (6.10)	NA	232,400 (5.34)
10:1 Outboard	3,320	431,600 (9.9)	NA	398,400 (9.14)
1B. Elevated Boardwalk – CT ROW	3,320	49,800 (1.14)	46,480 (1.07)	900 (0.02)
1C. Floating Boardwalk – CT ROW	3,320	49,800 (1.14)	33,200 (0.76)	33,200 (0.76)
1D. USFWS ROW Boardwalk	3,320	49,800 (1.14)	46,480 (1.07)	900 (0.02)
2. Boardwalk East of Eliot	1,760	61,600 (1.41)	24,600 (0.57)	500 (0.01)
3. Boardwalk South of Eliot	1,260	44,100 (1.01)	15,100 (0.35)	350 (0.005)
4. Southern/Narrows Crossing	240	8,400 (0.19)	2,880 (0.07)	75 (0.001)

Because of high project costs, the consultant team also noted that the trail would be best final engineered and constructed as a part of the overall SR-37 Corridor Transportation and Sea Level Rise Project. The team also recommended that information developed as part of this Study should be incorporated into the SR-37 Project.

Although several of the Alternatives occur outside of the Caltrans SR-37 Right of Way and Corridor study limit. Dianne Yee (Caltrans District 4 representative) noted that the Sears Point Trail Connector



Alternatives outside of the corridor could still be technically included in any Corridor Plan, as part of the SR-37 Active Transportation components.

The following conclusions regarding the preferred design along with Program Recommendations were presented at the final Stakeholder Meeting and there was broad consensus with these.

***Preferred Design:***

- There are multiple feasible trail connection Alternatives
- Trail Alternatives are relatively costly if viewed independently, but a small increment of overall SR-37 cost (2-4%)
- Trail Alternative 2 (east of Eliot Trailhead on boardwalk) is least costly and provides best user experience.
- All trail Alternatives should continue to be evaluated and incorporated into overall SR-37 implementation.
- Any SR-37 project should include seamless connections for bicycle and pedestrian travel within the corridor.
- Bay Trail connections between existing trails should be included in the SR-37 Project, even if outside current Caltrans ROW.

***Program Recommendations:***

Sears Point Trail connection project should be integrated into SR-37 improvements, and include:

- Trailhead staging
- Link to Eliot Trailhead, SR121, Tolay/Tubbs Trail
- Physical separation from vehicle travel lanes
- Crossing of Upper Tolay Lagoon
- Improvements to Tolay/Tubbs Trail
- Improved hydraulic connection between Tolay Creek and Tolay Lagoon
- Habitat restoration and mitigation for wetlands impacts

## **5.2 Construction Cost Estimate**

---

Preliminary Engineer's Estimates of Probable Construction Costs (Construction Costs) are summarized by trail Alternative in **Table 5-2.1**. Individual detailed cost spreadsheets have been prepared for each trail segment (1 through 6) and the segments combined as appropriate to create a total cost for each of the four Alternatives. More detailed cost estimates are provided in **Appendix B**. The cost estimates were prepared based on information provided by vendors of pre-engineered bridge and boardwalk systems , including installation of helical piers and ramps, and by using current unit prices for construction quantity take offs developed from the preliminary engineering plans (i.e. costs in dollars per cubic yard of placed and compacted engineered fill ).

The cost estimate includes the entire project costs and not just segment costs. For instance all of the alternatives have the same costs for construction of Segment 1, which includes minor improvements to the SMART train track crossing, construction of a small four car staging area, and the trail connection



from the staging area near Tolay Road to the Eliot trailhead. In addition to providing construction costs for making trail and public access facility improvements, the cost information also contains estimates for several line items common to all Alternatives, including mobilization, right of way acquisition, and environmental mitigation. These common costs are included on the first page of each Alternative spreadsheet.

In addition, all costs also include the costs to improve the existing/ primitive Tolay/Tubbs trail (segment 6). In addition to actual construction costs, estimates are also provided for mobilization/demobilization, environmental protection, right of way acquisition, and biology/wetlands mitigation. A 15% contingency is included in the cost estimate. An estimate of soft costs is also included; engineering design and environmental review and permitting (20%), and construction management (12%). The right of way acquisition estimate does not represent an appraisal or an offer to any prospective seller and was made for planning purposes only.

**Table 5-2.1. Implementation Costs**

Alternative	Mobilization & Site Protection, Acquisition, Mitigation	Trailhead Parking & Eliot Trail Connection	Tolay Creek or Lagoon Crossing Alternative	Tolay/Tubbs Trail Improvements	Total w/ Construction 15% Contingency	20% Design & Environmental and 12% Construction Mgmt.	Total
<b>1A. Highway 37 Buttress Fill</b>	\$2,640,000	\$1,124,575	\$4,830,775	\$421,375	\$10,369,234	\$3,318,155	\$13,687,400
<b>1B. Elevated Boardwalk - CT</b>	\$2,000,000	\$1,124,575	\$4,640,075	\$421,375	\$9,413,929	\$3,012,457	\$12,426,400
<b>1C. Floating Boardwalk - CT</b>	\$2,000,000	\$1,124,575	\$4,659,075	\$421,375	\$9,435,779	\$3,019,449	\$12,455,200
<b>1D. Elevated Boardwalk - USFWS</b>	\$2,000,000	\$1,124,575	\$4,444,579	\$421,375	\$9,189,108	\$2,940,515	\$12,129,600
<b>2. E. Eliot-Tolay Boardwalk</b>	\$2,000,000	\$1,124,575	\$2,604,000	\$421,375	\$7,072,443	\$2,263,182	\$9,335,600
<b>3. S. Eliot-Tolay Boardwalk</b>	\$2,000,000	\$1,124,575	\$3,188,000	\$421,375	\$7,744,043	\$2,478,094	\$10,222,100
<b>4. S. Narrows Bridge Crossing</b>	\$2,000,000	\$1,124,575	\$4,197,000	\$421,375	\$8,904,393	\$2,849,406	\$11,753,800

Based on this Preliminary Engineer's Estimate, the lowest cost alternative is Alternative 2, which traverses the central part of the Upper Tolay Lagoon from the Eliot Trailhead via an approximately 1,200-foot-long pre-engineered fiberglass boardwalk structure on helical piers. At a cost of \$9,335,600, this represents a very high cost, with a total cost per mile of over \$7 million. For reference purposes, a mile of trail on favorable terrain costs about \$1 million to \$1.5 million dollars. Typically boardwalk structures cost \$1,200 to \$1,500 per lineal foot (\$6.4 to \$8 million). Adding to this cost are right of way



and environmental mitigation, with boardwalk construction occurring in a very challenging environment of poor access and soft bay muds under tidal conditions and within sensitive biological resources.

The buttress fill Alternative along the Caltrans SR-37 shoulder right of way has the highest costs of \$13,687,400. In addition to traffic control issues associated with construction adjacent to the highway, this area also has poor construction access in addition to the engineering challenges.

### 5.3 Cost Analysis

Because of the apparently high total costs of the Bay Trail Sears Point Connector project and to provide the reader a relative perspective on these costs, total trail construction costs were compared to preliminary cost estimates to construct an elevated and sea level rise resilient and improved SR-37 roadway between the Highway 121 intersection, and the Sonoma Creek Bridge. This represents a portion of Segment B presented in the SR-37 Corridor Plan over which the trail would be constructed.

Preliminary cost information is provided in the SR-37 Corridor Plan for several design Alternatives, including: 1) a three lane Alternative, in which the center lane is contra-flow or has a moveable barrier or in which the center lane has reversible traffic flow, depending on commute time, and 2) a full four lane elevated and separated or divided highway. Costs for comparative purposes for these two Alternatives were developed from information contained in the SR-37 Corridor Plan.

**Table 5.3-1. SR-37 Corridor Plan Costs\* (Segment B)**

Costs	3-Lane Project – Segment B	4-Lane Project – Segment B
<b>Total Cost</b> <sup>1*</sup>	+/- \$1,266 million	+/- \$1,609 million
<b>Cost per Mile</b> <sup>2*</sup>	+/- \$136 million	+/- \$173 million
<b>Hwy 121 – Sonoma Creek Portion</b> <sup>3*</sup>	+/- \$313 million	+/- \$449 million

1\*. Assumes 2/3 elevated road and 1/3 causeway within Study Area

2\*. Based on 9.3 miles of Segment B (Hwy 121 to Mare Island)

3\*. Based on 2.3 miles between Hwy 121 and Sonoma Creek

\* Source: SR-37 Transportation and Sea Level Rise Corridor Improvement Plan September 2017

**Table 5.3-2** provides a comparison between estimated SR-37 roadway improvement costs for the two Alternatives discussed above and total trail costs on a percentage basis. Total trail construction costs as a percentage of total estimated roadway construction costs range from a low of 2.1% for Alternative 2 (crossing Tolay Lagoon directly east of the Eliot Trailhead) vs. Total estimated costs for a four lane elevated highway to a high of 4.4% for Alternative 1 (buttress fill) vs. three lane elevated roadway.

Our experience is that bicycle and pedestrian facilities as a percentage of a roadway construction project are often in the 1% to 2% range, and given the engineering complexity of the Sears Point Bay Trail Connector project and the need for structural solutions, costs in the 2% to 4% range are reasonable.

**Table 5.3-2. Percentage of Trail Costs of SR-37 Plan****Segment B: SR121 to Sonoma Creek**

Alternative	3-Lane Project	4-Lane Project
<b>1A. Highway 37 Buttress Fill</b>	4.4%	3.0%
<b>1B. Elevated Boardwalk - CT</b>	3.9%	4.0%
<b>1C. Floating Boardwalk - CT</b>	4.0%	4.0%
<b>1D. Elevated Boardwalk - USFWS</b>	3.9%	2.7%
<b>2. E. Eliot-Tolay Boardwalk</b>	2.9%	2.1%
<b>3. S. Eliot-Tolay Boardwalk</b>	3.2%	2.3%
<b>4. S. Narrows Bridge Crossing</b>	3.8%	2.6%

### Preliminary Engineering Plans

**Appendix C** contains the preliminary engineering plans for all four trail Alternatives for completion of the Bay Trail Sears Point Connector.

These are Conceptual or Preliminary Engineering Plans, suitable for preliminary Right of Way engineering, advanced project planning, development of a CEQA Project Description, initial discussions with permitting and regulatory agencies, and preliminary cost estimating and budgeting. Although they serve as the basis for subsequent engineering design, they are not suitable for construction. The following were used in development of the preliminary engineering plans.

Topographic information for planning and preliminary engineering was based on LiDAR (imagery from 2011 & 2013). No detailed field surveys were completed. Conditions along Tolay Creek and within Upper Tolay Lagoon may change rapidly over time with scour and sedimentation and new topographic information will be needed for construction plan engineering.

The elevations and dimensions in Plan profile and section of existing levees and roadway improvements presented here are approximations and are based on field observations and interpretation of As-Built Drawings of SR-37 obtained from Caltrans, and as built Drawings of the Sears Point Wetlands Restoration Project obtained from Ducks Unlimited (4/01/14).

The depiction of future SR-37 improvements, including lane widening, roadway elevation, and incorporation of causeway structures, represents our interpretation of how the concepts contained in the SR-37 Corridor Transportation and Sea Level Rise Corridor Improvement Plan (Sept. 2017) may fit with a Bay Trail Sears Point Connector. This includes information on needed improvement elevations with respect to 2050 sea level rise assumptions.

Geotechnical information on thickness of recent Bay Mud and depth to more suitable older Bay Muds was taken from information used to develop the Tolay Creek Restoration Plan and completed by Hultgren-Tillis Engineers (6/28/11). A new Geotechnical Investigation with additional soil borings in the vicinity of proposed project improvements will be needed to provide information for final engineering design of trail structures.



Drawing information for trail structure improvements was modified from information provided by product vendors, including Chance, Inc., for helical piers, ETIC for fiberglass bridge and boardwalk units, and Topper, Inc., and Gator Bridges for aluminum decks, ramps, and floating boardwalk structures.

### Final Construction Plans

---

During development of the final design documents, the following elements should be included:

- Trail components compliant with federal and state accessibility requirements, including compliance with Accessible Path of Travel requirements;
- Trail or boardwalk surfacing, width, and drainage provisions along the alignment;
- Access point design and site furnishings that are accessible;
- Bioswales, structures, ramps, retaining walls, as needed;
- Fencing, buffering and screening;
- Detailed boardwalk design, structural evaluation and other design treatments;
- Hydrology, drainage, safety and maintenance elements;
- Trailhead connections;
- Site furnishings, consistent with applicable standards;
- Concepts for Wetlands/Habitat Mitigation and Monitoring.
- Design elements should be compliant with:
  - ABAG Bay Trail Design Guidelines and Toolkit, 2016
  - Caltrans Highway Design Manual on Bikeway facilities (Chapter 1000)
  - Manual on Uniform Traffic Control Devices (MUTCD), part 9 and California Supplement
  - Americans with Disabilities Act
  - AASHTO Guide for the Development of Bicycle Facilities (1999)
  - National Highway Institute Pedestrian Facility Design
  - SF BCDC Design Guidelines for Shoreline Access

The goal of trail implementation will be for an all-weather shared-use trail, that is capable of accommodating pedestrians, bicycles, and universally accessible modes, as well as provide for emergency vehicle access where feasible. The trail would be designed in accordance with ADA accessibility guidelines, which require a firm, stable surface for trails, with provisions for grade, cross-slope, width, etc. In general, this means a minimum 8 foot wide path on land areas to accommodate two-way traffic, with a minimum of two foot shoulders (total width 12 feet). Trails within structures, such as boardwalks or bridges are required to be a minimum 10 foot wide of unobstructed surface.

### Accessibility Regulations

---

Access to project facilities by people of all abilities is subject to regulations and standards set forth by the United States Access Board (<https://www.access-board.gov/>). The Access Board is an independent federal agency that promotes equality for people with disabilities, and develops and maintains design



criteria for the built environment. The Board has developed standards for facilities as part of the Americans with Disabilities Act (ADA), which ensures access to the built environment for people with disabilities. The ADA Standards establish design requirements for the construction and alteration of facilities subject to the law. These enforceable standards apply to places of public accommodation, commercial facilities, and state and local government facilities.

In California, the State of California has adopted a set of design regulations for accessible facilities that incorporate both state mandates and federal ADA standards. These provisions are contained in the California Code of Regulations, Title 24, Part 2, California Building Code (CBC)<sup>1</sup>. CBC contains building design and construction requirements relating to fire and life safety, structural safety, and access compliance. The 2016 CBC became effective on January 1, 2017 and is updated every three years.

Recreation and public access facilities will need to comply with Title 24 and ADA accessibility regulations. This will be reviewed as part of permitting actions for project construction.

---

<sup>1</sup> California Code of Regulations, Title 24 Part 2, July 2016.



## 6. NEXT STEPS

---

Implementation of the Bay Trail Sears Point extension will be a multi-step process, involving:

- Review and/or acceptance of Feasibility Study by the County Board of Supervisors and project stakeholders.
- Integration of plan concepts into applicable Plans of lead agencies (SR-37 planning and implementation, County bicycle and pedestrian plan, ABAG Bay Trail Plan, USFWS Visitor Service Plan), where not already included.
- Completion of the required environmental review document(s) (CEQA/NEPA).
- Securing funds for preliminary design and construction.
- Obtaining regulatory permit approvals, including consultation regarding wetlands and endangered species issues.
- Negotiation and completion of potential Right of Way (ROW acquisition) and trail use, management and/or licensing agreements.
- Preparation of detailed engineering design and habitat restoration and mitigation plans.
- Publically bidding the project's Construction Plans including habitat restoration and mitigation components, either as a standalone project or as part of a larger transportation improvement project.
- Construction oversight of the approved plans by a qualified Contractor and Biological Monitor to ensure that the project plans, along with all of the CEQA/NEPA mitigation measures and all permit conditions, are followed and implemented as approved.
- Post-construction monitoring of trail use, habitat restoration and other mitigation or permit requirements.

The following steps outline the near-term process for trail planning.

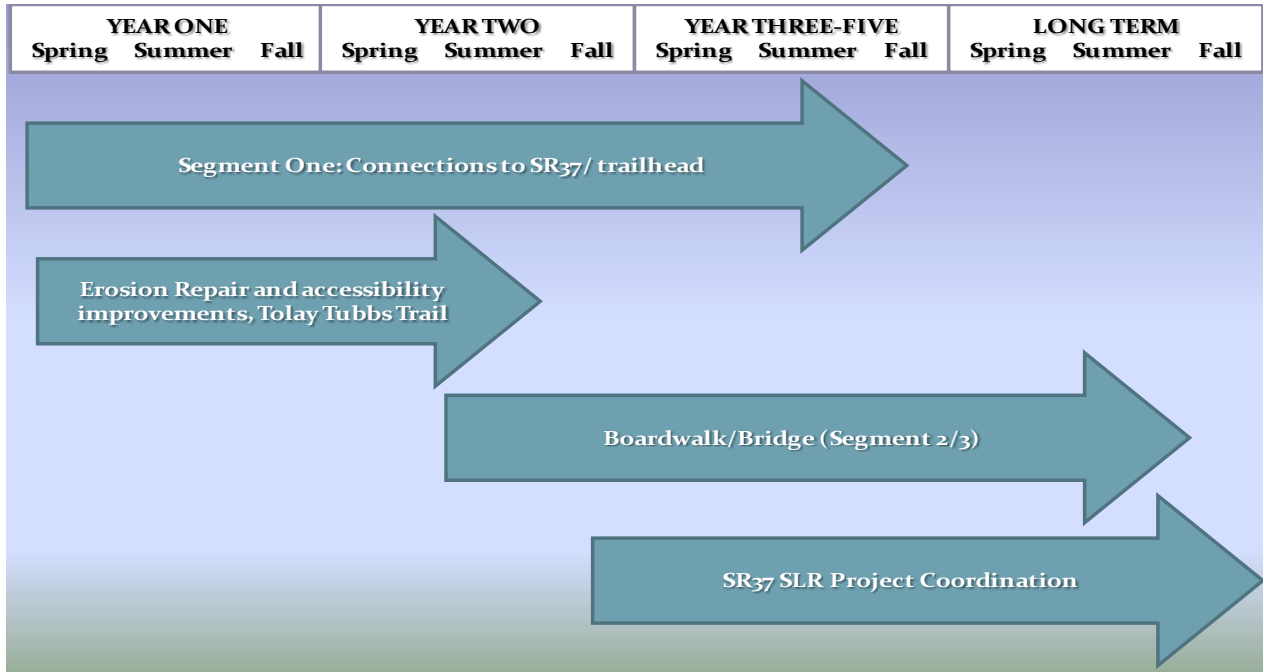
### 6.1 Project Review and Approval

---

The study report, including alignment recommendations, will be submitted to Sonoma County Regional Parks, Bay Trail and Caltrans for consideration. Recommendations should also be submitted to agencies such as USFWS, CDFW, Sonoma County Transportation Authority and MTC SR-37 Policy Advisory Committee and Sonoma Land Trust for consideration when related projects are identified. Where appropriate, this Plan would be integrated with ongoing planning and implementation efforts of each agency as part of a coordinated action, including the USFWS Visitor Services Plan, ABAG Bay Trail Plan, Countywide Bicycle and Pedestrian Master Plan, and Caltrans planning and implementation efforts for SR-37.

It is conceivable that the project is split into two segments: Completion of a trail segment and trailhead parking to Tolay Creek Road (Segment 1). This trail extension would provide connectivity to future SR-37 and SR 121 improvements. Separately, accessibility and erosion repairs to the existing Tolay/Tubbs Trail should be completed. Finally, construction of the boardwalk, or trail facilities integrated with SR-37 SLR improvements could be completed.

The Feasibility Study will also be presented to the Sonoma County Board of Supervisors for review and acceptance.



## 6.2 CEQA/NEPA Review

As a planning study, this Study itself is exempt from CEQA review. Although the trail connection was included in environmental review associated with the USFWS 2014 Final Comprehensive Conservation Plan (CCR) and associated environmental document, as well as environmental planning for the Sears Point Restoration Project, it is anticipated that additional supplemental review will be needed to reflect current environmental conditions.

As noted above, an environmental analysis needs to be conducted per California Environmental Quality Act (CEQA) requirements prior to any project construction. A CEQA Initial Study Checklist must be prepared to determine if there are potentially significant environmental impacts. If there are potential impacts, then an expanded environmental assessment will be prepared, most likely focusing on specific project issues. Mitigation measures may be incorporated into the project design (such as fencing, separation or other measures) to reduce the potential environmental impacts. The public will have several opportunities to review and comment on the project and potential impacts in this process.

Since the project will include Caltrans as well as USFWS coordination, then environmental review (under federal guidelines) will also need to comply with National Environmental Policy Act (NEPA) guidelines. Typically, a number of special technical environmental studies are conducted to assist in the NEPA and Caltrans Local Assistance Program review and approval process. These often include:

- Section 106 Cultural Resources Study;
- Section 4F determination, associated with parks that might be closed due to construction activities;
- Location Hydraulic Study, for areas within designated 100-year floodplain;
- Natural Environment Study (NES)- wetlands delineation;
- Biological Assessment to verify presence and protection protocols for sensitive wildlife and plant species that might be impacted by project activities.



If the environmental review and special studies identify feasible mitigation measures, such as habitat restoration, that adequately address potential project impacts, then a Mitigated Negative Declaration can be adopted by the lead agency, and a Finding of No Significant Impact (FONSI) can be adopted by federal agencies.

Trail segments on USFWS lands could be evaluated as part of the NEPA review for the CCR. USFWS biologists could provide the Section 7 consultation and write the Biological Opinion if the trail is on Refuge lands.

Portions of the trail that will be completed in association with other projects (SR-37 SLR actions) and construction of physical features for the trail should be included in those respective environmental documents, and implemented as appropriate.

### 6.3 Right of Way Agreements

---

Separate agreements would be needed with each landowner or easement holder. Continued dialogue with respective property owners and stakeholders (SLT, USFWS, CDFW, SMART, Vallejo Sanitation and Flood Control District, Caltrans) will be critical to incorporate trail elements into current and planned projects where appropriate. Right of way negotiations will likely include provisions for wayfinding, security, maintenance and operations, including fencing, signage vehicular access or other improvements.

### 6.4 Project Permitting

---

Multiple regulatory agencies may have jurisdictional authority over the project, may review and comment on the project's environmental document, request mitigation measures, and may require issuance of a permit with approval conditions and other mitigation and monitoring requirements.

Preparation of permit applications and requests for permit approvals from applicable regulatory agencies is typically completed concurrent with engineering design. Typically, permitting can often be completed on 35-60% submittal plans, although some agencies such as BCDC may require more detailed design documents. Trail segments will likely be subject to permit and review associated with proximity to sensitive habitat areas. Corps and CDFW permits will be required for any localized wetlands fill associated with bridge, boardwalk, or culvert structures.

The project may incur both temporary disturbance and permanent fill of wetlands, and could possibly disturb nearby endangered species habitat. In addition, potential water quality and stormwater construction-related impacts associated with any required excavation, filling, construction of hard elements such as bridges, boardwalks, retaining walls, and concrete and asphalt paving, must also be addressed in grading and improvement plans and associated Stormwater Pollution Prevention Plans (SWPPPs).

**Table 6.4-1** summarizes the agencies that potentially have jurisdictional review as well as permitting authority for the project. The Joint Aquatic Resources Permit Application (JARPA) was developed by Association of Bay Area governments (ABAG) to provide a simplified permit application for activities in or near Bay Area aquatic environments, and could potentially be utilized for this project.

**Table 6.4-1: Agencies with Review and/or Permitting Authority**

<b>Local Agencies</b>	<b>Permitting Authority</b>	<b>Note</b>
Sonoma County Regional Parks	None	Potential lead agency for trail construction and operation.
Sonoma County PRMD	Review and approval of projects in unincorporated area	Construction permits General Plan Consistency
Sonoma County Water Agency	Levees, bridges, and boardwalks that are in the 100-year Federal Emergency Management Agency (FEMA) floodplain	
Vallejo Sanitation and Flood Control District	Property Owner	Responsible for levee maintenance along Tubbs Island
<b>State Agencies</b>	<b>Permitting Authority</b>	<b>Note</b>
California Department of Fish and Wildlife	Property Owner Streambed Alteration Agreement, Section 1603 Fish and Game code (alteration of wetlands, sensitive species); California Endangered Species Act	Permit would be required
San Francisco Bay Conservation and Development Commission (BCDC)	Development permit for construction within shoreline band (within 100 feet of highest tidal action) of San Francisco Bay, including all sloughs, and specifically, the marshlands lying between mean high tide and five feet above mean sea level; Providing maximum feasible public access to and along the shoreline of the Bay consistent with BCDC's policies regarding Public Access	Permit would be required.
San Francisco Bay Regional Water Quality Control Board (RWQCB)	National Pollution Discharge Elimination System (NPDES) Permit, Waste Discharge Requirements to prevent impacts to surface water quality from construction runoff, Water Quality Waiver/Certification for any wetlands or Waters of US fill.	Permit would be required in association with construction activities
State Lands Commission (SLC)	Governs "sovereign" lands—submerged and tidal, historic river alignments. Trail project will need approval of public easement or licensing for trail use from State Lands Commission Board members.	Ownership and lease agreements for shoreline lands and levees



Federal Agencies	Permitting Authority	Note
US Army Corps of Engineers (Corps)	Section 404 Clean Water Act permit: Fill of jurisdictional waters of the U.S. or wetlands fill (fill of wetlands, fill associated with bridges and boardwalks over marshes or sloughs)	Permit would be required
	Section 10 of the Rivers and Harbors Act of 1899	Issues permit to create obstructions or fill of navigable waters of the U.S. (bridges)
	Section 408, Operations and Maintenance	Alteration of federal flood control levees
US Fish and Wildlife Service (USFWS)	Section 7 (U.S. Endangered Species Act) Consultation for effects to special status species associated with federal (Corps) permit application. (Tidal marsh impacts)	Consultation associated with Corps permit
National Oceanic and Atmospheric Association, National Marine Fisheries Service	Section 7 (U.S. Endangered Species Act) Consultation for effects to anadromous species associated with federal (Corps) permit for creek and slough crossings.	Consultation if Corps 404 permit is needed, if adjacent to water body.

## 6.5 Final Design

The design process can often proceed at the same time the environmental review work is being completed. Next steps may include detailed topographic, property and boundary and ROW/easement surveying, review of “as-built” drawings, completion of soil borings for pavement and boardwalk/bridge design, and preliminary trail design. Typically a design proceeds through several stages of preparation and review, from concept drawings to a final construction bid package (i.e., 35% completion, 70% completion, and 95% completion review and submittals). Depending on complexity, the completion of a final design and bid package, followed by public bidding, can take from eight to more than 14 months. An important part of the design will be in meeting trail full accessibility requirements.

## 6.6 Trail Construction

Depending on size and complexity, trail construction can take from six to eight or more months to complete. Trail implementation can also be completed in phases, depending upon prioritization, available funding, environmental requirements, permitting, or combined with other construction projects. The project may also be subject to seasonal implementation restrictions to avoid impacts to wildlife resources during nesting or breeding season.

Construction of the trail may be phased as described above to reflect available funds for implementation, as well as obtaining necessary ROW, private agency cooperation, and coordination with property owners. Construction protocols and Best Management Practices identified in Section 7 as well as required as part of environmental review will be incorporated into the construction project documents.



## 7. REFERENCES

---

AECOM. *San Francisco Bay Tidal Datums and Extreme Tides Study, Final Report*. February 2016.

AECOM. *Sea Level Rise Inundation Mapping and Shoreline Vulnerability Analysis for California State Route 37*. September 2015.

Kimley, Horn. AECOM. *Draft SR 37 Transportation and Sea Level Rise Corridor Improvement Plan*. September 2017

Baye, Peter R. *Alternative Monitoring Approaches for Large Bay-Delta Estuarine Wetland Restoration Projects*. February 2016.

California Department of Transportation. *Transportation Concept Report State Route 37 District 4*. January 2015.

ICF Jones and Stokes. *Sears Point Wetlands and Watershed Restoration Project, Draft Environmental Impact Report/ Environmental Impact Statement*. August 2009.

Graymer, Jones, and Brabb. *Geologic Map and Map Data base of Northeastern San Francisco Bay Region, California*. 2002

Hine, Scott Kulvin. *Adapting to Rising Sea Levels in San Francisco*. 2015

Hultgren – Tillis Engineers. *Geotechnical Investigation, New Flood Control Levee Sears Point Tidal Restoration Project, Sonoma County, California*. June 2011.

KKCS, David McCrossan. *SR 37 Passenger Rail Corridor Potential*. September 2016.

LSA Associates Inc. *Biological Resources Study Tolay Creek Ranch, Sonoma, California*. May 2009

Parsons Brinckerhoff Quade & Douglas, Inc. *Final Environmental Impact Report (FEIR) for the Sonoma-Marin Area Rail Transit (SMART) Project*. June 2006.

PFAL. *Consultant Introduction Project Finance Advisory LTD*. July 2016.

PFAL. *Finace Overview & Case Study Findings*. September 2016.

PFAL. *SR 37 Affordability & Financing Options*. May 2017.

Point Blue Conservation Science. *San Pablo Bay National Wildlife Refuge Climate Adaptation Plan*. December 2016.

Road Ecology Center, University Of California Davis. *State Highway Corridor Planning California Case Study*.



Road Ecology Center, University of California Davis. *State Route 37 Integrated Traffic, Infrastructure and Sea Level Rise Analysis*. February 2015.

San Francisco Bay Conservation and Development Commission. *North Bay Land Use and Public Ownership*. January 1997.

San Francisco Estuary Institute & The Aquatic Science Center. *Novato Creek Baylands Vision*. November 2015.

San Pablo Bay National Wildlife Refuge. *Final Tubbs Island Restoration Plan and Environmental Assessment*. 1998.

Sonoma Local Agency Formation Commission. *Staff Report Reclamation District Protest Hearing*. December 9<sup>th</sup>, 2015.

Sonoma County Regional Parks Department. *Sonoma County Bay Trail Corridor Plan*. December 2005.

Baylands Group. *San Pablo Baylands: Ensuring a Resilient Shoreline*. October 2017.

Takekawa, John Y et al. *Environmental Threats to Tidal- Marsh Vertebrates of the San Francisco Bay Estuary*. 2005.

Takekawa, John Y et al. *Tidal Saltmarsh Fragmentation and persistence of San Pablo Song Sparrows (Melospiza Melodia Samuelis) Assessing Benefits of Wetland Restoration in San Francisco Bay*. 2002.

U.S. Geological Survey, Western Ecological Research Center. *An Elevation and Climate Change Assessment of the Tolay Creek Restoration, San Pablo National Wildlife Refuge*. February 2014.

U.S. Department of the Interior Fish and Wildlife Service Pacific Southwest Region. *Environmental Assessment for Mosquito Management on San Pablo Bay National Refuge*. September 2011.

U.S. Fish and Wildlife Service. *San Pablo Bay National Wildlife Refuge Final Comprehensive Conservation Plan*. October 2011.

U.S. Fish and Wildlife Service. *Sears Point Wetland and Watershed Restoration Project Sonoma County, California, Final Environmental Impact Report / Environmental Impact Statement*. April 2012.



## APPENDIX A

### **PUBLIC OUTREACH**




**Stakeholders Meeting**  
February 24, 2017




**Sears Point Bay Trail Connector**






**AGENDA**

- INTRODUCTION
- STAKEHOLDERS
- WHAT IS THE SEARS POINT BAY TRAIL?
- RELATED PROJECTS
- SCOPE OF WORK
- ROUTE OPTIONS
- OPPORTUNITIES FOR INPUT
- NEXT STEPS







**INTRODUCTION: PURPOSE**

- INTRODUCE THE PROJECT
- REVIEW WITH STAKEHOLDERS
- SOLICIT INITIAL “FIRST THOUGHT” COMMENTS





**INTRODUCTION: PROJECT TEAM**



<p>Questa Engineering</p> <ul style="list-style-type: none"> <li>■ Jeff Peters</li> <li>■ Margaret Henderson</li> </ul>	<p>Ken Tam, Project Manager 707-565-3348 ken.tam@sonoma-county.org</p>
<p>2M Associates</p> <ul style="list-style-type: none"> <li>■ Patrick Miller</li> </ul>	<p>Steve Ehret, Park Planning Manager 707-565-2041 steve.ehret@sonoma-county.org</p>



## INTRODUCTION: STAKEHOLDERS

- ABAG
- Black Point Game Bird Club
- Caltrans District 4
- California Department of Fish and Wildlife
- California Public Utilities Commission
- Graton Rancheria
- Madrone Audubon Society
- NWP
- SF Bay Conservation and Development Commission
- SMART
- Sonoma Land Trust
- Sonoma Raceway
- Sonoma County Bicycle Coalition
- Sonoma County Regional Parks
- Sonoma County Transportation Authority
- State Lands Commission
- Thirty-Seven Wines
- U.S. Fish and Wildlife Service
- Vallejo Sanitation District
- Wing and Barrel Ranch
- Others?

SONOMA COUNTY REGIONAL PARKS

## INTRODUCTION: THE PROJECT

- The Sears Point Bay Trail is part of regional planning efforts, including:
  - San Francisco Bay Trail Plan
  - 2005 Sonoma County Bay Trail Corridor Plan
  - 2010 Sonoma County Bicycle and Pedestrian Plan
  - Sonoma County General Plan
- This evaluation of route options and preliminary costs is funded by an ABAG - San Francisco Bay Trail Project grant.
- Project funding for implementation has not been secured.

SONOMA COUNTY REGIONAL PARKS

What is the Sears Point Bay Trail?

What is the scope of work for the Feasibility Study?

- Part of the 500-mile San Francisco Bay Trail network along the shoreline.
- Segment will close a gap between two existing SF Bay Trail segments:
  - Eliot Trail, completed as part of the Sears Point Restoration Project, and
  - Tolay/Tubbs Island Trail, managed by USFWS as part of San Pablo Bay NWR.
- Scope of work includes: identifying potential alignments; considering construction techniques; evaluating implementation costs; and considering other evaluation factors.

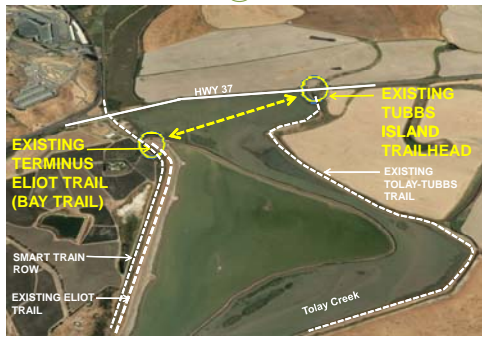
SONOMA COUNTY REGIONAL PARKS

## 2005 BAY TRAIL CORRIDOR PLAN



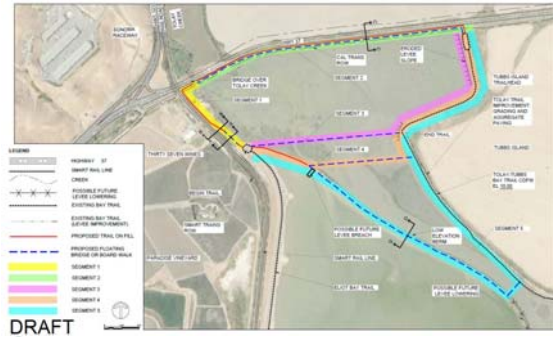
SONOMA COUNTY REGIONAL PARKS

## LOCATION



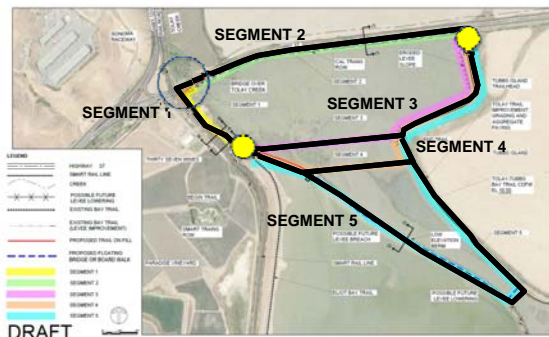
SONOMA COUNTY REGIONAL PARKS

## ROUTE SEGMENT OPTIONS



SONOMA COUNTY REGIONAL PARKS

## ROUTE SEGMENTS



SONOMA COUNTY REGIONAL PARKS

## SEGMENT 1 – SEGMENT 2



SONOMA COUNTY REGIONAL PARKS



## FEASIBILITY CONSIDERATIONS

- RIGHT OF WAY / LAND ACQUISITION
- GEOTECHNICAL / HYDROLOGIC CONDITIONS
- CONSTRUCTABILITY
- PUBLIC ACCESS AND WILDLIFE COMPATIBILITY
- USER EXPERIENCE
- PERMITTING
- COST
  
- COORDINATION WITH HIGHWAY 37 IMPROVEMENT PLANS
- CROSSING SMART TRACKS
  
- OTHER ?

 SONOMA COUNTY REGIONAL PARKS

## TIMELINE

**SUMMER 2016 – WINTER 2017:** Identification of existing conditions, mapping, stakeholder and interest groups outreach.

**WINTER 2017:** Route evaluation and cost analysis.

**SPRING 2017:** Preparation and presentation of study recommendations.

 SONOMA COUNTY REGIONAL PARKS

## OPPORTUNITIES FOR INPUT

- ELECTRONIC MAILING
- SOLICIT INPUT FROM COLLEAGUES
- PROJECT WEBSITE UPDATES
- COMMUNITY WORKSHOP
- CEQA / NEPA PROCESS

 SONOMA COUNTY REGIONAL PARKS

## NEXT STEPS

- COMPILE AND ANALYZE WHAT WE HEAR FROM YOU TODAY
  - PREPARE PRELIMINARY STUDY
  - CONDUCT ONE PUBLIC WORKSHOP THAT WILL ADDRESS DESIGN STRATEGIES
  - SCHEDULE FOLLOW-UP MEETING WITH STAKEHOLDERS (MARCH 2017)
  - CHECK THE PLAN WEBSITE FOR UPDATES
- <http://parks.sonomacounty.ca.gov/>

 SONOMA COUNTY REGIONAL PARKS

## THANK YOU !

### Questions?

#### Contacts:

Ken Tam, Project Manager, 565-3348  
[ken.tam@sonoma-county.org](mailto:ken.tam@sonoma-county.org)

Steve Ehret, Park Planning Manager, 565-2041  
[steve.ehret@sonoma-county.org](mailto:steve.ehret@sonoma-county.org)

Subscribe to project updates at parks website  
[www.parks.sonomacounty.ca.gov/](http://www.parks.sonomacounty.ca.gov/) by clicking on "Sign up for  
Planning Updates"



SONOMA COUNTY REGIONAL PARKS

## Bay Trail - Sears Point Connector Trail Stakeholder Meeting

### February 24, 2017 Meeting Notes

#### General comments:

Steve Ehret presented a history of access planning in the area. The SF Bay Trail is a planned continuous alignment around SF Bay that is included in various adopted plans of Sonoma County, as well as regional plans. The Bay Trail is supported by the access community, and this study will look at connecting the largest existing trail segments in the county: the Eliot Trail, part of the Sears Point Restoration Project, with the existing Tolay/Tubbs Trail. Patrick Miller of 2M presented an overview of the 5 potential trail segments to complete the trail project issues, outcomes and timeline. Other comments:

- This segment was initially studied in the 2005 Bay Trail Corridor Plan and is the basis for the current study.
- The proposal for Segment 5 would be to use the footprint of the existing berm (at approximate el. 8 ft.) to place footings with a boardwalk at elevation 12 ft. or higher.
- The Eliot trail is at approximate elevation 12 ft.; all segments would be built at that elevation or higher, for SLR (Sea Level Rise) resilience.
- There's flooding on the roadway along Highway 37 (elevation 8-9), especially at King tides coincident with storms. This project might provide some interim benefits to reduce flooding in the area until a long term solution is implemented.
- The project will balance feasibility issues with constructability. There are potential projects along Highway 37 that must also address Sea level Rise issues.
- Are there trail counts or use statistics? (no, but Tolay/Tubbs parking area has never been observed full)
- If a related project is built (causeway by Caltrans or others) connections through and across Hwy 37 would still be needed to connect to this trail. One scenario would be to build an elevated structure (need approximately 30 ft. above railroad tracks) and use the old roadway bed for the trail in the future.

#### General Questions regarding Trail design and regulations:

- Is this a regulatory trail; if they're not necessary does it need to meet a certain standard or does the trail even need to exist?
- Maureen Gaffney and Steve Ehret explained this is in the general plan and Bay Trail Plan, with standards to meet federal accessibility guidelines.
- Goal is a class one trail, the minimum width is 12 feet, there can be exceptions if needed.

#### Sergio Ruiz of Caltrans comments:

- Important to continue to provide bicycle access to Highway 121. Highway 121 is open to bicyclists.

- If the project is over \$3 million, you have to go through PAED (Project Approval and Environmental Document) process, which is cumbersome and has cost, permitting and timing issues. One to three years for processing.
- There may be interim project improvements proposed through the Caltrans maintenance office, Sergio can help coordinate.
- Segment 5 is least transportation friendly and would not necessarily make the connection to Hwy 121.
- Caltrans will need a maintenance agreement for improvements with their right of way

Greg Martinelli (CDFW) made the following comments:

- Tolay Lagoon was acquired as mitigation property and not sure if there are conditions regarding a trail through those lands, or agreements with Caltrans regarding tidal flooding of Caltrans ROW.
- If land is acquired in fee, there should be an endowment for ongoing maintenance.
- CDFW is working on fixing the eroded Tolay levee.
- Segments 3 and 4 are near pond constructed for salt marsh harvest mouse, so would need to consider if boardwalk or fencing design to discourage raptor perching.
- Ridgway rails have been detected or observed in the restoration area.
- Prefers trail near Hwy 37 to avoid disrupting wildlife.
- Options 4 and 5 are problematic.
- Would consider discussing buttress fill option along Hwy 37 with 10:1 outboard slopes for transition zone.

Vallejo Sanitation District comments:

- VSD pays into Sonoma County Fund for levee maintenance
- Think that they may own some or all of the levees
- Concern about public access to beneficial reuse biosolids fields -would like fencing between trail and fields.

Julian Meisler (SLT) comments:

- Segment Five is a remnant berm that was rebuilt with a 10 to 1 outboard slope thinking that perhaps it would use be used as a trail in the future, it is 5-6 feet wide.
- Austin Payne of Ducks Unlimited was the designer of the Sonoma Land Trust segment.
- SLT have docents on the Eliot Trail every weekend

Alisha O'Loughlin Sonoma County Bicycle Coalition:

- From a user experience would be better if Segment five were installed because it's further away from the road.

Sonoma Raceway:

- Permitting through PRMD and regulatory agencies has been challenging for them and would think also for this project.

Paradise Vineyards/37 Wines:

- Winery has issues with the tasting room permit; their project conditions include a deceleration lane as well as a lot of additional work and issues with red legged frog.
- They do not own the two occupied parcels on the east side of the SMART tracks. The two houses are occupied by renters.

Laura Giraud, SMART:

- Want trail as far away from SMART rail as possible, or at least a 10-15 ft. minimum setback.
- Example: Have used 4 feet tall and 6 feet tall fencing as a barrier between the SMART Trail and rail line. The 6 feet tall fencing is lowered to 4 feet tall where the fencing approaches a road intersection to improve site distance for the train operator.
- Trail is 25-50 ft. away at Eliot Trail.
- Can be as little as 10-15 feet if needed, evaluated case by case.
- Consider placement of trailhead on east side of SMART due to costs of pedestrian related improvements at the railroad crossing which could cost several million dollars
- SMART right of way is 80 feet wide.

Melissa Amato, USFWS:

- Is there additional restoration opportunity along Hwy 37 by creating transition zone?
- It may be too close to road.
- Lagoon is transitioning part-time and scour, it has a muted tidal prism.
- Scour and deposition need to be considered in the design along with Sea Level Rise.
- There may be permitting challenges with ESA (Environmentally Sensitive Areas?).

Maureen Gaffney, ABAG Bay Trail:

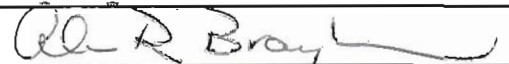

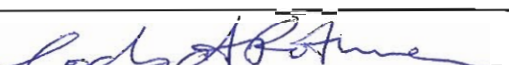
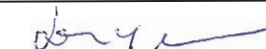
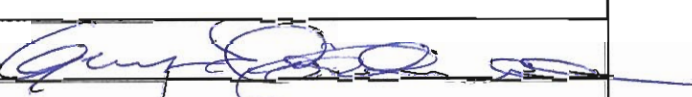
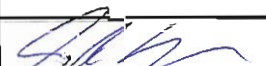
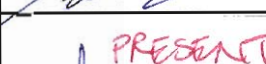



- Discussed new Bay Trail guidelines and how they apply to this project.
- 12 ft. wide trail is goal, but guidelines are flexible in constrained areas.
- Trail does not need to be asphalt paved.
- The development of the Bay Trail will need a permit from BCDC (San Francisco Bay Conservation and Development Commission).

James Cameron, Sonoma County Transportation Authority:

- Likes the elevated buttress design which would provide some flood protection for Highway 37.
- Option 3 and 4 would be preferred from a noise and user experience perspective.
- Option 5 is too long a diversion.
- Make sure there is a connection to Hwy 121 north of Hwy 37.

Stakeholders requested a copy of the presentation for review and discussion with agency colleagues; this will be coordinated by Ken Tam of Sonoma County Parks.

**BAY TRAIL - SEARS POINT CONNECTOR**  
**STAKEHOLDER MEETING**  
**SIGN IN SHEET**  
**DATE: February 24, 2017**

NAME	ORGANIZATION	SIGNATURE
✓ Al Brayton	Thirty-Seven Wines	
Alisha O'Loughlin	Sonoma County Bicycle Coalition	
Buffy McQuillen	Graton Rancheria	
Cody Aichele-Rothman	SF Bay Conservation and Development Commission	
David Stewart	California Public Utilities Commission	
Dianne Yee	Caltrans District 4	
Don Brubaker	US Fish and Wildlife Service	
Fraser Shilling	UC Davis	
George Asimakopoulos	State Lands Commission	
Greg Martinelli	California Fish and Wildlife Service - Lands Division	
Greg Sarris	Graton Rancheria	
Issac Pearlman	SF Bay Conservation and Development Commission	
James Cameron	Sonoma County Transportation Authority	
Jeff Peters	Questa Engineering	
✓ Jennifer Harrington	Vallejo Flood and Wastewater District	
✓ Jere Starks <sup>Jenah Smith</sup>	Sonoma Raceway	
John McCarthy	County Transportation and Public Works	
✓ Julian Meisler	Sonoma Land Trust	

**BAY TRAIL - SEARS POINT CONNECTOR**  
**STAKEHOLDER MEETING**  
**SIGN IN SHEET**  
**DATE: February 24, 2017**

NAME	ORGANIZATION	SIGNATURE
<del>Karen Taylor</del> <i>Greg Martelli</i>	California Fish and Wildlife Service - Lands Division	<i>[Signature]</i>
Karen Weiss	California Fish and Wildlife Service - Permits	
Ken Tam	Sonoma County Regional Parks	<i>Kenneth Tam</i>
Laura Giraud	Sonoma Marin Area Rail Transit	<i>Laura Giraud</i>
✓ Lisa Brayton	Thirty-Seven Wines	PRESENT
Lorie Hammerli	California Fish and Wildlife Service - Permits	
Margaret Henderson	Questa Engineering	<i>Margaret Henderson</i>
Mark Tomko	Vallejo Flood and Wastewater District	<i>Mark Tomko</i>
Maureen Gaffney	ABAG	<i>[Signature]</i>
✓ Melisa Amato	US Fish and Wildlife Service	<i>Melisa Amato</i>
Mike Edwards	Northwestern Pacific Railroad Company	
Mitch Stogner	NCRA (North Coast Railroad Authority)	
Nancy Simpson	Wing and Barrel Ranch	<i>Nancy Simpson</i>
Patrick Miller	2M Associates	<i>Patrick Miller</i>
Sergio Ruiz	Caltrans District 4	<i>[Signature]</i>
Steve Ehret	Sonoma County Regional Parks	PRESENT
Steve Page	Sonoma Raceway	
Susan Kirks	Madrone Audubon Society	

**DATE: February 24, 2017**

[illegible]

# **Bay Trail - Sears Point Connector Trail Community Workshop**

August 30, 2017



# SONOMA COUNTY REGIONAL PARKS

## **Bay Trail – Sears Point Connector Study**

### **Community Workshop #1**

# **Agenda**

**(August 30, 2017)**

- 1. Welcome and Introductions**
- 2. Presentation**
- 3. Questions and Answers**
- 4. Informal Review of Project Maps**
- 5. Wrap-up and Summary**



## Bay Trail-Sears Point Connector Study Workshop #1 - Comments

*Please use the space below to write any comments you may have regarding the Bay Trail-Sears Point Connector Feasibility Study below:*

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

## Optional

Name: \_\_\_\_\_

Email or Phone: \_\_\_\_\_

(Please print)

*Please note that comments and information submitted become part of the public record.*

*Please turn in to "Comments Box" at the end of the meeting.*

*Thank you!*

**Community Workshop**  
August 30, 2017



**Sears Point Bay Trail Connector Study**

SONOMA COUNTY REGIONAL PARKS

## Agenda

- Team Introduction
- What is the Sears Point Bay Trail?
- Scope of Work
- Stakeholders
- Related Projects
- Existing Conditions
- Route Options
- Opportunities for Input
- Next Steps

SONOMA COUNTY REGIONAL PARKS

## Study Team

**Questa Engineering**

- Jeff Peters
- Margaret Henderson

**2M Associates**

- Patrick Miller

**Ken Tam, Project Manager**  
707-565-3348  
ken.tam@sonoma-county.org

**Steve Ehret, Park Planning Manager**  
707-565-2041  
steve.ehret@sonoma-county.org


SONOMA COUNTY REGIONAL PARKS

## What is the Sears Point Bay Trail?

The Sears Point Bay Trail will close a gap between two existing SF Bay Trail segments:

- Eliot Trail, completed as part of the Sears Point Restoration Project, and
- Tolay/Tubbs Island Trail, managed by USFWS as part of San Pablo Bay NWR.

It's part of the 500-mile San Francisco Bay Trail network along the bay shoreline.

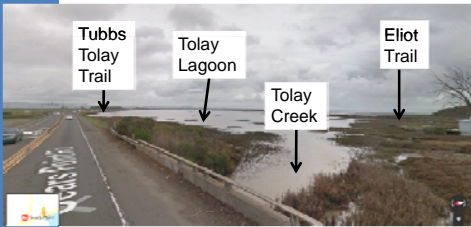


SONOMA COUNTY REGIONAL PARKS

### What is the scope of work for the Connector Study?

Study includes:

- Identifying potential alignments
- Considering construction techniques
- Evaluating project costs, and
- Identifying implementation issues.



SONOMA COUNTY REGIONAL PARKS

### Stakeholders

- ABAG
- Black Point Game Bird Club
- Caltrans District 4
- California Department of Fish and Wildlife
- California Public Utilities Commission
- Graton Rancheria
- Madrone Audubon Society
- NWP Railroad
- SF Bay Conservation and Development Commission
- SMART
- Sonoma Land Trust
- Sonoma Raceway
- Sonoma County Bicycle Coalition
- Sonoma County Regional Parks
- Sonoma County Transportation Authority
- State Lands Commission
- Thirty-Seven Wines
- U.S. Fish and Wildlife Service
- Vallejo Sanitation District
- Wing and Barrel Ranch
- Others?

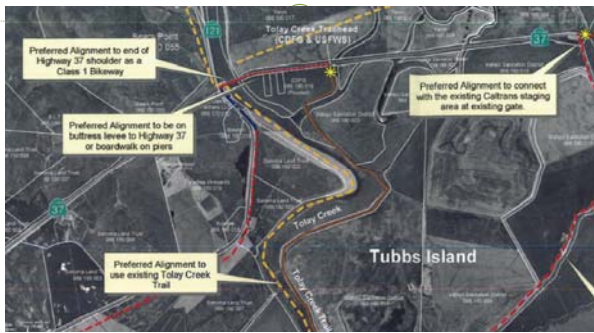
SONOMA COUNTY REGIONAL PARKS

### Related Projects

- The Sears Point Bay Trail is part of regional planning efforts, including:
  - San Francisco Bay Trail Plan
  - 2005 Sonoma County Bay Trail Corridor Plan
  - 2010 Sonoma County Bicycle and Pedestrian Plan
  - Sonoma County General Plan
- It is NOT part of the Highway 37 Planning Studies**
- This evaluation of route options and preliminary costs is funded by an ABAG - San Francisco Bay Trail Project grant.
- Construction funding has not been secured.

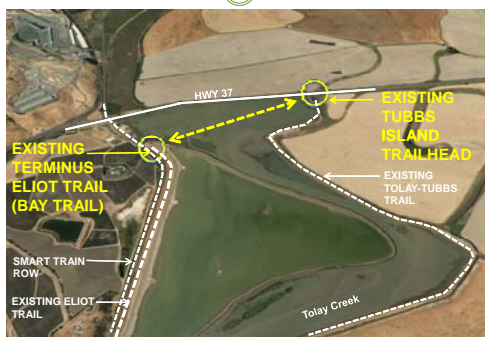
SONOMA COUNTY REGIONAL PARKS

### 2005 Bay Trail Corridor Plan

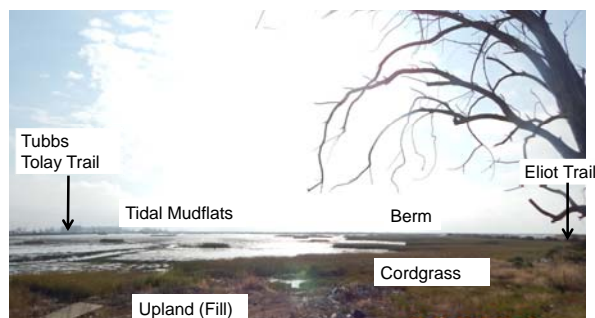


SONOMA COUNTY REGIONAL PARKS

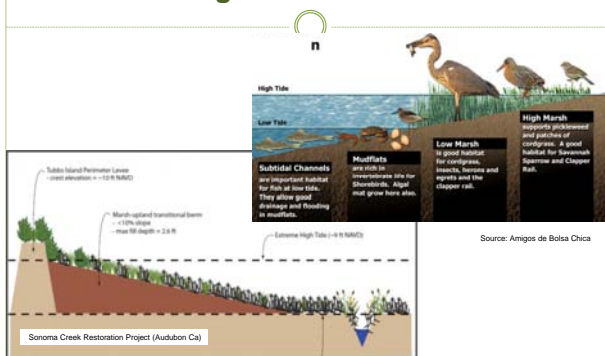
## Existing Conditions: Location



## Existing Conditions: Habitat



## Existing Conditions: Habitat

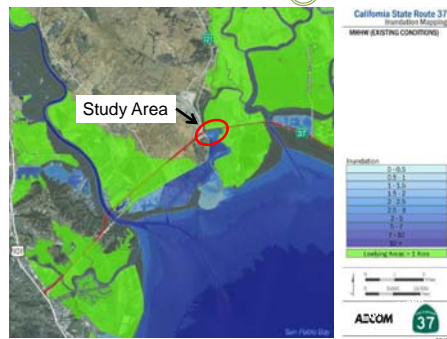


No Transition Zone

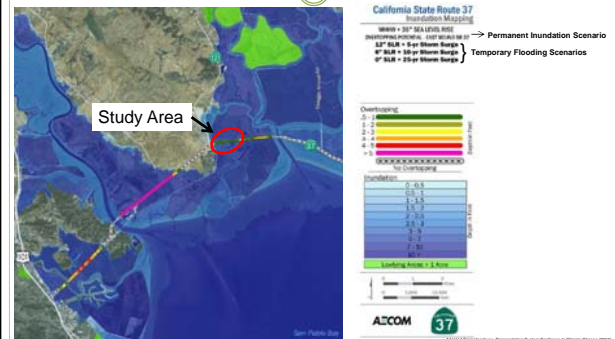
Cordgrass Establishment

Wide Shoreline Band

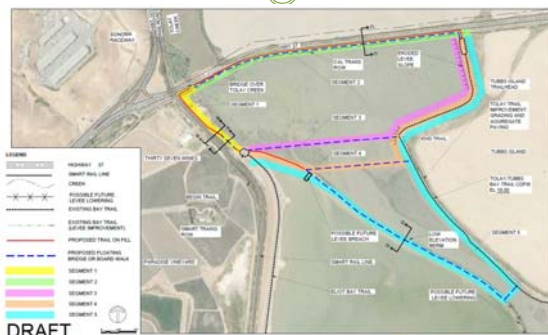
### Existing Conditions: Sea Level Rise



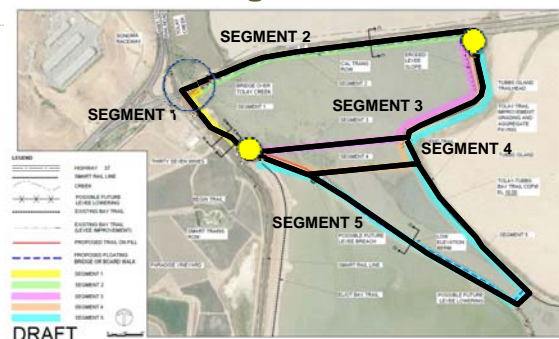
### MHHW + 36" Sea Level Rise (2100)



## Route Segment Options



## Segments



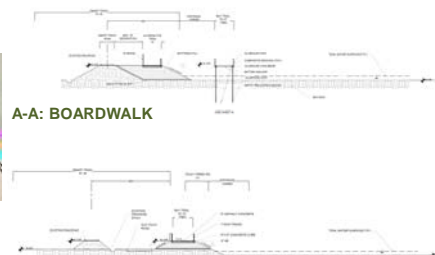
## Segment 1 – Segment 2



SONOMA COUNTY REGIONAL PARKS

## Design Concepts: SMART

### SEGMENT 1



B-B: FILL ALONG TOLAY CREEK ROAD

SONOMA COUNTY REGIONAL PARKS

## Design Concepts: SR 37

### SEGMENT 2



CC: FLOATING ALUMINIUM BOARDWALK



SONOMA COUNTY REGIONAL PARKS

## GEOFORM CORE FILL LEVEE

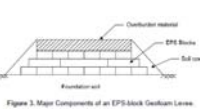
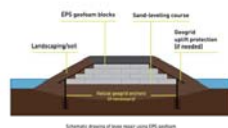


Figure 3: Major Components of an EPS-Block Geofirm Levee.

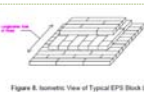


Figure 4: Isometric View of Typical EPS Block Layout



Figure 1: EPS block placement on part of the Tuleen Marsh Facilities Roasting River Slough Distribution System Levee Restoration in California

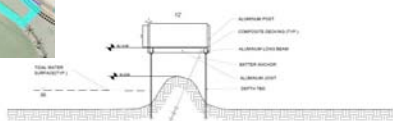


Figure 2: Completed Tuleen Marsh Facilities Roasting River Slough Distribution System Levee Restoration in California

SONOMA COUNTY REGIONAL PARKS

## Design Concepts: Tolay Berm

### SEGMENT 5



**DD: ELEVATED BERM WITH BOARDWALK**

SONOMA COUNTY REGIONAL PARKS

## Opportunities and Challenges of Corridor Alternatives

Alternative	Opportunity	Challenge
1 Highway 37	<ul style="list-style-type: none"> <li>• Within Caltrans ROW</li> <li>• Direct connection</li> <li>• Least Habitat disruption</li> <li>• Potential SLR resilience</li> </ul>	<ul style="list-style-type: none"> <li>• Longest water crossing</li> <li>• Highway noise and traffic</li> <li>• Caltrans SR 37 plan coordination</li> <li>• User experience</li> </ul>
2 Eliot Trailhead (E) Lagoon	<ul style="list-style-type: none"> <li>• Shorter Bridge/Boardwalk</li> <li>• Better user experience</li> <li>• Portion of boardwalk on berm</li> </ul>	<ul style="list-style-type: none"> <li>• Bisects habitat</li> <li>• Navigability challenge</li> <li>• Within CDFW/USFWS ROW</li> <li>• Second longest water crossing</li> </ul>
3 Eliot Trailhead (S) Lagoon	<ul style="list-style-type: none"> <li>• Trail away from highway</li> <li>• Better user experience</li> <li>• Boardwalk primarily on berm</li> </ul>	<ul style="list-style-type: none"> <li>• Bisects habitat</li> <li>• Navigability challenge</li> <li>• Within SLT/USFWS ROW</li> <li>• Third longest water crossing</li> </ul>
4 Tolay Creek Narrows	<ul style="list-style-type: none"> <li>• Best user experience</li> <li>• Least wetlands/water crossing</li> <li>• Easiest construction (on Berm)</li> <li>• Maintains navigability to Tolay Lagoon</li> </ul>	<ul style="list-style-type: none"> <li>• Indirect route to SR 37/SR121 trailhead</li> <li>• Requires longest Tubbs Tolay levee repair</li> <li>• Proximity to endangered species; permitting issues</li> <li>• SLT/USFWS ROW</li> </ul>

SONOMA COUNTY REGIONAL PARKS

## Constructability Considerations

- Right of Way / Land Acquisition needed
- Public Access and Wildlife Compatibility
- Geotechnical / Hydrologic conditions
- Crossing SMART Tracks
- Coordination With Highway 37 Improvement Project
- User Experience
- Constructability
- Navigability
- Permitting
- Cost



SONOMA COUNTY REGIONAL PARKS

## TIMELINE

**Summer 2016 – Winter 2017:** Identification of existing conditions, mapping, stakeholder and interest groups outreach.

**Spring-Summer 2017:** Route evaluation and cost analysis.

**Fall 2017:** Preparation and presentation of study recommendations.

SONOMA COUNTY REGIONAL PARKS

## OPPORTUNITIES FOR INPUT

- ELECTRONIC MAILING
- PROJECT WEBSITE UPDATES
- COMMUNITY WORKSHOP
- CEQA / NEPA PROCESS (Future)
- Board of Supervisors Study Review

SONOMA COUNTY REGIONAL PARKS

## NEXT STEPS

- Compile And Analyze What We Hear from you Today
- Finalize Study
- Follow-up Meeting with Stakeholders
- Check the Parks Website for Updates:  
<http://parks.sonomacounty.ca.gov/>

SONOMA COUNTY REGIONAL PARKS

## THANK YOU !

### Questions?

#### Contacts:

Ken Tam, Project Manager, 565-3348  
[ken.tam@sonoma-county.org](mailto:ken.tam@sonoma-county.org)

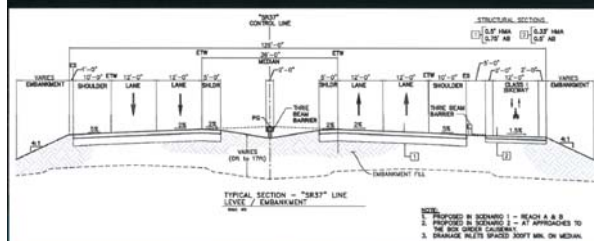
Steve Ehret, Park Planning Manager, 565-2041  
[steve.ehret@sonoma-county.org](mailto:steve.ehret@sonoma-county.org)

Subscribe to project updates at parks website  
[www.parks.sonomacounty.ca.gov/](http://www.parks.sonomacounty.ca.gov/) by clicking on "Sign up for Planning Updates"

SONOMA COUNTY REGIONAL PARKS

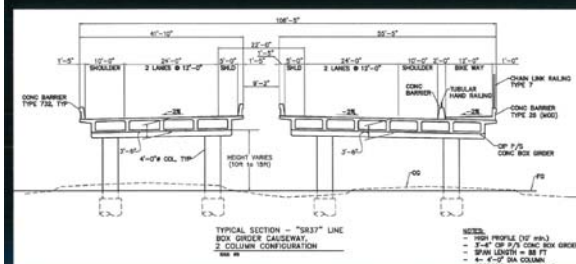
Additional Slides: HWY 37 Planning

## Adaptive Designs: Berm



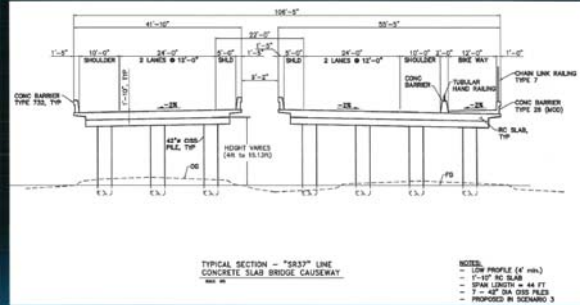
Two lanes w/ shoulder  
12 ft wide bikeway  
Height of fill varies

## Adaptive Designs: Box-girder

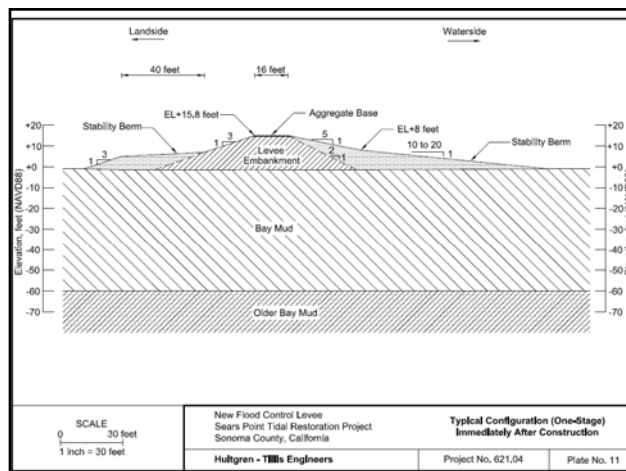


3.5 ft deep box girder  
88 ft span length, 4.0 ft diameter columns  
Two lanes w/ shoulder, 12 ft wide bikeway

## Adaptive Designs: Slab bridge



22" thick slab, 44 ft span length, 3.5 ft diameter columns  
Two lanes w/ shoulder, 12 ft wide bikeway



Bay Trail Sears Point Connector  
Community Workshop  
August 30, 2017  
Workshop Minutes

After a presentation by Patrick Miller of the study team, the following comments and questions were addressed:

1. Why is this study a Regional Parks project?
  - a. County Parks takes a role to build Class I paths within Sonoma County
  - b. This trail is part of the Sonoma County General Plan and Bicycle Plan.
  - c. Regional Parks typically deals with many agencies to build and operate trails in the County, and gets easements from California Department of Fish and Wildlife, Caltrans, State Parks and others as needed, and enters into long-term management agreements to implement projects.
  - d. The Study is funded by Association of Bay Area Governments and County Parks mitigation fees.
  - e. Different pieces of the trail may be implemented by different entities as part of a complete trail.
  - f. There are many ongoing development proposals in this area such as the winery, USFWS, Sears Point Raceway, Wing and Barrel Club.
2. Are there any statistics on the number and type of species that inhabit this area? It would be helpful to articulate how the various trail options would fit with future restoration activities.
  - a. CDFW has stated this is a mitigation area, and sensitive species such as Salt marsh harvest mouse and Black rail are in the area, but not specifically where they are.
  - b. USFWS has indicated that improved circulation and connectivity with Tolay Creek are a priority, and none of the options would affect this.
  - c. USFWS completed a Climate Adaptation Plan in 2016 that supports public access and passive recreation, and states that a priority is improved tidal flow into Tolay Creek and sediment deposition
3. Suggest that the alternatives be evaluated considering which work best with re-colonization species planning. Identify the desired species and how the trail options would affect them.
4. What is the hydrology of the area? Is Tolay Creek connected to Sonoma Creek?
  - a. There are at least three restoration projects in the area—Lower Tubbs Island, the Dickson Ranch restoration, and the CDFW work.
  - b. The Lower Sonoma Creek Hydrology Study is looking at the freshwater/saltwater groundwater issues, and restoration options.
5. Has Dickson Ranch been deeded over to the Refuge?
  - a. (Maureen) Yes.
6. What is the project cost?
  - a. The project will be very expensive, a boardwalk is in the range of \$1000-1500 per lineal foot, and the amount of boardwalk needed if along Hwy 37 is 3600 feet.
7. What can be done to improve the walking/riding surface of the boardwalk, with joints and shifting, it could be a hazard.
  - a. Tennessee Valley Boardwalk is pressure treated decking, would not be used here.
  - b. The correct pier depth may limit the amount of shifting.
  - c. Surface treatments such as mats or flexible coating could be explored.
  - d. Expansion plates are commonly included to accommodate shifting conditions.
  - e. Look at Elkhorn Slough, piers were connected at base, but it is very expensive.
  - f. Key is to have a lightweight structure that does not have significant settlement.
8. Can the trail be less than 12 feet wide?

- a. Yes, boardwalk is about \$40-\$80 per square foot, so a significant cost reduction would result if the trail is reduced from 12 to 10 feet wide. Less than 10 feet is not consistent with Caltrans standards, and not recommended.
  - b. Sonoma Baylands is about 8 feet wide, Eliot Trail is approximately 12 feet.
- 9. What is the current trail use?
  - a. 15-20 users per day, based on volunteer observation. It is not well advertised.



SONOMA COUNTY

REGIONAL PARKS

## Bay Trail – Sears Point Connector Study

PUBLIC WORKSHOP

August 30, 2017

NAME

(PLEASE PRINT CLEARLY)

REPRESENTING

E-MAIL

Ingrid Spetz

Sonoma Land Trust

ingrid@sonomalandtrust.org

LINDA FELT

Sonoma Land TRUST

LG FELT@SBCglobal.NET

Maurice Gaffney SF Bay Trail

mgaffney@bayareametro.gov

Bobbie Jenkins

bjenkins45@gmail.com

Rick Parer

Bay Trail Board

rrparer@comcast.net



## Bay Trail-Sears Point Connector Study Workshop #1 - Comments

Please use the space below to write any comments you may have regarding the Bay Trail-Sears Point Connector Feasibility Study.

What is the status of the 37/121  
intersection improvement project? It  
may be relevant to funding & design  
considerations for this project.

Optional  
Name:

Rick Parner

Email or Phone:  
(Please print)

(707) 367-4666

rrparner@comcast.net

Please note that comments and information submitted become part of the public record.

Please turn in to "Comments Box" at the end of the meeting.

**Thank you!**

## **Bay Trail - Sears Point Connector Trail Stakeholder Meeting #2**

November 17, 2017

**Stakeholder Meeting 2**  
November 17, 2017



**Sears Point Bay Trail Connector Study**

SONOMA COUNTY REGIONAL PARKS

## Agenda

- Team, Scope and Context
- Review of Stakeholder/Community Input
- Segments and Options
- Preferred Design
- Implementation Costs
- Next Steps

SONOMA COUNTY REGIONAL PARKS

## Study Team

**Questa Engineering**

- Jeff Peters
- Margaret Henderson

**2M Associates**

- Patrick Miller

**Ken Tam, Project Manager**  
707-565-3348  
ken.tam@sonoma-county.org

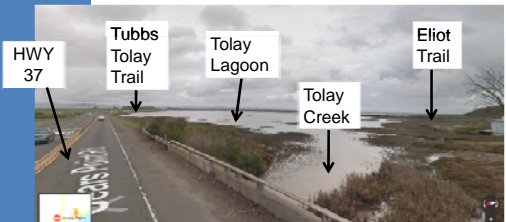
**Steve Ehret, Park Planning Manager**  
707-565-2041  
steve.ehret@sonoma-county.org

SONOMA COUNTY REGIONAL PARKS

What is the scope of work for the Connector Study?

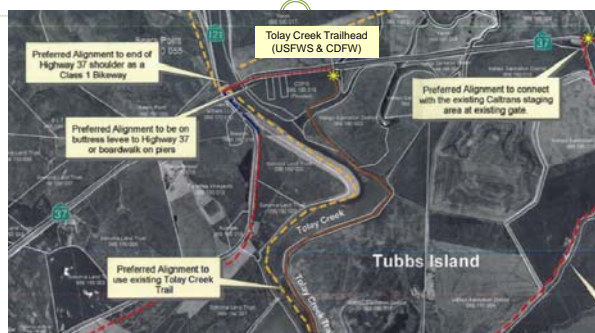
**Study includes:**

- Identifying potential alignments
- Considering construction techniques
- Evaluating project costs, and
- Identifying implementation issues.



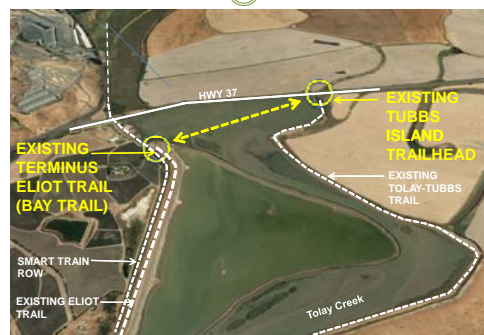
SONOMA COUNTY REGIONAL PARKS

## 2005 Bay Trail Corridor Plan



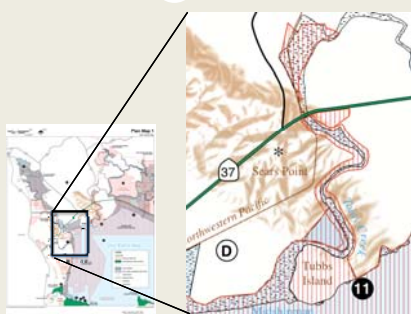
SONOMA COUNTY REGIONAL PARKS

## Context: Location



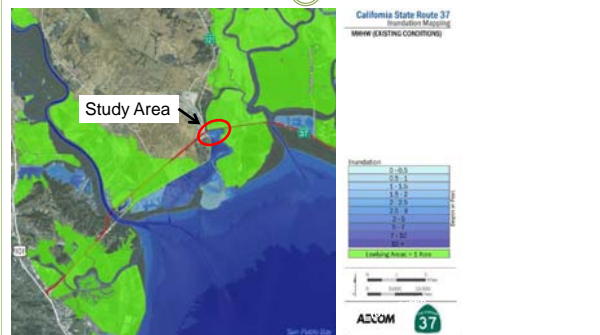
SONOMA COUNTY REGIONAL PARKS

## BCDC- Bay Plan and Permitting



SONOMA COUNTY REGIONAL PARKS

## Context: Sea Level Rise

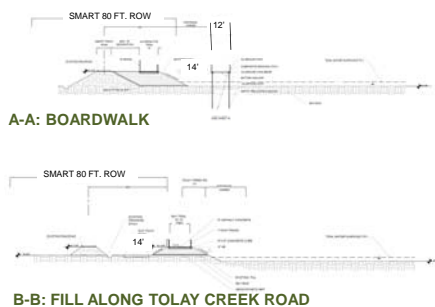


SONOMA COUNTY REGIONAL PARKS



## Eliot Trail Connection

### SEGMENT 1



SONOMA COUNTY REGIONAL PARKS

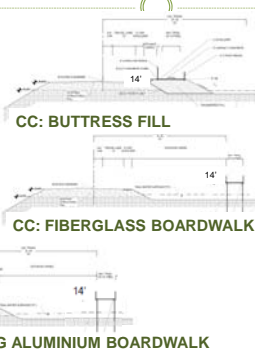
## Trailhead



SONOMA COUNTY REGIONAL PARKS

## Design Options: SR 37

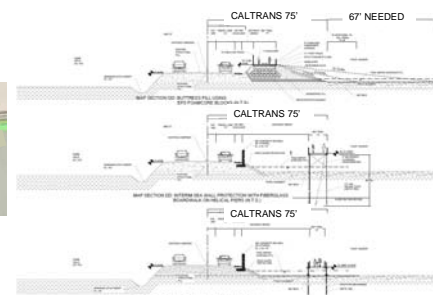
### SEGMENT 2



SONOMA COUNTY REGIONAL PARKS

## Near Term: SR 37 Corridor

### SEGMENT 2



SONOMA COUNTY REGIONAL PARKS

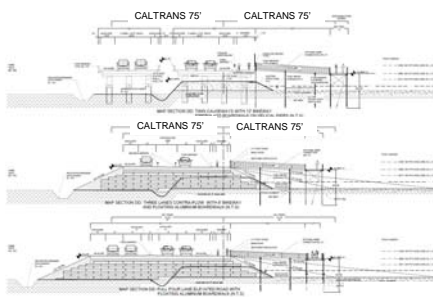
## Near-Term: SR 37 Corridor



SONOMA COUNTY REGIONAL PARKS

## SR 37 Causeway and Elevated Road

### SEGMENT 2



SONOMA COUNTY REGIONAL PARKS

## SR 37 Causeway



SONOMA COUNTY REGIONAL PARKS

## Geofoam Core Fill Levee

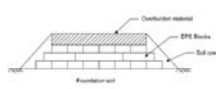
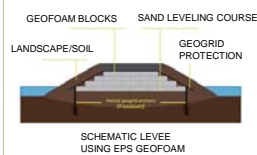


Figure 3: Major Components of an EPS-Block Geofram Levee.



Figure 4: Isometric View of Typical EPS Block Layout



Figure 1: EPS block placement on part of the Tustin Marsh Facilities Roaring River Slough Construction System Levee Restoration in California

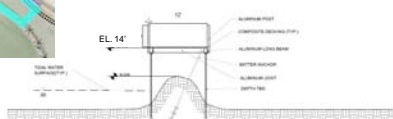


Figure 2: Completed Tustin Marsh Facilities Roaring River Slough Construction System Levee Restoration in California

SONOMA COUNTY REGIONAL PARKS

## Design Concepts: Tolay Low Berm

### SEGMENT 5



**DD: ELEVATED BERM WITH BOARDWALK**

SONOMA COUNTY REGIONAL PARKS

## Opportunities and Challenges of Corridor Options

Option	Opportunity	Challenge
1 Highway 37	<ul style="list-style-type: none"> <li>Within Caltrans ROW</li> <li>Direct connection</li> <li>Least Habitat disruption</li> <li>Potential SLR resilience</li> </ul>	<ul style="list-style-type: none"> <li>Longest water crossing</li> <li>Highway noise, wind drag and traffic</li> <li>Caltrans SR 37 plan coordination</li> <li>User experience</li> </ul>
2 Eliot Trailhead (E) Lagoon	<ul style="list-style-type: none"> <li>Shorter Bridge/Boardwalk</li> <li>Better user experience</li> <li>Portion of boardwalk on berm</li> </ul>	<ul style="list-style-type: none"> <li>Bisects habitat</li> <li>Navigability challenge</li> <li>Within CDFW/USFWS ROW</li> <li>Second longest water crossing</li> </ul>
3 Eliot Trailhead (S) Lagoon	<ul style="list-style-type: none"> <li>Trail away from highway</li> <li>Better user experience</li> <li>Boardwalk primarily on berm</li> </ul>	<ul style="list-style-type: none"> <li>Bisects habitat</li> <li>Navigability challenge</li> <li>Within SLT/USFWS ROW</li> <li>Third longest water crossing</li> </ul>
4 Tolay Creek Narrows	<ul style="list-style-type: none"> <li>Best user experience</li> <li>Least wetlands/water crossing</li> <li>Easiest construction (on Berm)</li> <li>Maintains navigability to Tolay Lagoon</li> </ul>	<ul style="list-style-type: none"> <li>Indirect route to SR 37/SR121 trailhead</li> <li>Requires longest Tubbs Tolay levee repair</li> <li>Proximity to endangered species; permitting issues</li> <li>SLT/USFWS ROW</li> </ul>

SONOMA COUNTY REGIONAL PARKS

## Potential Wetland Disturbance

Option	Length over Wetlands LF	Temp. Distance Sq. ft.(ac.)	Shadow Fill Sq. ft.(ac.)	Wetlands Fill Sq. ft.(ac.)
1A. Buttress Fill - 3:1 Outboard	3,200	192,000 (4.41)	NA	160,000 (3.67)
5:1 Outboard	3,200	256,000 (5.87)	NA	224,000 (5.14)
10:1 Outboard	3,200	416,000 (9.55)	NA	384,000 (8.82)
1B. Elevated Boardwalk - CT ROW	3,200	48,000 (1.10)	44,800 (1.02)	850 (0.02)
1C. Floating Boardwalk - CT ROW	3,200	48,000 (1.10)	32,000 (0.73)	32,000 (0.73)
1D. USFWS ROW Boardwalk	3,200	48,000 (1.10)	44,800 (1.02)	850 (0.02)
2. Boardwalk East of Eliot	1,700	59,500 (1.37)	23,800 (0.55)	450 (0.01)
3. Boardwalk South of Eliot	1,200	42,000 (0.96)	14,400 (0.33)	320 (0.00)
4. Southern/Narrows Crossing	240	8,400 (0.19)	2,880 (0.07)	75 (0.00)

SONOMA COUNTY REGIONAL PARKS

## Preferred Design

1. There are multiple feasible trail connection options
2. Trail options are relatively costly if viewed independently, but a small increment of overall SR 37 cost (2-4%)
3. Trail Option 2 (east of Eliot Trailhead on boardwalk) is least costly and provides best user experience.
4. All trail options should continue to be evaluated and incorporated into overall SR 37 implementation.
5. Any SR37 project should include seamless connections for bicycle and pedestrian travel within the corridor.

SONOMA COUNTY REGIONAL PARKS

## Constructability Considerations

- Right of Way / Land Acquisition needed
- Public Access and Wildlife Compatibility
- Geotechnical / Hydrologic conditions
- Crossing SMART Tracks
- Coordination With Highway 37 Improvement Project
- User Experience
- Constructability
- Navigability
- Permitting
- Cost



SONOMA COUNTY REGIONAL PARKS

## Implementation Cost Estimate

Option	Mobilization & Site Protection, Acquisition, Mitigation	Trailhead Parking & Eliot Trail Connection	Tolay Crossing Alternative	Tubbs Tolay Trail Improvements	Total w/ Construction 15% Contingency	20% Design & Environmental and 12% Construction Mgmt.	Total
1A. Highway 37 Buttress Fill	\$ 2,640,000	\$ 1,124,575	\$ 4,830,775	\$ 421,375	\$ 10,369,234	\$ 3,318,155	\$ 13,687,400
1B. Elevated Boardwalk - CT	\$ 2,000,000	\$ 1,124,575	\$ 4,640,075	\$ 421,375	\$ 9,413,929	\$ 3,012,457	\$ 12,426,400
1C. Floating Boardwalk - CT	\$ 2,000,000	\$ 1,124,575	\$ 4,659,075	\$ 421,375	\$ 9,435,779	\$ 3,019,449	\$ 12,455,200
1D. Elevated Boardwalk - USFWS	\$ 2,000,000	\$ 1,124,575	\$ 4,444,579	\$ 421,375	\$ 9,189,108	\$ 2,940,515	\$ 12,129,600
2. E. Eliot-Tolay Boardwalk	\$ 2,000,000	\$ 1,124,575	\$ 2,604,000	\$ 421,375	\$ 7,072,443	\$ 2,263,182	\$ 9,335,600
3. S. Eliot-Tolay Boardwalk	\$ 2,000,000	\$ 1,124,575	\$ 3,188,000	\$ 421,375	\$ 7,744,043	\$ 2,478,094	\$ 10,222,100
4. S. Narrows Bridge Crossing	\$ 2,000,000	\$ 1,124,575	\$ 4,197,000	\$ 421,375	\$ 8,904,393	\$ 2,849,406	\$ 11,753,800

SONOMA COUNTY REGIONAL PARKS

## SR37 Corridor Plan Costs\* (Segment B)

Costs	3-Lane Project – Segment B	4-Lane Project – Segment B
Total Cost <sup>1</sup>	+/- \$1,266 million	+/- \$1,609 million
Cost per Mile <sup>2</sup>	+/- \$136 million	+/- \$173 million
Hwy 121 – Sonoma Creek Portion <sup>3</sup>	+/- \$313 million	+/- \$449 million

- Assumes 2/3 elevated road and 1/3 causeway within Study Area
- Based on 9.3 miles of Segment B (Hwy 121 to Mare Island)
- Based on 2.3 miles between Hwy 121 and Sonoma Creek

\* Source: SR37 Transportation and Sea Level Rise Corridor Improvement Plan September 2017

SONOMA COUNTY REGIONAL PARKS

## % Trail Costs of SR37 Plan

Option	Segment B: SR121 to Sonoma Creek	
	3-Lane Project	4-Lane Project
1A. Highway 37 Buttress Fill	4.4%	3.0%
1B. Elevated Boardwalk - CT	3.9%	4.0%
1C. Floating Boardwalk - CT	4.0%	4.0%
1D. Elevated Boardwalk - USFWS	3.9%	2.7%
2. E. Eliot-Tolay Boardwalk	2.9%	2.1%
3. S. Eliot-Tolay Boardwalk	3.2%	2.3%
4. S. Narrows Bridge Crossing	3.8%	2.6%

SONOMA COUNTY REGIONAL PARKS

## Program Recommendations

Sears Point Trail connection project should be integrated into SR37 improvements, and include:

- Trailhead staging
- Link to Eliot Trailhead, SR121, Tubbs Trail
- Physical separation from vehicle travel lanes
- Crossing of Upper Tolay Lagoon
- Improvements to Tubbs-Tolay Trail
- Improved hydraulic connection between Tolay Creek and Tolay Lagoon
- Habitat restoration and mitigation for wetlands impacts

SONOMA COUNTY REGIONAL PARKS

## Next Steps

- Summarize what we hear from you today
- Finalize Study
- Present Study to Board of Supervisors
- Incorporate recommendations into project analysis, environmental review, decision-making and implementation

SONOMA COUNTY REGIONAL PARKS

## Thank You!

### Questions?

#### Contacts:

Ken Tam, Project Manager, 565-3348  
[ken.tam@sonoma-county.org](mailto:ken.tam@sonoma-county.org)

Steve Ehret, Park Planning Manager, 565-2041  
[steve.ehret@sonoma-county.org](mailto:steve.ehret@sonoma-county.org)

Subscribe to project updates at parks website  
[www.parks.sonomacounty.ca.gov/](http://www.parks.sonomacounty.ca.gov/) by clicking on "Sign up for Planning Updates"

SONOMA COUNTY REGIONAL PARKS

## **Bay Trail - Sears Point Connector Trail Stakeholder Meeting #2**

### **November 17, 2017 Meeting Notes**

#### Attendees:

Sonoma County Regional Parks:  
Ken Tam, Park Planner

#### ABAG Bay Trail:

Maureen Gaffney, Bay Trail Planner

#### USFWS San Pablo Bay Refuge:

Don Brubaker, Refuge Manager

#### Caltrans:

Dianne Yee, Transportation Planner

#### CDFW:

Greg Martinelli, Wildlife Program Manager

#### Study Team:

Patrick Miller, 2M Associates  
Jeff Peters, Questa Engineering  
Margaret Henderson, Questa Engineering

#### Guests:

Jane Miller, 2M Associates

Patrick Miller presented the results of the study and previous public workshop. The project goal is to close a one-mile gap in the Bay Trail between the end of the Eliot Trail (Sears Point Restoration Project) and Tolay-Tubbs Trail (managed by USFWS). Trail improvements to the Tolay-Tubbs Trail are needed, and have been included in all the options.

A BCDC permit will be required for all actions.

The Eliot Trail is at elevation 14', and the Tubbs Tolay Trail is at elevation 11'-12'. Sea Level Rise estimates from the SR37 study and USFWS Climate Plan indicate that elevations of 16' by 2080, or 19'-20' (2100) due to storm surge may be expected. However, elevations of a trail may be different than a roadway, and unlike a public roadway, trail closure and closure for a short period during extreme events may be acceptable, provided the trail is designed to withstand storm damage.

#### Don Brubaker USFWS comments:

- Geofoam (buttress fill alternative) was used in Cullinan Ranch Restoration project; much cheaper than pumice alternative. \$2.5M vs. \$9.7M.
- Will the trail be accessible? (yes)

- The Refuge only has legal access to Lower Tubbs Island, there is no formal agreement with Vallejo Sanitation District for access.
- Other entities that will be part of consultation/permitting:
  - USFWS Ecological Services
  - National Marine Fisheries Service
  - CDFW
  - SF BAY Regional Water Quality Control Board
  - US Army Corps of Engineers
  - Caltrans
  - BCDC

Dianne Yee of Caltrans comments:

- The off-highway route provides a pleasant parallel route and fits with Caltrans Complete Streets policies.

Greg Martinelli (CDFW) made the following comments:

- Additional mitigation may be required if trail is on their land, since it is already being used for mitigation (72 acres).
- A higher mitigation ratio might be imposed.
- Will Regional Parks manage this? (yes, if they build it)
- What is the lifespan and maintenance costs of the options? (will include, discussion of epoxy coated galvanized piers, fiberglass reinforced decking and other options)
- CDFW is working on fixing the eroded Tolay levee. CDFW has applied for regulatory permits and is scheduled to complete the levee repair next year.
- Boardwalk railings should be designed to discourage raptor perching (Salt marsh harvest mouse consideration), “no-take” of listed species. It was noted that raptors are able to see and prey on the mouse from the air as Don Brubaker noticed this occurrence during high tide.
- Team discussed possibility of using an articulated cylindrical rail with a ball bearing assembly to discourage raptors.

Maureen Gaffney, ABAG Bay Trail:

- SR37 study included option for a bicycle lane separated by a rumble strip; this is no longer being considered.
- SR37 will have bicycle facilities in addition to whatever Bay Trail facilities are provided.

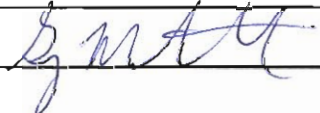

Stakeholders received a copy of the presentation for review and discussion with agency colleagues.

Conclusions, for which there was general consensus:

- Due to project costs and overall benefits associated with SR37 reconstruction, the Bay Trail segment should be included as part of the SR37 or a larger project.
- When considered as part of the larger SR37 project, this Bay Trail gap closure represents approximately 2-4% of project cost from SR121 to the Sonoma Creek bridge. This is not atypical of a bike/ped share of costs.
- The SR37 project should include segments such as this that are not part of the highway structure.

- Connections, such as ramps, need to be considered as part of the overall SR37 project to connect to the existing Eliot Trail, Tubbs-Tolay Trail, and bicycle/pedestrian facilities on SR121.
- There may be some potential cost savings if the causeway structure (needed to go over rail line) can be made narrower through providing the bicycle and pedestrian facilities in one of the options presented in this study.
- Improved connectivity to Tolay Creek north of SR37 should be a part of any project.
- Restoration and habitat mitigation are needed as part of a comprehensive project, including measures to protect wildlife.
- SMART rail line upgrades may be needed, and trail improvements along the rail line might provide an opportunity to leverage trail construction

**BAY TRAIL - SEARS POINT CONNECTOR**  
**STAKEHOLDER MEETING**  
**SIGN IN SHEET**  
**DATE: November 17, 2017**

NAME	ORGANIZATION	SIGNATURE
Al Brayton	Thirty-Seven Wines	
Alisha O'Loughlin	Sonoma County Bicycle Coalition	
Buffy McQuillen	Graton Rancheria	
Cody Aichele-Rothman	SF Bay Conservation and Development Commission	
David Stewart	California Public Utilities Commission	
Dianne Yee	Caltrans District 4	
Don Brubaker	US Fish and Wildlife Service	
Fraser Shilling	UC Davis	
George Asimakopoulos	State Lands Commission	
Greg Martinelli	California Fish and Wildlife Service - Lands Division	
Greg Sarris	Graton Rancheria	
Issac Pearlman	SF Bay Conservation and Development Commission	
James Cameron	Sonoma County Transportation Authority	
Jeff Peters	Questa Engineering	
Jennifer Harrington	Vallejo Flood and Wastewater District	
Jere Starks	Sonoma Raceway	
	County Transportation and Public Works	
Julian Meisler	Sonoma Land Trust	

Karen Taylor	California Fish and Wildlife Service - Lands Division	
Karen Weiss	California Fish and Wildlife Service - Permits	
Ken Tam	Sonoma County Regional Parks	<i>Kenneth Tam</i>
Laura Giraud	Sonoma Marin Area Rail Transit	
Lisa Brayton	Thirty-Seven Wines	
Lorie Hammerli	California Fish and Wildlife Service - Permits	
Margaret Henderson	Questa Engineering	<i>PRESENT</i>
Mark Tomko	Vallejo Flood and Wastewater District	
Maureen Gaffney	ABAG	<i>PRESENT</i>
Melisa Amato	US Fish and Wildlife Service	
Mike Edwards	Northwestern Pacific Railroad Company	
Mitch Stogner	NCRA (North Coast Railroad Authority)	
Nancy Simpson	Wing and Barrel Ranch	
Patrick Miller	2M Associates	<i>PRESENT</i>
Sergio Ruiz	Caltrans District 4	
Steve Ehret	Sonoma County Regional Parks	
Steve Page	Sonoma Raceway	
Wendy Atkins	City of Sonoma	



## APPENDIX B

### **COST ESTIMATES**

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

**Table 1. Segment 2, Option A - Highway 37 Corridor**  
**ALTERNATIVE 1-A**  
**Buttress Fill along Highway 37**

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>A</b>	<b>GENERAL</b>				
1	Mobilization/Demobilization	LS	1	\$500,000.00	\$500,000.00
2	ESA and Site Protection, including Biological Monitoring	LS	1	\$120,000.00	\$120,000.00
3	Survey and Stakeout	LS	1	\$55,000.00	\$55,000.00
4	Traffic Control	LS	1	\$65,000.00	\$65,000.00
5	Right of Way Acquisition (Allowance)	LS	1	\$650,000.00	\$650,000.00
6	Environmental Mitigation (Allowance)	LS	1	\$1,250,000.00	\$1,250,000.00
<b>SUBTOTAL A</b>					<b>\$2,640,000.00</b>
<b>B</b>	<b>SEGMENT 1 - OLD TOLAY ROAD (200 LF)</b>				
1	Old Tolay Road Improvements - 14' Roadway, Elevation 12				
a	Clear and Grub - 15' Width	SF	10,500	\$0.35	\$3,675.00
b	Earthwork and Engineered Fill	SF	2,300	\$45.00	\$103,500.00
c	Class 2 AB - 8"	CY	1,200	\$80.00	\$96,000.00
d	Gravel Surface - 4"	SF	8,400	\$4.50	\$37,800.00
e	Twisted Wire Field Fence (Both Sides of Road/Trail)	LF	1,500	\$9.00	\$13,500.00
f	Field Gates	EA	2	\$1,500.00	\$3,000.00
g	Signage	LS	1	\$3,000.00	\$3,000.00
<b>Subtotal 1</b>					<b>\$260,475.00</b>
2	Trailhead Improvements - 4-Car Parking Lot (12,000 SF)				
a	Rail Crossing Improvements (Allowance)	LS	1	\$250,000.00	\$250,000.00
b	Clear & Grub	SF	12,000	\$0.35	\$4,200.00
c	Earthwork & Fill	CY	1,200	\$45.00	\$54,000.00
d	Class 2 AB - 8"	CY	800	\$80.00	\$64,000.00
e	Gravel Surface - 4"	SF	12,000	\$4.50	\$54,000.00
f	Staging Area - Twisted Wire Field Fence	LF	100	\$9.00	\$900.00
g	Signage	LS	1	\$4,000.00	\$4,000.00
h	Van Accessible Concrete Pad, including Signage/Striping	LS	1	\$12,000.00	\$12,000.00
i	Wheel Stops	EA	4	\$500.00	\$2,000.00
j	Gate	LS	1	\$2,500.00	\$2,500.00
<b>Subtotal 2</b>					<b>\$447,600.00</b>
3	Eliot Trailhead Wetlands Crossing Connection (300 LF)				
a	Transition Ramp Structures - Old Tolay Rd. & Eliot Trailhead Ends	EA	2	\$30,000.00	\$60,000.00
b	12' x 20' Elevated Fiberglass Boardwalk (Installed over Water @ 20'OC)	LF	220	\$750.00	\$165,000.00
c	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA	15	\$12,500.00	\$187,500.00
d	Signage	LS	1	\$4,000.00	\$4,000.00
<b>Subtotal 3</b>					<b>\$416,500.00</b>
<b>SUBTOTAL B</b>					<b>\$1,124,575.00</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>C</b>	<b>SEGMENT 2 - HIGHWAY 37 CORRIDOR (3,200 LF)</b>				
<b>1</b>	<b>West of Tolay Creek to Old Tolay Road</b>				
<b>a</b>	Clear and Grub	SF	2,400	\$0.25	\$600.00
<b>b</b>	Earthwork and Fill	CY	400	\$40.00	\$16,000.00
<b>c</b>	Class 2 AB - 8"	CY	60	\$70.00	\$4,200.00
<b>d</b>	Gravel Surface - 4"	SF	30	\$2.50	\$75.00
<b>e</b>	Twisted Wire Field Fence (Both Sides)	LF	200	\$8.00	\$1,600.00
<b>f</b>	Signage	LS	1	\$3,000.00	\$3,000.00
<b>Subtotal 1</b>					<b>\$25,475.00</b>
<b>2</b>	<b>Tolay Creek Crossing (120 LF)</b>				
<b>a</b>	Transition Ramp to Bridge	LS	1	\$20,000.00	\$20,000.00
<b>b</b>	12' x 60' Fiberglass Bridge	EA	2	\$80,000.00	\$160,000.00
<b>c</b>	Bridge Abutments	LS	1	\$60,000.00	\$60,000.00
<b>d</b>	Transition Ramp to Elevated or Floating Boardwalk or Levee	LS	1	\$20,000.00	\$20,000.00
<b>Subtotal 2</b>					<b>\$260,000.00</b>
<b>3</b>	<b>Buttress Fill along Highway 37 (3,200 LF)</b>				
<b>a</b>	Clear and Grub, site prep.	SF	80,000	\$0.35	\$28,000.00
<b>b</b>	Geosynthetic Fabric Base	SF	80,000	\$4.50	\$360,000.00
<b>c</b>	EPS Geofoam Core Fill	CY	25,000	\$90.00	\$2,250,000.00
<b>d</b>	Engineered Fill	CY	15,000	\$60.00	\$900,000.00
<b>e</b>	12" Class 2 AB	CY	1,500	\$80.00	\$120,000.00
<b>f</b>	4" Gravel Trail Surface	SF	45,000	\$4.50	\$202,500.00
<b>g</b>	Drainage System	LS	1	\$350,000.00	\$350,000.00
<b>h</b>	4" Compost Outboard Slope	SF	48,000	\$0.75	\$36,000.00
<b>i</b>	Hydroseed Outboard Slope- (5:1 slope)	SF	48,000	\$0.25	\$12,000.00
<b>j</b>	Cable Barrier - Road Shoulder	LF	3,400	\$75.00	\$255,000.00
<b>k</b>	Field Fence - Marsh Edge	LF	3,200	\$9.00	\$28,800.00
<b>l</b>	Signage	LS	1	\$3,000.00	\$3,000.00
<b>Subtotal 3</b>					<b>\$4,545,300.00</b>
<b>SUBTOTAL C</b>					<b>\$4,830,775.00</b>
<b>D</b>	<b>SEGMENT 6 - TUBBS-TOLAY TRAIL IMPROVEMENTS (3,800 LF)</b>				
<b>1</b>	Tubbs Trailhead Improvement (Allowance)	LS	1	\$7,500.00	\$7,500.00
<b>2</b>	Tubbs Levee Rock Toe Stabilization (Allowance)	LS	1	\$250,000.00	\$250,000.00
<b>3</b>	<b>Tubbs Tolay Trail Improvements (3,900 LF)</b>				
<b>a</b>	Clear and Grub 15' Width	SF	58,500	\$0.25	\$14,625.00
<b>b</b>	Earthwork and Grading - 12' Trail Width	CY	3,500	\$10.00	\$35,000.00
<b>c</b>	Class 2 AB - 8" - 12' Trail Width	CY	900	\$70.00	\$63,000.00
<b>d</b>	Gravel Surface - 4" - 12' Trail Width	SF	3,500	\$3.50	\$12,250.00
<b>e</b>	Twisted Wire Field Fence (Tubbs Island Ag. Field)	LF	4,000	\$9.00	\$36,000.00
<b>f</b>	Signage	LS	1	\$3,000.00	\$3,000.00
<b>SUBTOTAL D</b>					<b>\$421,375.00</b>
<b>TOTAL A, B, C, &amp; D</b>					<b>\$9,016,725</b>
15% Construction Contingency					\$1,352,509
Total Construction with Contingency					\$10,369,234
10% Engineering Design					\$1,036,923
8% Environmental & Permitting					\$829,539
2% Right of Way Engineering					\$207,385
12% Construction Management					\$1,244,308
<b>TOTAL COST ESTIMATE</b>					<b>\$13,687,400</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

**Table 2. Segment 2, Option B - Highway 37 Corridor**  
**ALTERNATIVE 1-B**  
**Fixed Pier Fiberglass Boardwalk within Caltrans ROW**

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>A</b>	<b>GENERAL</b>				
1	Mobilization/Demobilization	LS	1	\$400,000.00	\$400,000.00
2	ESA and Site Protection, including Biological Monitoring	LS	1	\$120,000.00	\$120,000.00
3	Survey and Stakeout	LS	1	\$55,000.00	\$55,000.00
4	Traffic Control	LS	1	\$25,000.00	\$25,000.00
5	Right of Way Acquisition (Allowance)	LS	1	\$650,000.00	\$650,000.00
6	Environmental Mitigation (Allowance)	LS	1	\$750,000.00	\$750,000.00
				<b>SUBTOTAL A</b>	<b>\$2,000,000.00</b>
<b>B</b>	<b>SEGMENT 1 - OLD TOLAY ROAD (200 LF)</b>				
1	Old Tolay Road Improvements - 14' Roadway, Elevation 12				
a	Clear and Grub - 15' Width	SF	10,500	\$0.35	\$3,675.00
b	Earthwork and Engineered Fill	SF	2,300	\$45.00	\$103,500.00
c	Class 2 AB - 8"	CY	1,200	\$80.00	\$96,000.00
d	Gravel Surface - 4"	SF	8,400	\$4.50	\$37,800.00
e	Twisted Wire Field Fence (Both Sides of Road/Trail)	LF	1,500	\$9.00	\$13,500.00
f	Field Gates	EA	2	\$1,500.00	\$3,000.00
g	Signage	LS	1	\$3,000.00	\$3,000.00
				<b>Subtotal 1</b>	<b>\$260,475.00</b>
2	Trailhead Improvements - 4-Car Parking Lot (12,000 SF)				
a	Vehicular/Rail Crossing Improvements (Allowance)	LS	1	\$250,000.00	\$250,000.00
b	Clear & Grub	SF	12,000	\$0.35	\$4,200.00
c	Earthwork & Fill	CY	1,200	\$45.00	\$54,000.00
d	Class 2 AB - 8"	CY	800	\$80.00	\$64,000.00
e	Gravel Surface - 4"	SF	12,000	\$4.50	\$54,000.00
f	Staging Area - Twisted Wire Field Fence	LF	100	\$9.00	\$900.00
g	Signage	LS	1	\$4,000.00	\$4,000.00
h	Van Accessible Concrete Pad, including Signage/Striping	LS	1	\$12,000.00	\$12,000.00
i	Wheel Stops	EA	4	\$500.00	\$2,000.00
j	Gate	LS	1	\$2,500.00	\$2,500.00
				<b>Subtotal 2</b>	<b>\$447,600.00</b>
3	Eliot Trailhead Wetlands Crossing Connection (300 LF)				
a	Transition Ramp Structures - Old Tolay Rd. & Eliot Trailhead Ends	EA	2	\$30,000.00	\$60,000.00
b	12' x 20' Elevated Fiberglass Boardwalk (Installed over Water @ 20' OC)	LF	220	\$750.00	\$165,000.00
c	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA	15	\$12,500.00	\$187,500.00
d	Signage	LS	1	\$4,000.00	\$4,000.00
				<b>Subtotal 3</b>	<b>\$416,500.00</b>
				<b>SUBTOTAL B</b>	<b>\$1,124,575.00</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>C</b>	<b>SEGMENT 2 - HIGHWAY 37 CORRIDOR</b>				
<b>1</b>	<b>West of Tolay Creek to Old Tolay Road</b>				
a	Clear and Grub	SF	2,400	\$0.35	\$840.00
b	Earthwork and Fill	CY	400	\$45.00	\$18,000.00
c	Class 2 AB - 8"	CY	60	\$80.00	\$4,800.00
d	Gravel Surface - 4"	SF	30	\$4.50	\$135.00
e	Twisted Wire Field Fence (Both Sides)	LF	200	\$9.00	\$1,800.00
f	Signage	LS	1	\$4,000.00	\$4,000.00
	<b>Subtotal 1</b>				<b>\$29,575.00</b>
<b>2</b>	<b>Tolay Creek Crossing (120 LF)</b>				
a	Transition Ramp to Bridge	LS	1	\$20,000.00	\$20,000.00
b	12' x 60' Fiberglass Bridge	EA	2	\$80,000.00	\$160,000.00
c	Bridge Abutments	LS	1	\$60,000.00	\$60,000.00
d	Transition Ramp to Elevated or Floating Boardwalk or Levee	LS	1	\$20,000.00	\$20,000.00
	<b>Subtotal 2</b>				<b>\$260,000.00</b>
<b>3</b>	<b>Highway 37 Boardwalk</b>				
a	12' x 20' Elevated Fiberglass Boardwalk Units (Installed over Water @ 20' OC)	LF	3,100	\$750.00	\$2,325,000.00
b	12' x 20' Elevated Boardwalk (Installed over Low Berm)	LF		\$550.00	\$0.00
c	10' x 30' Floating Aluminum Boardwalk with 42" Railing - Both Sides	LF		\$750.00	\$0.00
d	12' x 20' Fiberglass Boardwalk Observation Area, with End Rails (Installed)	EA	3	\$18,000.00	\$54,000.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA	155	\$12,500.00	\$1,937,500.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents including Abutment Installed over Low Berm @ 20' OC)	EA		\$8,500.00	\$0.00
f	Transition Ramp to Tubbs Island Levee, Floating Boardwalk	LS	1	\$30,000.00	\$30,000.00
g	Signage	LS	1	\$4,000.00	\$4,000.00
	<b>Subtotal 3</b>				<b>\$4,350,500.00</b>
	<b>SUBTOTAL C</b>				<b>\$4,640,075.00</b>
<b>D</b>	<b>SEGMENT 6 - TUBBS-TOLAY TRAIL IMPROVEMENTS (3,800 LF)</b>				
<b>1</b>	<b>Tubbs Trailhead Improvement (Allowance)</b>	LS	1	\$7,500.00	\$7,500.00
<b>2</b>	<b>Tubbs Levee Rock Toe Stabilization (Allowance)</b>	LS	1	\$250,000.00	\$250,000.00
<b>3</b>	<b>Tubbs Tolay Trail Improvements (3,900 LF)</b>				
a	Clear and Grub 15' Width	SF	58,500	\$0.25	\$14,625.00
b	Earthwork and Grading - 12' Trail Width	CY	3,500	\$10.00	\$35,000.00
c	Class 2 AB - 8" - 12' Trail Width	CY	900	\$70.00	\$63,000.00
d	Gravel Surface - 4" - 12' Trail Width	SF	3,500	\$3.50	\$12,250.00
e	Twisted Wire Field Fence (Tubbs Island Ag. Field)	LF	4,000	\$9.00	\$36,000.00
f	Signage	LS	1	\$3,000.00	\$3,000.00
	<b>SUBTOTAL D</b>				<b>\$421,375.00</b>
	<b>TOTAL A, B, C, &amp; D</b>				<b>\$8,186,025</b>
	15% Construction Contingency				\$1,227,904
	Total Construction with Contingency				\$9,413,929
	10% Engineering Design				\$941,393
	8% Environmental & Permitting				\$753,114
	2% Right of Way Engineering				\$188,279
	12% Construction Management				\$1,129,671
	<b>TOTAL COST ESTIMATE</b>				<b>\$12,426,400</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

**Table 3. Segment 2, Option C - Highway 37 Corridor**  
**ALTERNATIVE 1-C**  
**Fixed Pier Boardwalk within Caltrans ROW**

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>A</b>	<b>GENERAL</b>				
1	Mobilization/Demobilization	LS	1	\$400,000.00	\$400,000.00
2	ESA and Site Protection, including Biological Monitoring	LS	1	\$120,000.00	\$120,000.00
3	Survey and Stakeout	LS	1	\$55,000.00	\$55,000.00
4	Traffic Control	LS	1	\$25,000.00	\$25,000.00
5	Right of Way Acquisition (Allowance)	LS	1	\$650,000.00	\$650,000.00
6	Environmental Mitigation (Allowance)	LS	1	\$750,000.00	\$750,000.00
				<b>SUBTOTAL A</b>	<b>\$2,000,000.00</b>
<b>B</b>	<b>SEGMENT 1 - OLD TOLAY ROAD (200 LF)</b>				
1	Old Tolay Road Improvements - 14' Roadway, Elevation 12				
a	Clear and Grub - 15' Width	SF	10,500	\$0.35	\$3,675.00
b	Earthwork and Engineered Fill	SF	2,300	\$45.00	\$103,500.00
c	Class 2 AB - 8"	CY	1,200	\$80.00	\$96,000.00
d	Gravel Surface - 4"	SF	8,400	\$4.50	\$37,800.00
e	Twisted Wire Field Fence (Both Sides of Road/Trail)	LF	1,500	\$9.00	\$13,500.00
f	Field Gates	EA	2	\$1,500.00	\$3,000.00
g	Signage	LS	1	\$3,000.00	\$3,000.00
				<b>Subtotal 1</b>	<b>\$260,475.00</b>
2	Trailhead Improvements - 4-Car Parking Lot (12,000 SF)				
a	Rail Crossing Improvements (Allowance)	LS	1	\$250,000.00	\$250,000.00
b	Clear & Grub	SF	12,000	\$0.35	\$4,200.00
c	Earthwork & Fill	CY	1,200	\$45.00	\$54,000.00
d	Class 2 AB - 8"	CY	800	\$80.00	\$64,000.00
e	Gravel Surface - 4"	SF	12,000	\$4.50	\$54,000.00
f	Staging Area - Twisted Wire Field Fence	LF	100	\$9.00	\$900.00
g	Signage	LS	1	\$4,000.00	\$4,000.00
h	Van Accessible Concrete Pad, including Signage/Striping	LS	1	\$12,000.00	\$12,000.00
i	Wheel Stops	EA	4	\$500.00	\$2,000.00
j	Gate	LS	1	\$2,500.00	\$2,500.00
				<b>Subtotal 2</b>	<b>\$447,600.00</b>
3	Eliot Trailhead Wetlands Crossing Connection (300 LF)				
a	Transition Ramp Structures - Old Tolay Rd. & Eliot Trailhead Ends	EA	2	\$30,000.00	\$60,000.00
b	12' x 20' Elevated Fiberglass Boardwalk (Installed over Water @ 20'OC)	LF	220	\$750.00	\$165,000.00
c	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA	15	\$12,500.00	\$187,500.00
d	Signage	LS	1	\$4,000.00	\$4,000.00
				<b>Subtotal 3</b>	<b>\$416,500.00</b>
				<b>SUBTOTAL B</b>	<b>\$1,124,575.00</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>C</b>	<b>SEGMENT 2 - HIGHWAY 37 CORRIDOR</b>				
<b>1</b>	<b>West of Tolay Creek to Old Tolay Road</b>				
a	Clear and Grub	SF	2,400	\$0.35	\$840.00
b	Earthwork and Fill	CY	400	\$45.00	\$18,000.00
c	Class 2 AB - 8"	CY	60	\$80.00	\$4,800.00
d	Gravel Surface - 4"	SF	30	\$4.50	\$135.00
e	Twisted Wire Field Fence (Both Sides)	LF	200	\$9.00	\$1,800.00
f	Signage	LS	1	\$3,000.00	\$3,000.00
	<b>Subtotal 1</b>				<b>\$28,575.00</b>
<b>2</b>	<b>Tolay Creek Crossing (120 LF)</b>				
a	Transition Ramp to Bridge	LS	1	\$20,000.00	\$20,000.00
b	12' x 60' Fiberglass Bridge	EA	2	\$80,000.00	\$160,000.00
c	Bridge Abutments	LS	1	\$60,000.00	\$60,000.00
d	Transition Ramp to Elevated or Floating Boardwalk or Levee	LS	1	\$20,000.00	\$20,000.00
	<b>Subtotal 2</b>				<b>\$260,000.00</b>
<b>3</b>	<b>Fixed Pier Boardwalk within Caltrans ROW</b>				
a	12' x 20' Elevated Fiberglass Boardwalk Units (Installed over Water @ 20' OC)	LF	3,100	\$750.00	\$2,325,000.00
b	12' x 20' Elevated Boardwalk (Installed over Low Berm)	LF		\$550.00	\$0.00
c	10' x 30' Floating Aluminum Boardwalk with 42" Railing - Both Sides	LF		\$750.00	\$0.00
d	12' x 20' Fiberglass Boardwalk Observation Area, with End Rails (Installed)	EA	3	\$18,000.00	\$54,000.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA	155	\$12,500.00	\$1,937,500.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents including Abutment Installed over Low Berm @ 20' OC)	EA		\$8,500.00	\$0.00
f	Transition Ramp to Tubbs Island Levee	LS	1	\$50,000.00	\$50,000.00
g	Signage	LS	1	\$4,000.00	\$4,000.00
	<b>Subtotal 3</b>				<b>\$4,370,500.00</b>
	<b>SUBTOTAL C</b>				<b>\$4,659,075.00</b>
<b>D</b>	<b>SEGMENT 6 - TUBBS-TOLAY TRAIL IMPROVEMENTS (3,800 LF)</b>				
<b>1</b>	<b>Tubbs Trailhead Improvement (Allowance)</b>	LS	1	\$7,500.00	\$7,500.00
<b>2</b>	<b>Tubbs Levee Rock Toe Stabilization (Allowance)</b>	LS	1	\$250,000.00	\$250,000.00
<b>3</b>	<b>Tubbs Tolay Trail Improvements (3,900 LF)</b>				
a	Clear and Grub 15' Width	SF	58,500	\$0.25	\$14,625.00
b	Earthwork and Grading - 12' Trail Width	CY	3,500	\$10.00	\$35,000.00
c	Class 2 AB - 8" - 12' Trail Width	CY	900	\$70.00	\$63,000.00
d	Gravel Surface - 4" - 12' Trail Width	SF	3,500	\$3.50	\$12,250.00
e	Twisted Wire Field Fence (Tubbs Island Ag. Field)	LF	4,000	\$9.00	\$36,000.00
f	Signage	LS	1	\$3,000.00	\$3,000.00
	<b>SUBTOTAL D</b>				<b>\$421,375.00</b>
	<b>TOTAL A, B, C, &amp; D</b>				<b>\$8,205,025</b>
	15% Construction Contingency				\$1,230,754
	Total Construction with Contingency				\$9,435,779
	10% Engineering Design				\$943,578
	8% Environmental & Permitting				\$754,862
	2% Right of Way Engineering				\$188,716
	12% Construction Management				\$1,132,293
	<b>TOTAL COST ESTIMATE</b>				<b>\$12,455,200</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

**Table 4. Segment 2, Option D - Highway 37 Corridor**  
**ALTERNATIVE 1-D**  
**Fixed Pier Boardwalk outside Caltrans ROW**

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>A</b>	<b>GENERAL</b>				
1	Mobilization/Demobilization	LS	1	\$400,000.00	\$400,000.00
2	ESA and Site Protection, including Biological Monitoring	LS	1	\$120,000.00	\$120,000.00
3	Survey and Stakeout	LS	1	\$55,000.00	\$55,000.00
4	Traffic Control	LS	1	\$25,000.00	\$25,000.00
5	Right of Way Acquisition (Allowance)	LS	1	\$650,000.00	\$650,000.00
6	Environmental Mitigation (Allowance)	LS	1	\$750,000.00	\$750,000.00
				<b>SUBTOTAL A</b>	<b>\$2,000,000.00</b>
<b>B</b>	<b>SEGMENT 1 - OLD TOLAY ROAD (200 LF)</b>				
1	Old Tolay Road Improvements - 14' Roadway, Elevation 12				
a	Clear and Grub - 15' Width	SF	10,500	\$0.35	\$3,675.00
b	Earthwork and Engineered Fill	SF	2,300	\$45.00	\$103,500.00
c	Class 2 AB - 8"	CY	1,200	\$80.00	\$96,000.00
d	Gravel Surface - 4"	SF	8,400	\$4.50	\$37,800.00
e	Twisted Wire Field Fence (Both Sides of Road/Trail)	LF	1,500	\$9.00	\$13,500.00
f	Field Gates	EA	2	\$1,500.00	\$3,000.00
g	Signage	LS	1	\$3,000.00	\$3,000.00
				<b>Subtotal 1</b>	<b>\$260,475.00</b>
2	Trailhead Improvements - 4-Car Parking Lot (12,000 SF)				
a	Rail Crossing Improvements (Allowance)	LS	1	\$250,000.00	\$250,000.00
b	Clear & Grub	SF	12,000	\$0.35	\$4,200.00
c	Earthwork & Fill	CY	1,200	\$45.00	\$54,000.00
d	Class 2 AB - 8"	CY	800	\$80.00	\$64,000.00
e	Gravel Surface - 4"	SF	12,000	\$4.50	\$54,000.00
f	Staging Area - Twisted Wire Field Fence	LF	100	\$9.00	\$900.00
g	Signage	LS	1	\$4,000.00	\$4,000.00
h	Van Accessible Concrete Pad, including Signage/Striping	LS	1	\$12,000.00	\$12,000.00
i	Wheel Stops	EA	4	\$500.00	\$2,000.00
j	Gate	LS	1	\$2,500.00	\$2,500.00
				<b>Subtotal 2</b>	<b>\$447,600.00</b>
3	Eliot Trailhead Wetlands Crossing Connection (300 LF)				
a	Transition Ramp Structures - Old Tolay Rd. & Eliot Trailhead Ends	EA	2	\$30,000.00	\$60,000.00
b	12' x 20' Elevated Fiberglass Boardwalk (Installed over Water @ 20'OC)	LF	220	\$750.00	\$165,000.00
c	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA	15	\$12,500.00	\$187,500.00
d	Signage	LS	1	\$4,000.00	\$4,000.00
				<b>Subtotal 3</b>	<b>\$416,500.00</b>
				<b>SUBTOTAL B</b>	<b>\$1,124,575.00</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>C</b>	<b>SEGMENT 2 - HIGHWAY 37 CORRIDOR</b>				
<b>1</b>	<b>West of Tolay Creek to Old Tolay Road</b>				
a	Clear and Grub	SF	2,400	\$0.35	\$840.00
b	Earthwork and Fill	CY	400	\$45.00	\$18,000.00
c	Class 2 AB - 8"	CY	60	\$80.00	\$4,800.00
d	Gravel Surface - 4"	SF	30	\$4.50	\$135.00
e	Twisted Wire Field Fence (Both Sides)	LF	200	\$9.00	\$1,800.00
f	Signage	LS	1	\$4.00	\$4.00
<b>Subtotal 1</b>					<b>\$25,579.00</b>
<b>2</b>	<b>Tolay Creek Crossing (120 LF)</b>				
a	Transition Ramp to Bridge	LS	1	\$20,000.00	\$20,000.00
b	12' x 60' Fiberglass Bridge	EA	2	\$80,000.00	\$160,000.00
c	Bridge Abutments	LS	1	\$60,000.00	\$60,000.00
d	Transition Ramp to Elevated or Floating Boardwalk or Levee	LS	1	\$20,000.00	\$20,000.00
<b>Subtotal 2</b>					<b>\$260,000.00</b>
<b>3</b>	<b>Fixed Pier Boardwalk outside Caltrans ROW</b>				
a	12' x 20' Elevated Fiberglass Boardwalk Units (Installed over Water @ 20' OC)	LF	3,100	\$750.00	\$2,325,000.00
b	12' x 20' Elevated Boardwalk (Installed over Low Berm)	LF		\$550.00	\$0.00
c	10' x 30' Floating Aluminum Boardwalk with 42" Railing - Both Sides	LF	3	\$750.00	\$2,250.00
d	12' x 20' Fiberglass Boardwalk Observation Area, with End Rails (Installed)	EA	3	\$18,000.00	\$54,000.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA	155	\$11,250.00	\$1,743,750.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents including Abutment Installed over Low Berm @ 20' OC)	EA		\$8,500.00	\$0.00
f	Transition Ramp to Tubbs Island Levee	LS	1	\$30,000.00	\$30,000.00
g	Signage	LS	1	\$4,000.00	\$4,000.00
<b>Subtotal 3</b>					<b>\$4,159,000.00</b>
<b>SUBTOTAL C</b>					<b>\$4,444,579.00</b>
<b>D</b>	<b>SEGMENT 6 - TUBBS-TOLAY TRAIL IMPROVEMENTS (3,800 LF)</b>				
<b>1</b>	<b>Tubbs Trailhead Improvement (Allowance)</b>	LS	1	\$7,500.00	\$7,500.00
<b>2</b>	<b>Tubbs Levee Rock Toe Stabilization (Allowance)</b>	LS	1	\$250,000.00	\$250,000.00
<b>3</b>	<b>Tubbs Tolay Trail Improvements (3,900 LF)</b>				
a	Clear and Grub 15' Width	SF	58,500	\$0.25	\$14,625.00
b	Earthwork and Grading - 12' Trail Width	CY	3,500	\$10.00	\$35,000.00
c	Class 2 AB - 8" - 12' Trail Width	CY	900	\$70.00	\$63,000.00
d	Gravel Surface - 4" - 12' Trail Width	SF	3,500	\$3.50	\$12,250.00
e	Twisted Wire Field Fence (Tubbs Island Ag. Field)	LF	4,000	\$9.00	\$36,000.00
f	Signage	LS	1	\$3,000.00	\$3,000.00
<b>SUBTOTAL D</b>					<b>\$421,375.00</b>
<b>TOTAL A, B, C, &amp; D</b>					<b>\$7,990,529</b>
15% Construction Contingency					\$1,198,579
Total Construction with Contingency					\$9,189,108
10% Engineering Design					\$918,911
8% Environmental & Permitting					\$735,129
2% Right of Way Engineering					\$183,782
12% Construction Management					\$1,102,693
<b>TOTAL COST ESTIMATE</b>					<b>\$12,129,600</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

**Table 5. Segment 3, Eliot Trailhead East to Tubbs Levee**  
**ALTERNATIVE 2**  
**Fixed Pier Fiberglass Boardwalk Crossing of Tolay Lagoon**

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>A</b>	<b>GENERAL</b>				
1	Mobilization/Demobilization	LS	1	\$400,000.00	\$400,000.00
2	ESA and Site Protection, including Biological Monitoring	LS	1	\$120,000.00	\$120,000.00
3	Survey and Stakeout	LS	1	\$55,000.00	\$55,000.00
4	Traffic Control	LS	1	\$25,000.00	\$25,000.00
5	Right of Way Acquisition (Allowance)	LS	1	\$650,000.00	\$650,000.00
6	Environmental Mitigation (Allowance)	LS	1	\$750,000.00	\$750,000.00
<b>SUBTOTAL A</b>					<b>\$2,000,000.00</b>
<b>B</b>	<b>SEGMENT 1 - OLD TOLAY ROAD (200 LF)</b>				
1	Old Tolay Road Improvements - 14' Roadway, Elevation 12				
a	Clear and Grub - 15' Width	SF	10,500	\$0.35	\$3,675.00
b	Earthwork and Engineered Fill	SF	2,300	\$45.00	\$103,500.00
c	Class 2 AB - 8"	CY	1,200	\$80.00	\$96,000.00
d	Gravel Surface - 4"	SF	8,400	\$4.50	\$37,800.00
e	Twisted Wire Field Fence (Both Sides of Road/Trail)	LF	1,500	\$9.00	\$13,500.00
f	Field Gates	EA	2	\$1,500.00	\$3,000.00
g	Signage	LS	1	\$3,000.00	\$3,000.00
<b>Subtotal 1</b>					<b>\$260,475.00</b>
2	Trailhead Improvements - 4-Car Parking Lot (12,000 SF)				
a	Rail Crossing Improvements (Allowance)	LS	1	\$250,000.00	\$250,000.00
b	Clear & Grub	SF	12,000	\$0.35	\$4,200.00
c	Earthwork & Fill	CY	1,200	\$45.00	\$54,000.00
d	Class 2 AB - 8"	CY	800	\$80.00	\$64,000.00
e	Gravel Surface - 4"	SF	12,000	\$4.50	\$54,000.00
f	Staging Area - Twisted Wire Field Fence	LF	100	\$9.00	\$900.00
g	Signage	LS	1	\$4,000.00	\$4,000.00
h	Van Accessible Concrete Pad, including Signage/Striping	LS	1	\$12,000.00	\$12,000.00
i	Wheel Stops	EA	4	\$500.00	\$2,000.00
j	Gate	LS	1	\$2,500.00	\$2,500.00
<b>Subtotal 2</b>					<b>\$447,600.00</b>
3	Eliot Trailhead Wetlands Crossing Connection (300 LF)				
a	Transition Ramp Structures - Old Tolay Rd. & Eliot Trailhead Ends	EA	2	\$30,000.00	\$60,000.00
b	12' x 20' Elevated Fiberglass Boardwalk (Installed over Water @ 20'OC)	LF	220	\$750.00	\$165,000.00
c	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA	15	\$12,500.00	\$187,500.00
d	Signage	LS	1	\$4,000.00	\$4,000.00
<b>Subtotal 3</b>					<b>\$416,500.00</b>
<b>SUBTOTAL B</b>					<b>\$1,124,575.00</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>C</b>	<b>SEGMENT 2 - HIGHWAY 37 CORRIDOR</b>				
<b>1</b>	<b>West of Tolay Creek to Old Tolay Road</b>				
a	Clear and Grub	SF		\$0.35	\$0.00
b	Earthwork and Fill	CY		\$45.00	\$0.00
c	Class 2 AB - 8"	CY		\$80.00	\$0.00
d	Gravel Surface - 4"	SF		\$4.50	\$0.00
e	Twisted Wire Field Fence (Both Sides)	LF		\$9.00	\$0.00
f	Signage	LS		\$4,000.00	\$0.00
	<b>Subtotal 1</b>				<b>\$0.00</b>
<b>2</b>	<b>Tolay Creek Crossing (60 LF)</b>				
a	Transition Ramp to Bridge at Eliot Trail	LS	1	\$30,000.00	\$30,000.00
b	12' x 60' Fiberglass Bridge	EA	1	\$80,000.00	\$80,000.00
c	Bridge Abutments	LS	1	\$30,000.00	\$30,000.00
d	Transition Ramp to Elevated or Floating Boardwalk or Levee	LS	1	\$30,000.00	\$30,000.00
	<b>Subtotal 2</b>				<b>\$170,000.00</b>
<b>3</b>	<b>Fixed Pier Fiberglass Boardwalk Crossing of Tolay Lagoon (1,200 LF)</b>				
a	12' x 20' Elevated Fiberglass Boardwalk Units (Installed over Water @ 20' OC)	LF	1,660	\$750.00	\$1,245,000.00
b	12' x 20' Elevated Boardwalk (Installed over Low Berm)	LF		\$550.00	\$0.00
c	10' x 30' Floating Aluminum Boardwalk with 42" Railing - Both Sides	LF		\$750.00	\$0.00
d	12' x 20' Fiberglass Boardwalk Observation Area, with End Rails (Installed)	EA	3	\$18,000.00	\$54,000.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA	84	\$12,500.00	\$1,050,000.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents including Abutment Installed over Low Berm @ 20' OC)	EA	6	\$8,500.00	\$51,000.00
f	Transition Ramp to Tubbs Island Levee	LS	1	\$30,000.00	\$30,000.00
g	Signage	LS	1	\$4,000.00	\$4,000.00
	<b>Subtotal 3</b>				<b>\$2,434,000.00</b>
	<b>SUBTOTAL C</b>				<b>\$2,604,000.00</b>
<b>D</b>	<b>SEGMENT 6 - TUBBS-TOLAY TRAIL IMPROVEMENTS (3,800 LF)</b>				
<b>1</b>	<b>Tubbs Trailhead Improvement (Allowance)</b>	LS	1	\$7,500.00	\$7,500.00
<b>2</b>	<b>Tubbs Levee Rock Toe Stabilization (Allowance)</b>	LS	1	\$250,000.00	\$250,000.00
<b>3</b>	<b>Tubbs Tolay Trail Improvements (3,900 LF)</b>				
a	Clear and Grub 15' Width	SF	58,500	\$0.25	\$14,625.00
b	Earthwork and Grading - 12' Trail Width	CY	3,500	\$10.00	\$35,000.00
c	Class 2 AB - 8" - 12' Trail Width	CY	900	\$70.00	\$63,000.00
d	Gravel Surface - 4" - 12' Trail Width	SF	3,500	\$3.50	\$12,250.00
e	Twisted Wire Field Fence (Tubbs Island Ag. Field)	LF	4,000	\$9.00	\$36,000.00
f	Signage	LS	1	\$3,000.00	\$3,000.00
	<b>SUBTOTAL D</b>				<b>\$421,375.00</b>
	<b>TOTAL A, B, C, &amp; D</b>				<b>\$6,149,950</b>
	15% Construction Contingency				\$922,493
	Total Construction with Contingency				\$7,072,443
	10% Engineering Design				\$707,244
	8% Environmental & Permitting				\$565,795
	2% Right of Way Engineering				\$141,449
	12% Construction Management				\$848,693
	<b>TOTAL COST ESTIMATE</b>				<b>\$9,335,600</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

**Table 6. Segment 4, Eliot Trailhead South to Tubbs Levee**  
**ALTERNATIVE 3**  
**Fixed Pier Fiberglass Boardwalk Crossing of Tolay Lagoon**

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>A</b>	<b>GENERAL</b>				
1	Mobilization/Demobilization	LS	1	\$400,000.00	\$400,000.00
2	ESA and Site Protection, including Biological Monitoring	LS	1	\$120,000.00	\$120,000.00
3	Survey and Stakeout	LS	1	\$55,000.00	\$55,000.00
4	Traffic Control	LS	1	\$25,000.00	\$25,000.00
5	Right of Way Acquisition (Allowance)	LS	1	\$650,000.00	\$650,000.00
6	Environmental Mitigation (Allowance)	LS	1	\$750,000.00	\$750,000.00
<b>SUBTOTAL A</b>					<b>\$2,000,000.00</b>
<b>B</b>	<b>SEGMENT 1 - OLD TOLAY ROAD (200 LF)</b>				
1	Old Tolay Road Improvements - 14' Roadway, Elevation 12				
a	Clear and Grub - 15' Width	SF	10,500	\$0.35	\$3,675.00
b	Earthwork and Engineered Fill	SF	2,300	\$45.00	\$103,500.00
c	Class 2 AB - 8"	CY	1,200	\$80.00	\$96,000.00
d	Gravel Surface - 4"	SF	8,400	\$4.50	\$37,800.00
e	Twisted Wire Field Fence (Both Sides of Road/Trail)	LF	1,500	\$9.00	\$13,500.00
f	Field Gates	EA	2	\$1,500.00	\$3,000.00
g	Signage	LS	1	\$3,000.00	\$3,000.00
<b>Subtotal 1</b>					<b>\$260,475.00</b>
2	Trailhead Improvements - 4-Car Parking Lot (12,000 SF)				
a	Rail Crossing Improvements (Allowance)	LS	1	\$250,000.00	\$250,000.00
b	Clear & Grub	SF	12,000	\$0.35	\$4,200.00
c	Earthwork & Fill	CY	1,200	\$45.00	\$54,000.00
d	Class 2 AB - 8"	CY	800	\$80.00	\$64,000.00
e	Gravel Surface - 4"	SF	12,000	\$4.50	\$54,000.00
f	Staging Area - Twisted Wire Field Fence	LF	100	\$9.00	\$900.00
g	Signage	LS	1	\$4,000.00	\$4,000.00
h	Van Accessible Concrete Pad, including Signage/Striping	LS	1	\$12,000.00	\$12,000.00
i	Wheel Stops	EA	4	\$500.00	\$2,000.00
j	Gate	LS	1	\$2,500.00	\$2,500.00
<b>Subtotal 2</b>					<b>\$447,600.00</b>
3	Eliot Trailhead Wetlands Crossing Connection (300 LF)				
a	Transition Ramp Structures - Old Tolay Rd. & Eliot Trailhead Ends	EA	2	\$30,000.00	\$60,000.00
b	12' x 20' Elevated Fiberglass Boardwalk (Installed over Water @ 20' OC)	LF	220	\$750.00	\$165,000.00
c	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA	15	\$12,500.00	\$187,500.00
d	Signage	LS	1	\$4,000.00	\$4,000.00
<b>Subtotal 3</b>					<b>\$416,500.00</b>
<b>SUBTOTAL B</b>					<b>\$1,124,575.00</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>C</b>	<b>SEGMENT 2 - HIGHWAY 37 CORRIDOR</b>				
<b>1</b>	<b>West of Tolay Creek to Old Tolay Road</b>				
a	Clear and Grub	SF		\$0.35	\$0.00
b	Earthwork and Fill	CY		\$45.00	\$0.00
c	Class 2 AB - 8"	CY		\$80.00	\$0.00
d	Gravel Surface - 4"	SF		\$4.50	\$0.00
e	Twisted Wire Field Fence (Both Sides)	LF		\$9.00	\$0.00
f	Signage	LS		\$4.00	\$0.00
<b>Subtotal 1</b>					<b>\$0.00</b>
<b>2</b>	<b>Tolay Creek Crossing (60 LF)</b>				
a	Transition Ramp to Bridge	LS	1	\$30,000.00	\$30,000.00
b	12' x 60' Fiberglass Bridge	EA	2	\$80,000.00	\$160,000.00
c	Bridge Abutments	EA	4	\$30,000.00	\$120,000.00
d	Transition Ramp to Elevated or Floating Boardwalk or Levee	LS	1	\$30,000.00	\$30,000.00
<b>Subtotal 2</b>					<b>\$340,000.00</b>
<b>3</b>	<b>Fixed Pier Fiberglass Boardwalk Crossing of Tolay Lagoon</b>				
a	12' x 20' Elevated Fiberglass Boardwalk Units (Installed over Water @ 20' OC)	LF	1,200	\$750.00	\$900,000.00
b	12' x 20' Elevated Boardwalk (Installed over Low Berm)	LF	700	\$550.00	\$385,000.00
c	10' x 30' Floating Aluminum Boardwalk with 42" Railing - Both Sides	LF		\$750.00	\$0.00
d	12' x 20' Fiberglass Boardwalk Observation Area, with End Rails (Installed)	EA		\$18,000.00	\$0.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA		\$11,250.00	\$0.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents including Abutment Installed over Low Berm @ 20' OC)	EA	180	\$8,500.00	\$1,530,000.00
f	Transition Ramp to Tubbs Island Levee, Floating Boardwalk	LS	1	\$30,000.00	\$30,000.00
g	Signage	LS	1	\$3,000.00	\$3,000.00
<b>Subtotal 3</b>					<b>\$2,848,000.00</b>
<b>SUBTOTAL C</b>					<b>\$3,188,000.00</b>
<b>D</b>	<b>SEGMENT 6 - TUBBS-TOLAY TRAIL IMPROVEMENTS (3,800 LF)</b>				
1	Tubbs Trailhead Improvement (Allowance)	LS	1	\$7,500.00	\$7,500.00
2	Tubbs Levee Rock Toe Stabilization (Allowance)	LS	1	\$250,000.00	\$250,000.00
3	Tubbs Tolay Trail Improvements (3,900 LF)				
a	Clear and Grub 15' Width	SF	58,500	\$0.25	\$14,625.00
b	Earthwork and Grading - 12' Trail Width	CY	3,500	\$10.00	\$35,000.00
c	Class 2 AB - 8" - 12' Trail Width	CY	900	\$70.00	\$63,000.00
d	Gravel Surface - 4" - 12' Trail Width	SF	3,500	\$3.50	\$12,250.00
e	Twisted Wire Field Fence (Tubbs Island Ag. Field)	LF	4,000	\$9.00	\$36,000.00
f	Signage	LS	1	\$3,000.00	\$3,000.00
<b>SUBTOTAL D</b>					<b>\$421,375.00</b>
<b>TOTAL A, B, C, &amp; D</b>					<b>\$6,733,950</b>
15% Construction Contingency					\$1,010,093
Total Construction with Contingency					\$7,744,042.50
10% Engineering Design					\$774,404.25
8% Environmental & Permitting					\$619,523.40
2% Right of Way Engineering					\$154,880.85
12% Construction Management					\$929,285.10
<b>TOTAL COST ESTIMATE</b>					<b>\$10,222,100.00</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

**Table 7. Segment 5, Tolay Creek Crossing at Southern Narrows**  
**ALTERNATIVE 4**  
**Low Berm Boardwalk Crossing of South Tolay Creek**

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>A</b>	<b>GENERAL</b>				
1	Mobilization/Demobilization	LS	1	\$400,000.00	\$400,000.00
2	ESA and Site Protection, including Biological Monitoring	LS	1	\$120,000.00	\$120,000.00
3	Survey and Stakeout	LS	1	\$55,000.00	\$55,000.00
4	Traffic Control	LS	1	\$25,000.00	\$25,000.00
5	Right of Way Acquisition (Allowance)	LS	1	\$650,000.00	\$650,000.00
6	Environmental Mitigation (Allowance)	LS	1	\$750,000.00	\$750,000.00
<b>SUBTOTAL A</b>					<b>\$2,000,000.00</b>
<b>B</b>	<b>SEGMENT 1 - OLD TOLAY ROAD (200 LF)</b>				
1	Old Tolay Road Improvements - 14' Roadway, Elevation 12				
a	Clear and Grub - 15' Width	SF	10,500	\$0.35	\$3,675.00
b	Earthwork and Engineered Fill	SF	2,300	\$45.00	\$103,500.00
c	Class 2 AB - 8"	CY	1,200	\$80.00	\$96,000.00
d	Gravel Surface - 4"	SF	8,400	\$4.50	\$37,800.00
e	Twisted Wire Field Fence (Both Sides of Road/Trail)	LF	1,500	\$9.00	\$13,500.00
f	Field Gates	EA	2	\$1,500.00	\$3,000.00
g	Signage	LS	1	\$3,000.00	\$3,000.00
<b>Subtotal 1</b>					<b>\$260,475.00</b>
2	Trailhead Improvements - 4-Car Parking Lot (12,000 SF)				
a	Rail Crossing Improvements (Allowance)	LS	1	\$250,000.00	\$250,000.00
b	Clear & Grub	SF	12,000	\$0.35	\$4,200.00
c	Earthwork & Fill	CY	1,200	\$45.00	\$54,000.00
d	Class 2 AB - 8"	CY	800	\$80.00	\$64,000.00
e	Gravel Surface - 4"	SF	12,000	\$4.50	\$54,000.00
f	Staging Area - Twisted Wire Field Fence	LF	100	\$9.00	\$900.00
g	Signage	LS	1	\$4,000.00	\$4,000.00
h	Van Accessible Concrete Pad, including Signage/Striping	LS	1	\$12,000.00	\$12,000.00
i	Wheel Stops	EA	4	\$500.00	\$2,000.00
j	Gate	LS	1	\$2,500.00	\$2,500.00
<b>Subtotal 2</b>					<b>\$447,600.00</b>
3	Eliot Trailhead Wetlands Crossing Connection (300 LF)				
a	Transition Ramp Structures - Old Tolay Rd. & Eliot Trailhead Ends	EA	2	\$30,000.00	\$60,000.00
b	12' x 20' Elevated Fiberglass Boardwalk (Installed over Water @ 20'OC)	LF	220	\$750.00	\$165,000.00
c	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA	15	\$12,500.00	\$187,500.00
d	Signage	LS	1	\$4,000.00	\$4,000.00
<b>Subtotal 3</b>					<b>\$416,500.00</b>
<b>SUBTOTAL B</b>					<b>\$1,124,575.00</b>

PRELIMINARY ESTIMATE OF CONSTRUCTION COSTS  
Sears Point Connector Bay Trail

Item No.	Item Description	Unit	Quantity	Unit Price	Item Total
<b>C</b>	<b>SEGMENT 2 - HIGHWAY 37 CORRIDOR</b>				
<b>1</b>	<b>West of Tolay Creek to Old Tolay Road</b>				
a	Clear and Grub	SF		\$0.25	\$0.00
b	Earthwork and Fill	CY		\$40.00	\$0.00
c	Class 2 AB - 8"	CY		\$70.00	\$0.00
d	Gravel Surface - 4"	SF		\$2.50	\$0.00
e	Twisted Wire Field Fence (Both Sides)	LF		\$8.00	\$0.00
f	Signage	LS		\$3,000.00	\$0.00
	<b>Subtotal 1</b>				<b>\$0.00</b>
<b>2</b>	<b>S. Tolay Creek Crossing (240 LF)</b>				
a	Transition Ramp to Bridge	LS	1	\$20,000.00	\$20,000.00
b	12' x 60' Fiberglass Bridge	EA	4	\$80,000.00	\$320,000.00
c	Bridge Abutments	EA	8	\$30,000.00	\$240,000.00
d	Transition Ramp to Elevated toLevee	LS	1	\$20,000.00	\$20,000.00
	<b>Subtotal 2</b>				<b>\$600,000.00</b>
<b>3</b>	<b>Low Berm Boardwalk (3,600 LF)</b>				
a	12' x 20' Elevated Fiberglass Boardwalk Units (Installed over Water @ 20' OC)	LF		\$625.00	\$0.00
b	12' x 20' Elevated Boardwalk (Installed over Low Berm)	LF	3,600	\$550.00	\$1,980,000.00
c	10' x 30' Floating Aluminum Boardwalk with 42" Railing - Both Sides	LF		\$750.00	\$0.00
d	12' x 20' Fiberglass Boardwalk Observation Area, with End Rails (Installed)	EA	3	\$18,000.00	\$54,000.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents Installed over Water @ 20' OC)	EA		\$12,500.00	\$0.00
e	3, 80' Helical Piers, Lateral Supports, Beams (Bents including Abutment Installed over Low Berm @ 20' OC)	EA	180	\$8,500.00	\$1,530,000.00
f	Transition Ramp to Tubbs Island Levee	LS	1	\$30,000.00	\$30,000.00
g	Signage	LS	1	\$3,000.00	\$3,000.00
	<b>Subtotal 3</b>				<b>\$3,597,000.00</b>
	<b>SUBTOTAL C</b>				<b>\$4,197,000.00</b>
<b>D</b>	<b>SEGMENT 6 - TUBBS-TOLAY TRAIL IMPROVEMENTS (3,800 LF)</b>				
<b>1</b>	<b>Tubbs Trailhead Improvement (Allowance)</b>	LS	1	\$7,500.00	\$7,500.00
<b>2</b>	<b>Tubbs Levee Rock Toe Stabilization (Allowance)</b>	LS	1	\$250,000.00	\$250,000.00
<b>3</b>	<b>Tubbs Tolay Trail Improvements (3,900 LF)</b>				
a	Clear and Grub 15' Width	SF	58,500	\$0.25	\$14,625.00
b	Earthwork and Grading - 12' Trail Width	CY	3,500	\$10.00	\$35,000.00
c	Class 2 AB - 8" - 12' Trail Width	CY	900	\$70.00	\$63,000.00
d	Gravel Surface - 4" - 12' Trail Width	SF	3,500	\$3.50	\$12,250.00
e	Twisted Wire Field Fence (Tubbs Island Ag. Field)	LF	4,000	\$9.00	\$36,000.00
f	Signage	LS	1	\$3,000.00	\$3,000.00
	<b>SUBTOTAL D</b>				<b>\$421,375.00</b>
	<b>TOTAL A, B, C, &amp; D</b>				<b>\$7,742,950</b>
	15% Construction Contingency				\$1,161,443
	Total Construction with Contingency				\$8,904,393
	10% Engineering Design				\$890,439
	8% Environmental & Permitting				\$712,351
	2% Right of Way Engineering				\$178,088
	12% Construction Management				\$1,068,527
	<b>TOTAL COST ESTIMATE</b>				<b>\$11,753,800</b>

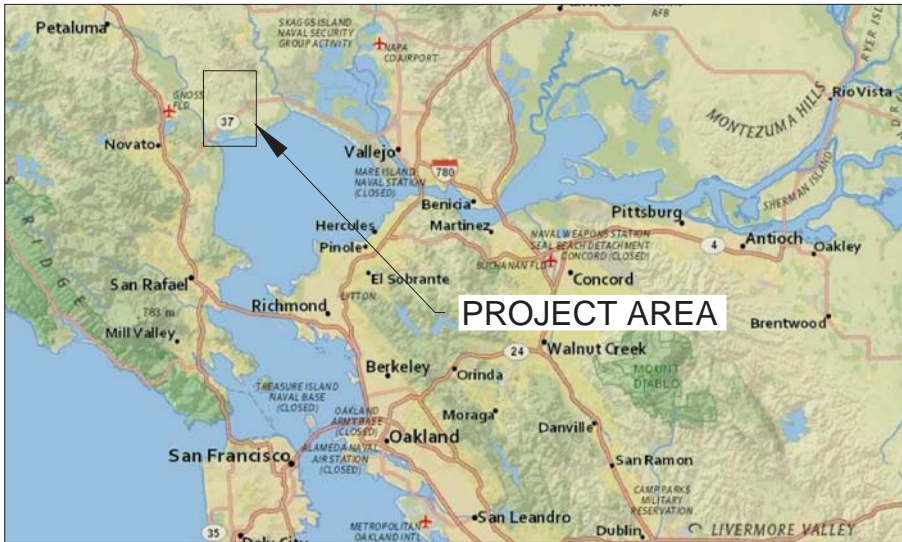


APPENDIX C

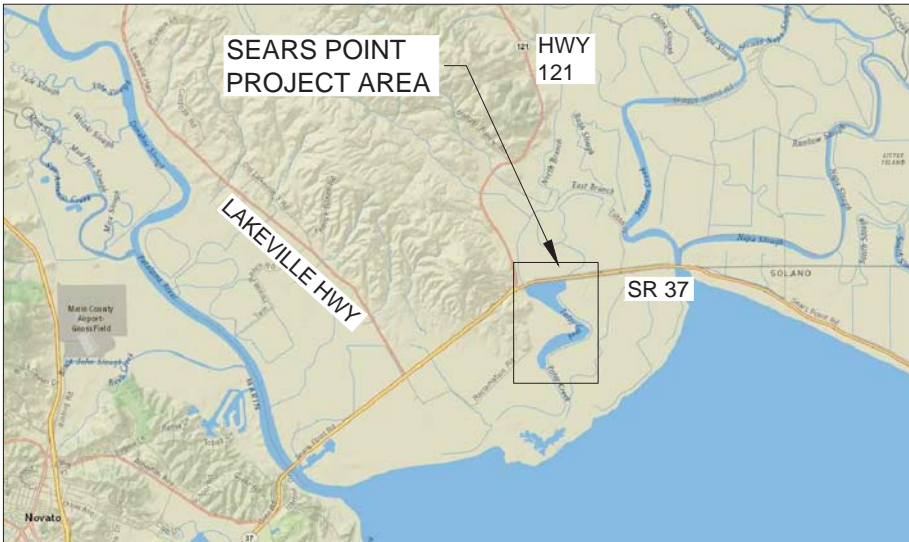
**PRELIMINARY ENGINEERING PLANS**

# BAY TRAIL SEARS POINT CONNECTOR

## FEASIBILITY STUDY/ PRELIMINARY ENGINEERING PLANS



AREA MAP  
N.T.S



VICINITY MAP  
N.T.S

DRAWING INDEX	
Sheet Number	Sheet Title
1	TITLE SHEET
2	PLAN
3	ALTERNATIVE 1
4	ALTERNATIVE 2
5	ALTERNATIVE 3
6	ALTERNATIVE 4
7	TRAILHEAD IMPROVEMENTS
8	SECTIONS AA,BB,CC,and EE
9	SECTIONS DD-1, SR 37
10	SECTIONS DD-2
11	BRIDGE DETAILS
12	BOARDWALK DETAILS
13	FLOATING BOARDWALK DETAILS



TRAIL OPTIONS  
N.T.S



TRAIL SEGMENTS  
N.T.S

- Notes:
- These are Conceptual or Preliminary Engineering Plans, suitable for preliminary Right of Way engineering, advanced project planning, development of a CEQA Project Description, initial discussions with permitting and regulatory agencies, and preliminary cost estimating and budgeting. Although they serve as the basis for subsequent engineering design, they are not suitable for construction.
  - Topographic information for planning and preliminary engineering was based on LiDAR (imagery from 2011 & 2013). No detailed field surveys were completed. Conditions along Tolay Creek and within Upper Tolay Lagoon may change rapidly over time with scour and sedimentation and new topographic information will be needed for construction plan engineering.
  - The elevations and dimensions in Plan profile and section of existing levees and roadway improvements presented here are approximations and are based on field observations and interpretation of As-Built Drawings of SR37 obtained from CalTrans, and as built Drawings of the Sears Point Wetlands Restoration Project obtained from Ducks Unlimited (4/01/14).
  - The depiction of future SR37 improvements, including lane widening, roadway elevation, and incorporation of causeway structures, represents our interpretation of how the concepts contained in the SR37 Corridor Transportation and Sea Level Rise Corridor Improvement Plan (Sept. 2017) may fit with a Bay Trail Connector in the Sears Point area. This includes information on needed improvement elevations with respect to 2050 sea level rise assumptions.
  - Geotechnical information on thickness of recent Bay Mud and depth to more suitable older Bay Muds was taken from information used to develop the Tolay Creek Restoration Plan and completed by Hultgren-Tillis Engineers (6/28/11). A new Geotechnical Investigation with additional soil borings in the vicinity of proposed project improvements will be needed to provide information for final engineering design of trail structures.
  - Drawing information for trail structure improvements was modified from information provided by product vendors, including Chance, Inc., for helical piers, ETIC for fiberglass bridge and boardwalk units, and Topper, Inc., and Gator Bridges for aluminum decks, ramps, and floating boardwalk structures.

30% NOT FOR CONSTRUCTION

BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA,CA

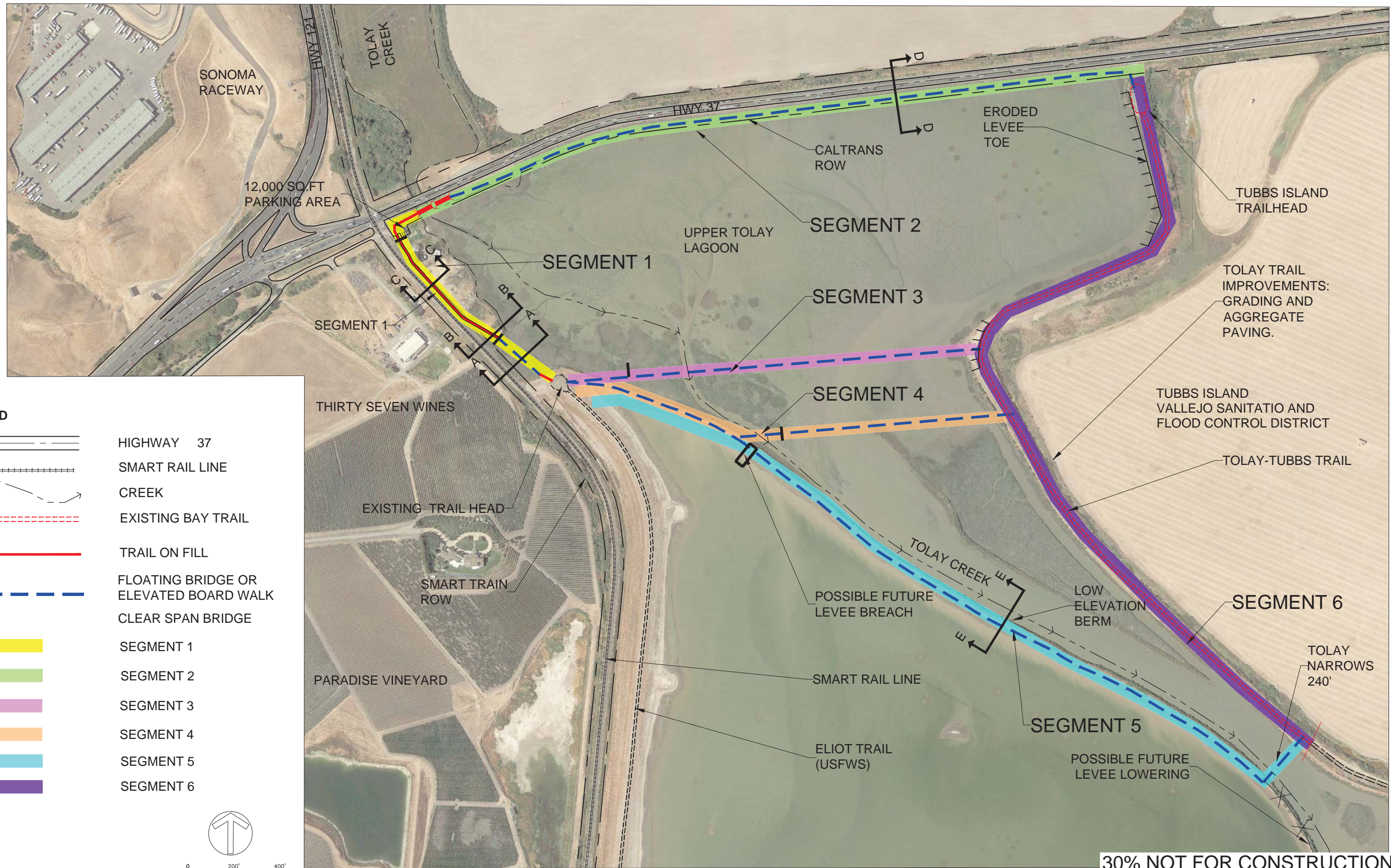


Shr	Rev	Date	By	Description	App'd

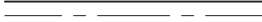
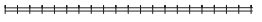











Design:	JP
Drawn:	SY
Checked:	MH
App'd:	MH

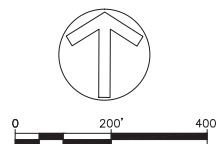
BAY TRAIL SEARS POINT CONNECTOR  
TITLE SHEET  
SEARS POINT  
SONOMA,CA

Size	Project
D	1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	1 OF 13



# LEGEND

-  HIGHWAY 37
-  SMART RAIL LINE
-  CREEK
-  EXISTING BAY TRAIL
-  TRAIL ON FILL
-  FLOATING BRIDGE OR ELEVATED BOARD WALK
-  CLEAR SPAN BRIDGE
-  SEGMENT 1
-  SEGMENT 2
-  SEGMENT 3
-  SEGMENT 4
-  SEGMENT 5
-  SEGMENT 6



## BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA



Sht	Rev	Date	By	Description	App'd

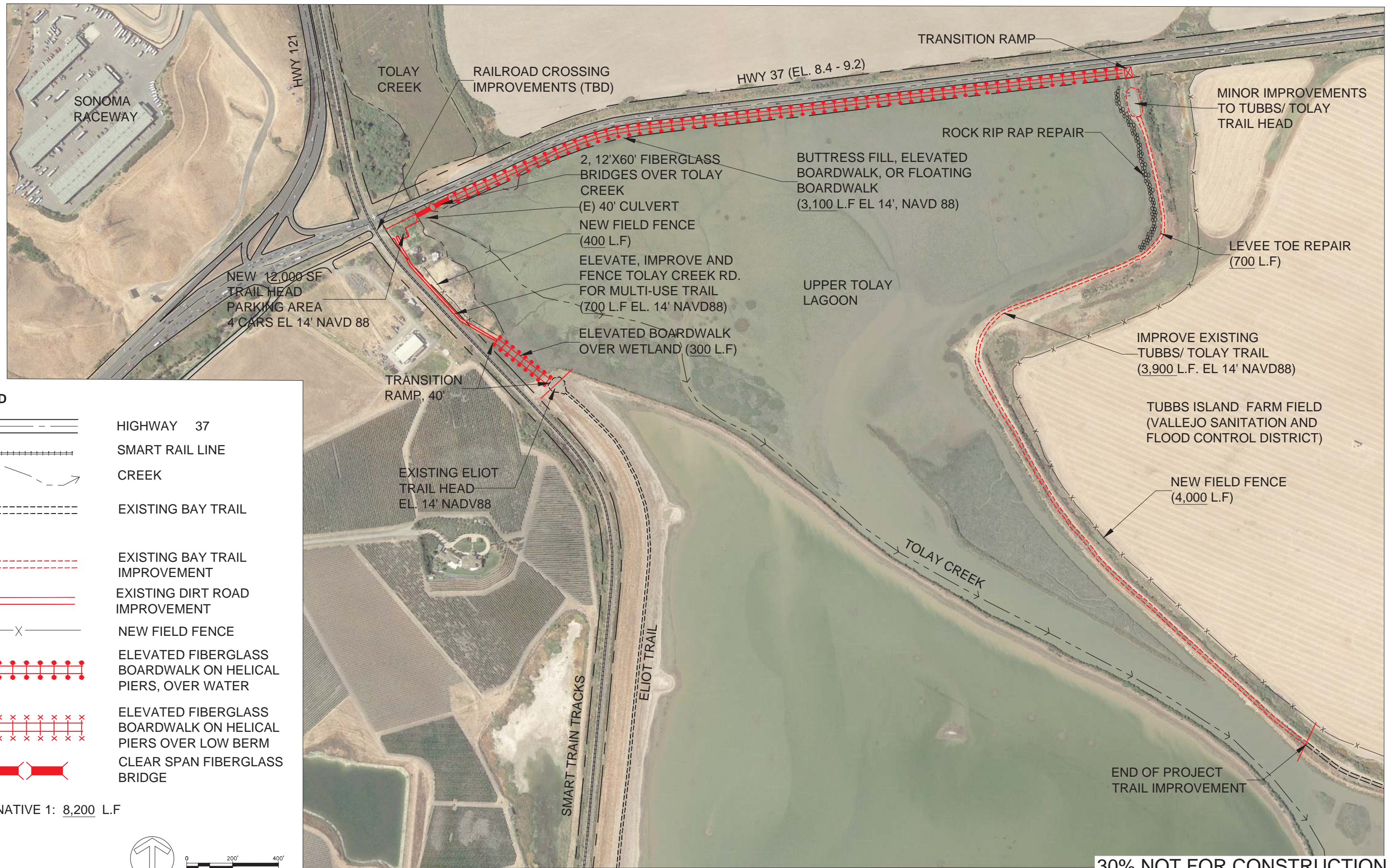
Design:	JP
Drawn:	SY
Checked:	MH
App'd:	MH

## SEGMENT OVERVIEW

(SEE SHEET 8 & 9 FOR SECTIONS)

Size	Project
D	1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	2 OF 13

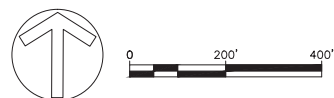
IF BAY DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY  
LAST SAVED: 2/12/2018 2:12 PM PLOT DATE: 2/12/2018 PLOT STYLE: PLT01.DWT  
F:\2016\1600049\_SEARS\_POINT\_TRAIL\_2016\CAV\MODEL\SEARS\_POINT\_TRAILS\_PLAN.DWG



LEGEND

- HIGHWAY 37
- SMART RAIL LINE
- CREEK
- EXISTING BAY TRAIL
- EXISTING BAY TRAIL IMPROVEMENT
- EXISTING DIRT ROAD IMPROVEMENT
- NEW FIELD FENCE
- ELEVATED FIBERGLASS BOARDWALK ON HELICAL PIERS, OVER WATER
- ELEVATED FIBERGLASS BOARDWALK ON HELICAL PIERS OVER LOW BERM
- CLEAR SPAN FIBERGLASS BRIDGE

ALTERNATIVE 1: 8,200 L.F



30% NOT FOR CONSTRUCTION

BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA

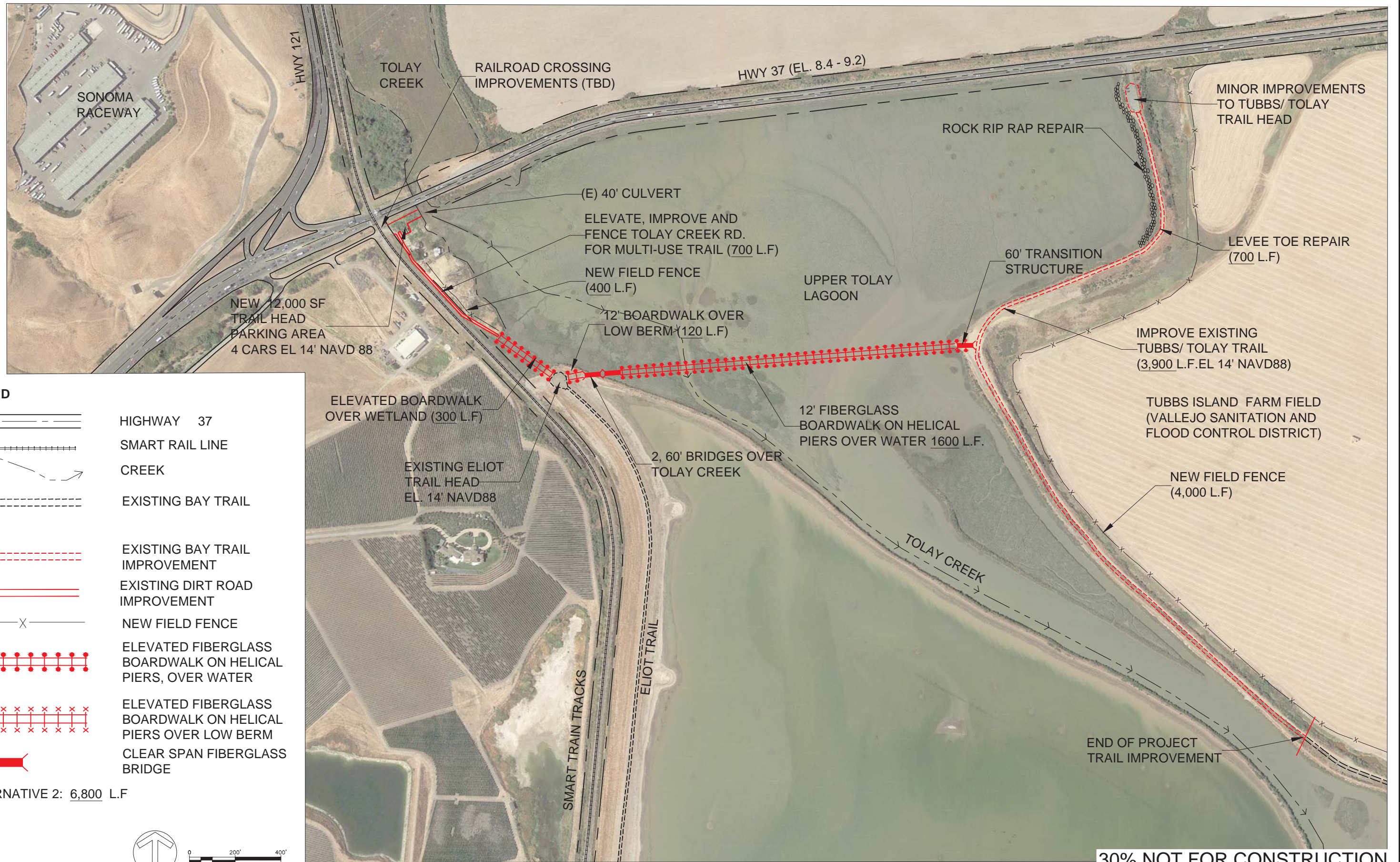


Sht.	Rev.	Date:	By:	Description:	App'd:

Design:	JP
Drawn:	SY
Checked:	MH
App'd:	MH

OPTION 1  
HIGHWAY 37 CORRIDOR TRAIL  
(SEGMENT 1,2,6)

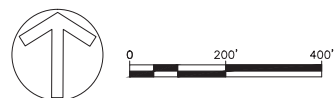
Size	Project
D	1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	3 OF 13



LEGEND

- HIGHWAY 37
- SMART RAIL LINE
- CREEK
- EXISTING BAY TRAIL
- EXISTING BAY TRAIL IMPROVEMENT
- EXISTING DIRT ROAD IMPROVEMENT
- NEW FIELD FENCE
- ELEVATED FIBERGLASS BOARDWALK ON HELICAL PIERS, OVER WATER
- ELEVATED FIBERGLASS BOARDWALK ON HELICAL PIERS OVER LOW BERM
- CLEAR SPAN FIBERGLASS BRIDGE

ALTERNATIVE 2: 6,800 L.F



30% NOT FOR CONSTRUCTION

BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA

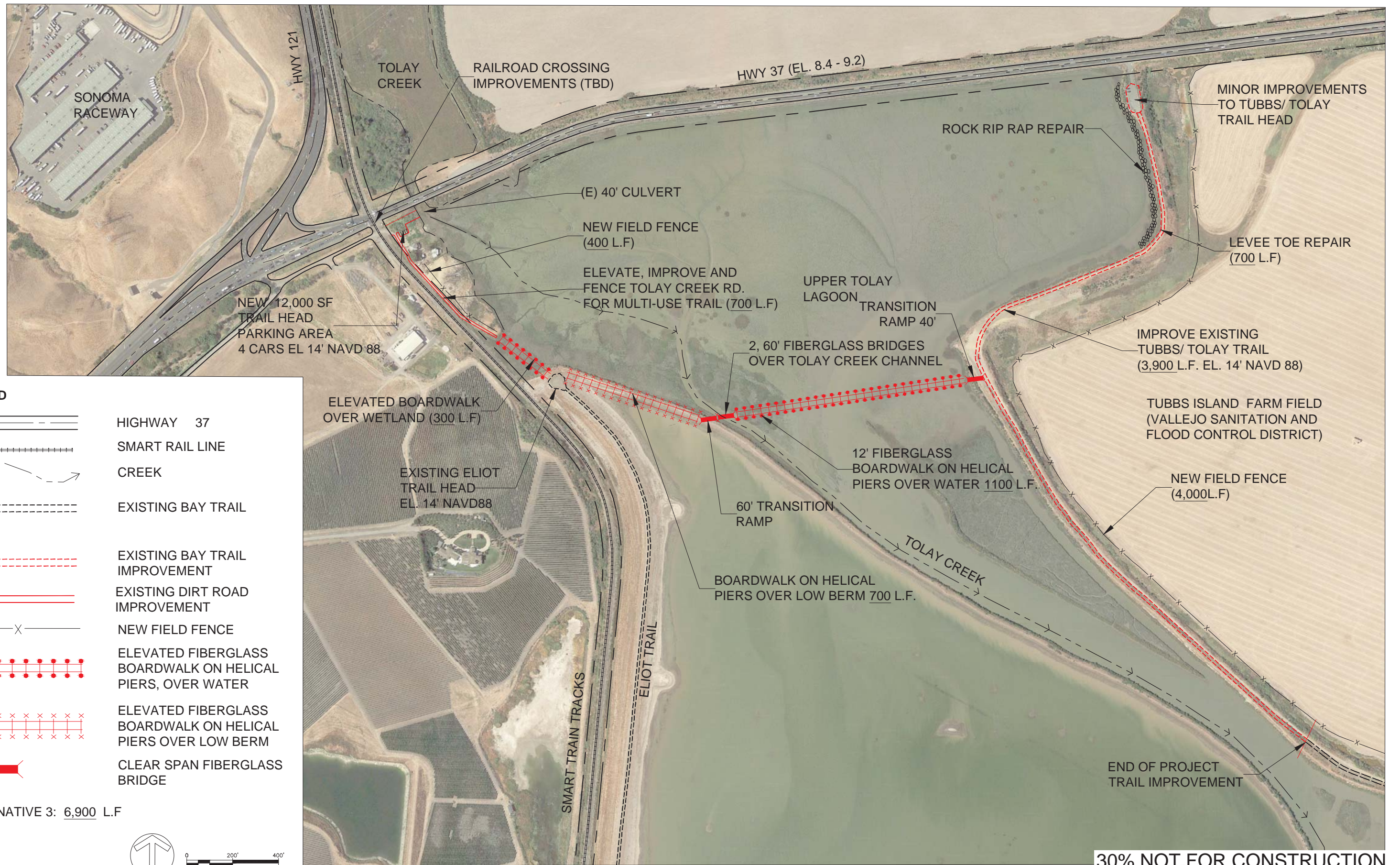


Sht	Rev	Date	By	Description	App'd

Design:	JP
Drawn:	SY
Checked:	MH
App'd:	MH

OPTION 2  
ELIOT TRAILHEAD EAST TO  
TUBBS ISLAND TRAIL  
(SEGMENTS 1,3,6)

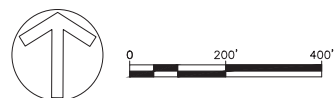
Size	Project
D	1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	4 OF 13



LEGEND

- HIGHWAY 37
- SMART RAIL LINE
- CREEK
- EXISTING BAY TRAIL
- EXISTING BAY TRAIL IMPROVEMENT
- EXISTING DIRT ROAD IMPROVEMENT
- NEW FIELD FENCE
- ELEVATED FIBERGLASS BOARDWALK ON HELICAL PIERS, OVER WATER
- ELEVATED FIBERGLASS BOARDWALK ON HELICAL PIERS OVER LOW BERM
- CLEAR SPAN FIBERGLASS BRIDGE

ALTERNATIVE 3: 6,900 L.F.



30% NOT FOR CONSTRUCTION

BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA

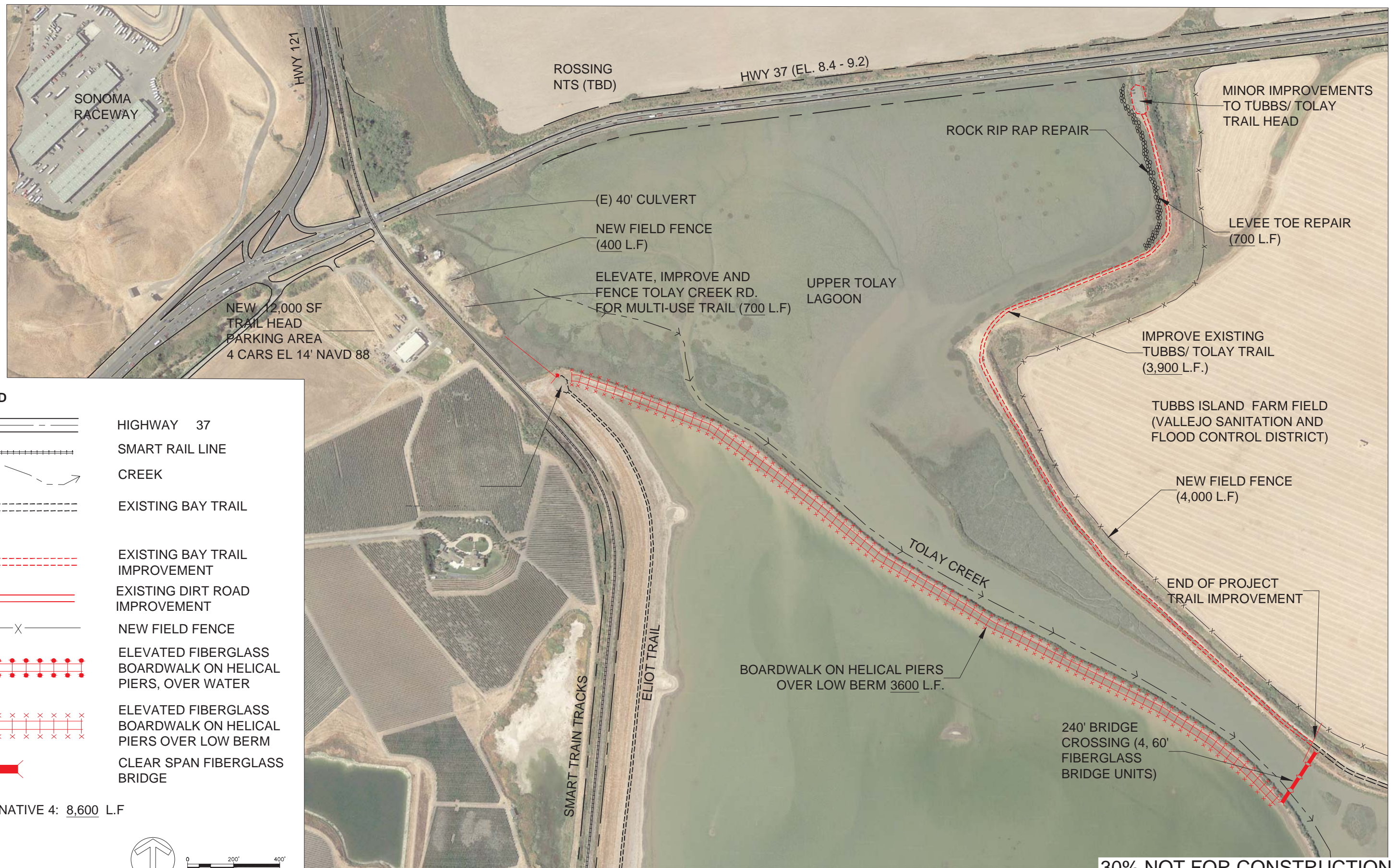


Sht	Rev	Date	By	Description	App'd

Design:	JP
Drawn:	SY
Checked:	MH
App'd:	MH

OPTION 3  
ELIOT TRAILHEAD SOUTH TO  
TUBBS ISLAND TRAIL  
(SEGMENTS 1,4,6)

Size	Project
D	1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	5 OF 13



# BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA



Sht	Rev	Date	By	Description	App'd

Design:	JP
Drawn:	SY
Checked:	MH
App'd:	MH

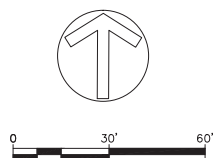
**OPTION 4**  
**ELIOT TRAILHEAD CROSSING OF TOLLEY CREEK AT SOUTH NARROWS**  
**(SEGMENT 1,5,6)**

Size	Project
D	1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	6 OF 13

LAST SAVED: 2/12/2018 2:12:18 PM PLOT DATE: 2/12/2018 PLOT STYLE: PLT1.DWT

LEGEND

- ===== HIGHWAY 37
- INTERPRETIVE SIGN
- ENTRY SIGN
- ▨ RAILROAD CROSSING IMPROVEMENT
- VEHICLE ACCESS GATE
- - - - - CALTRANS ROW
- - - - - SMART ROW
- - - - - EDGE OF TOLAY CREEK WETLAND
- X- FENCE



BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA

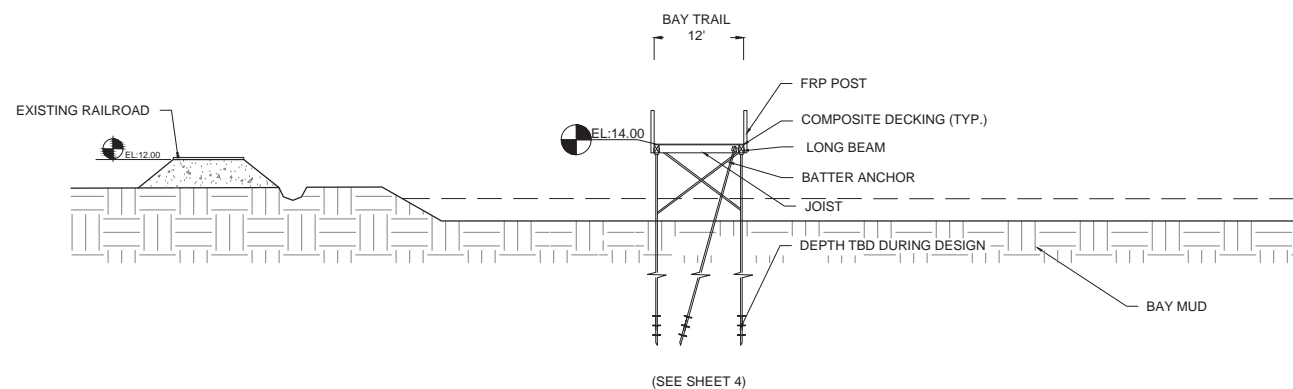


Sht	Rev	Date	By	Description	App'd

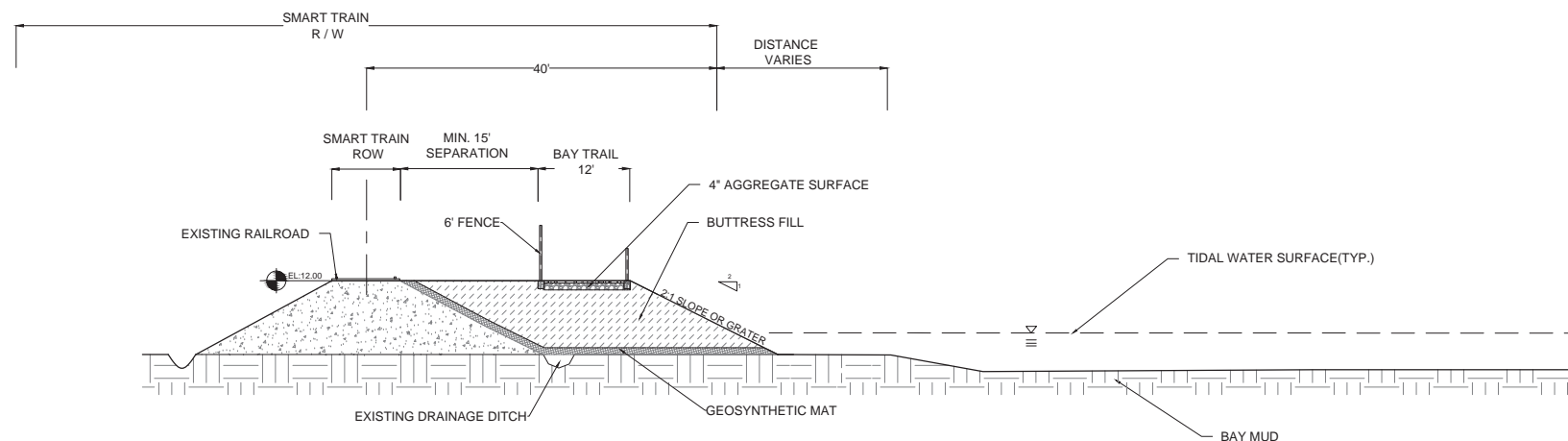
Design:	JP
Drawn:	SY
Checked:	MH
App'd:	MH

TRAILHEAD IMPROVEMENTS

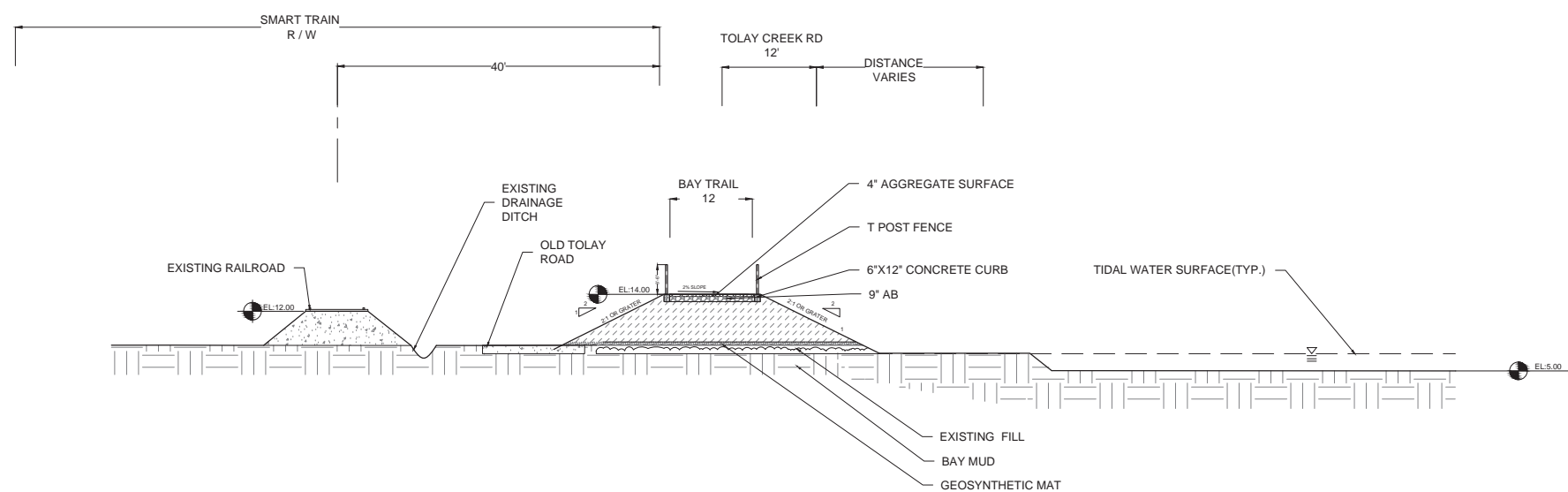
Size D	Project 1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	7 OF 13



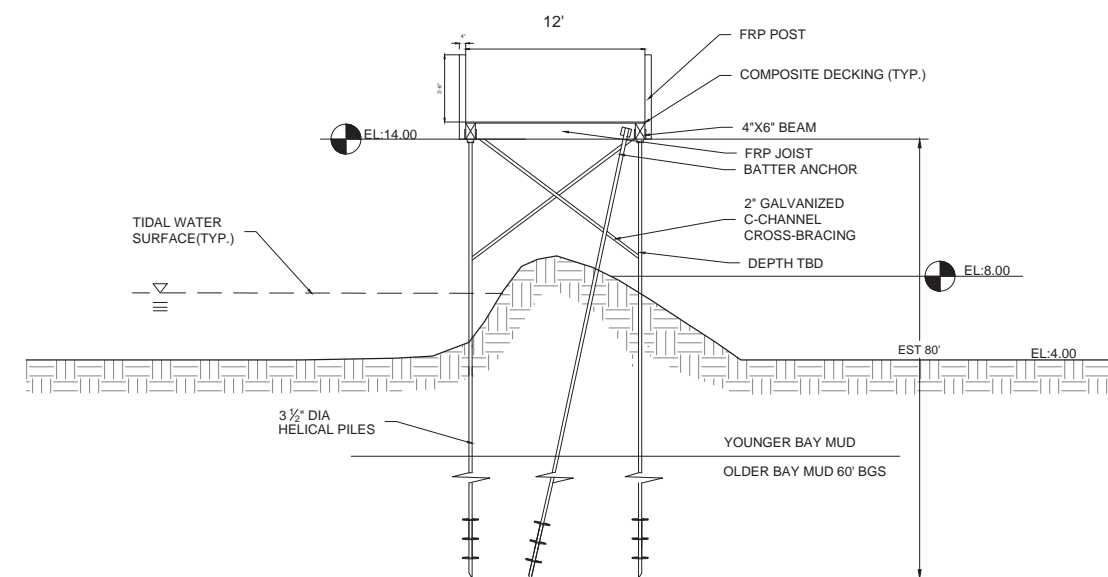
MAP SECTION AA: BOARDWALK  
(N.T.S.)



MAP SECTION CC: RAILROAD EMBANKMENT FILL OPTION  
(N.T.S.)



MAP SECTION BB: FILL AND BAY TRAIL ALONG EDGE  
OF (E) TOLAY CREEK RD  
(N.T.S.)



MAP SECTION EE: LOW ELEVATION BERM WITH BOARDWALK  
(N.T.S.)

NOTES:  
USE HELICAL PIER BATTER ANCHOR EVERY OTHER BENT  
ALTERNATIVE WITH C - CHANNEL GALVANIZED STEEL  
CROSSING- BRACING

**30% NOT FOR CONSTRUCTION**

BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA



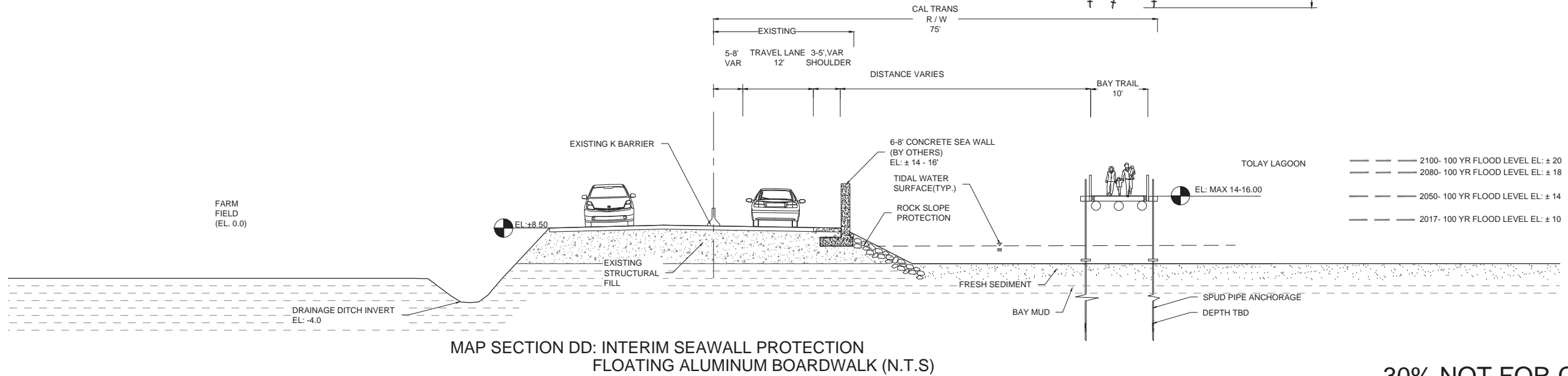
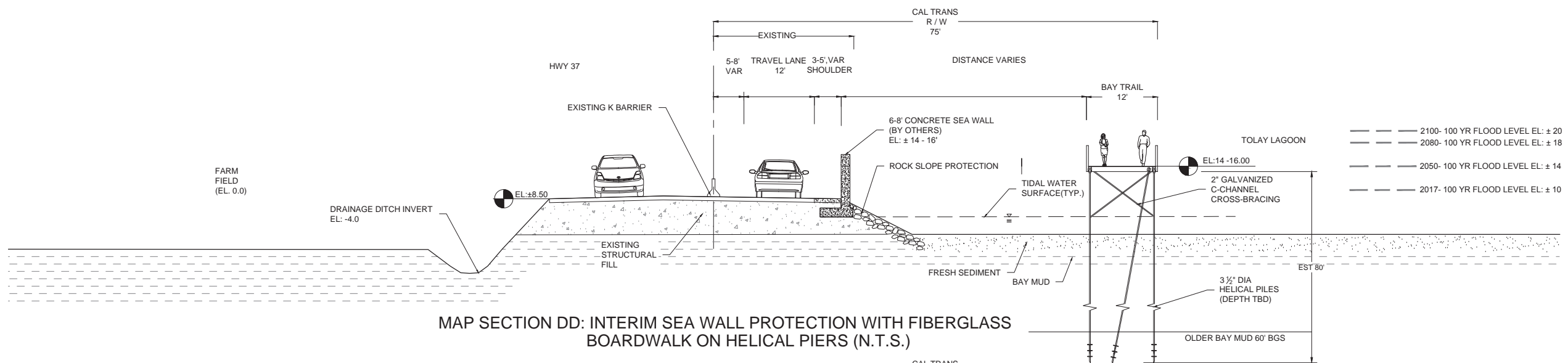
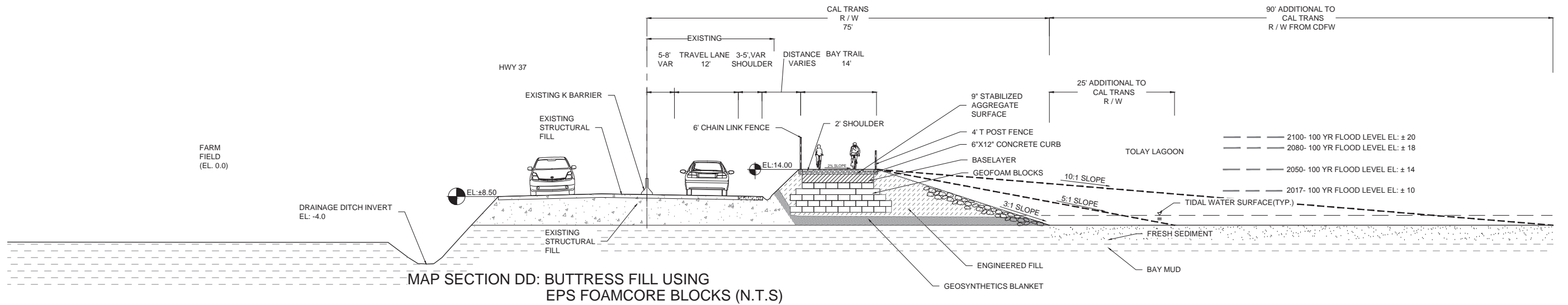
Sht.	Rev.	Date:	By:	Description:	App'd:

Design:	JP
Drawn:	SY
Checked:	MH
App'd:	MH

SECTIONS AA,BB,CC,AND EE  
SEGMENT 1

Size	Project
D	1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	8 OF 13

P:\2015\1600049\_SEARS\_POINT\_TRAIL\2016\CAD\MODEL\SEARS\_POINT\_TRAIL\_SECTION.DWG PLOT DATE: 2/12/2018 PLOT STYLE: sct.dwt LAST SAVED: 1/10/2018 IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY



30% NOT FOR CONSTRUCTION

BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA

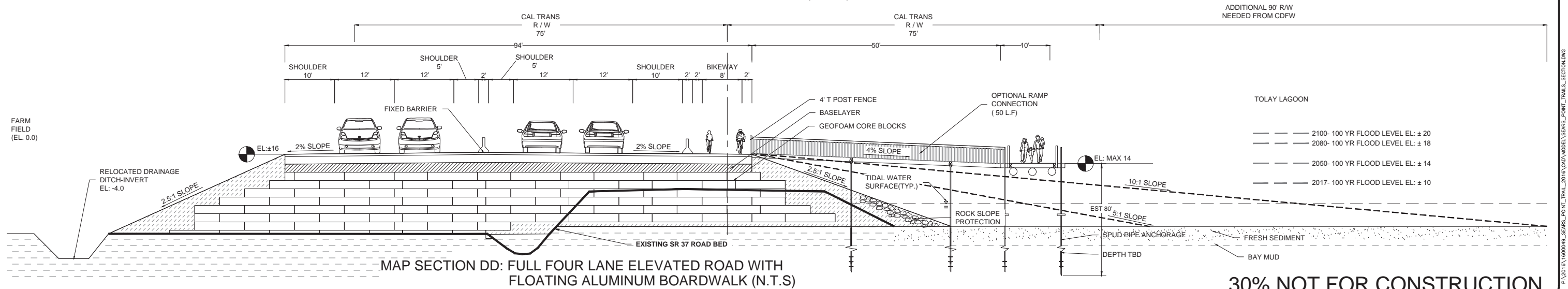
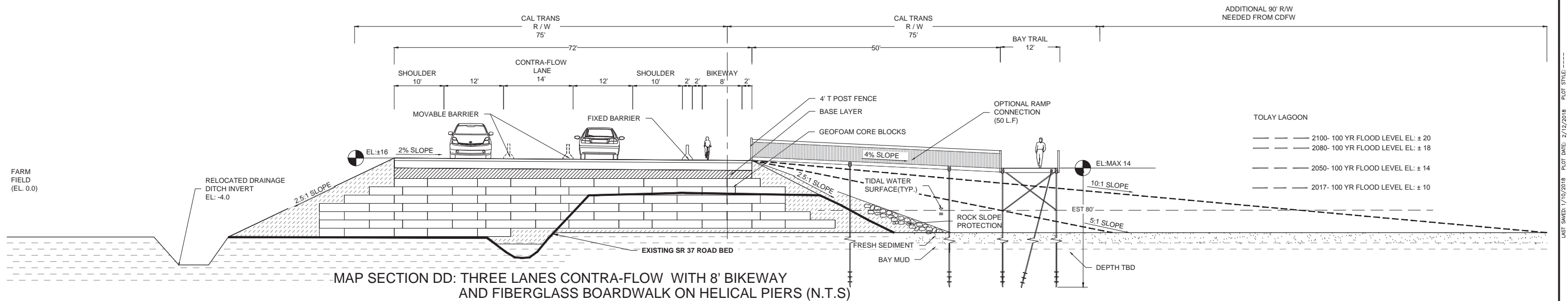
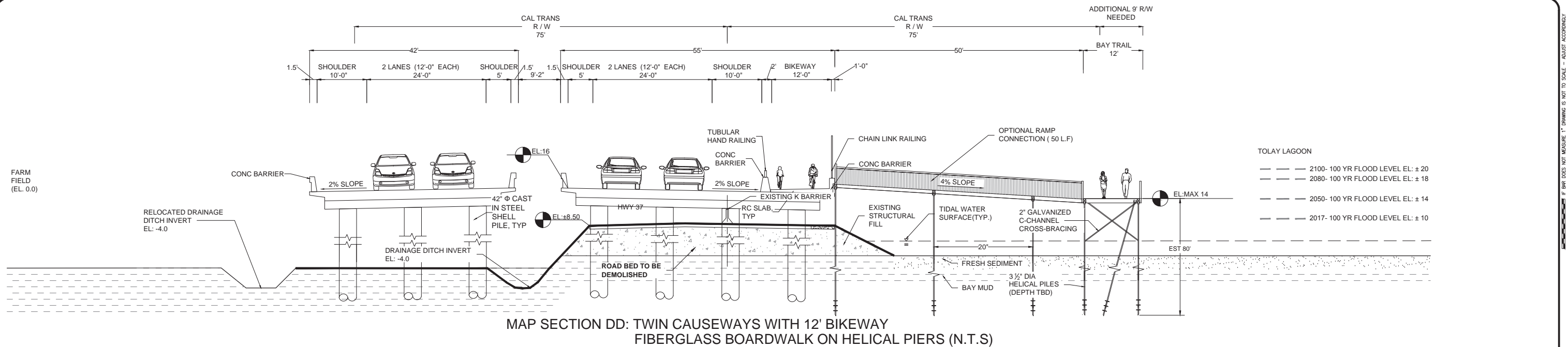


Shr	Rev	Date	By	Description	App'd	Design
						JP
						SY
						MH
						MH

SECTIONS DD-1, SR 37  
NEAR- TERM PROJECT  
OPTION 1

Size	Project
D	1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	9 OF 13

P:\2018\1600049\_SEARS\_POINT\_TRAIL\2018\CAD\MODEL\SEARS\_POINT\_TRAIL\_SECTION.DWG PLOT DATE: 2/12/2018 PLOT STYLE: sct.dwt LAST SAVED: 1/10/2018 IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY



30% NOT FOR CONSTRUCTION

## BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA

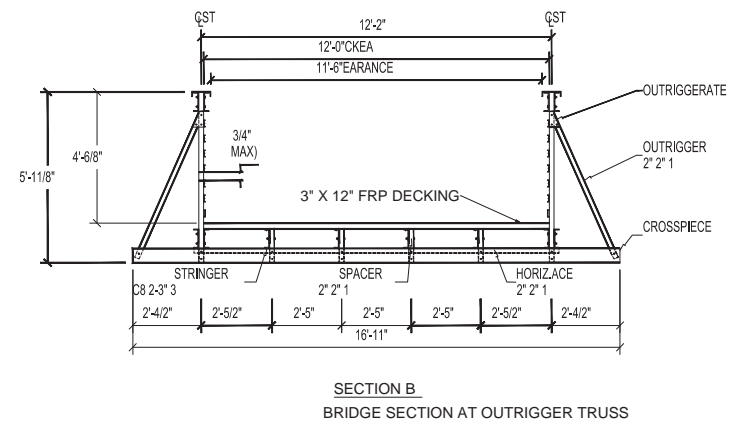
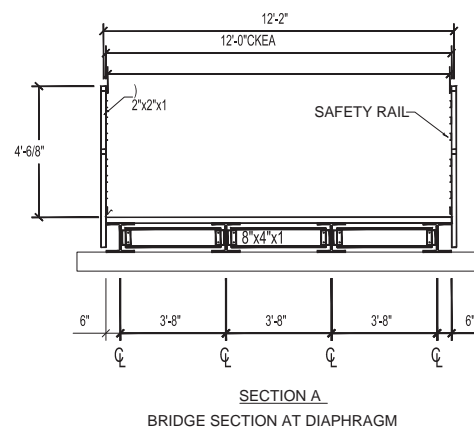
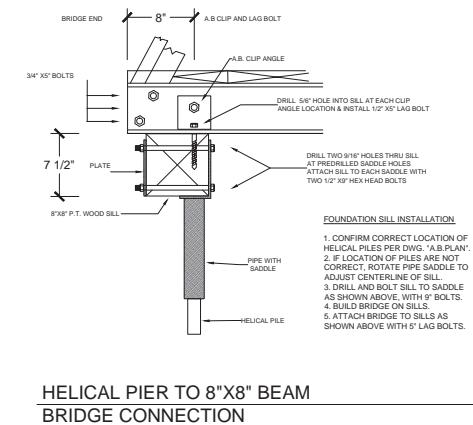
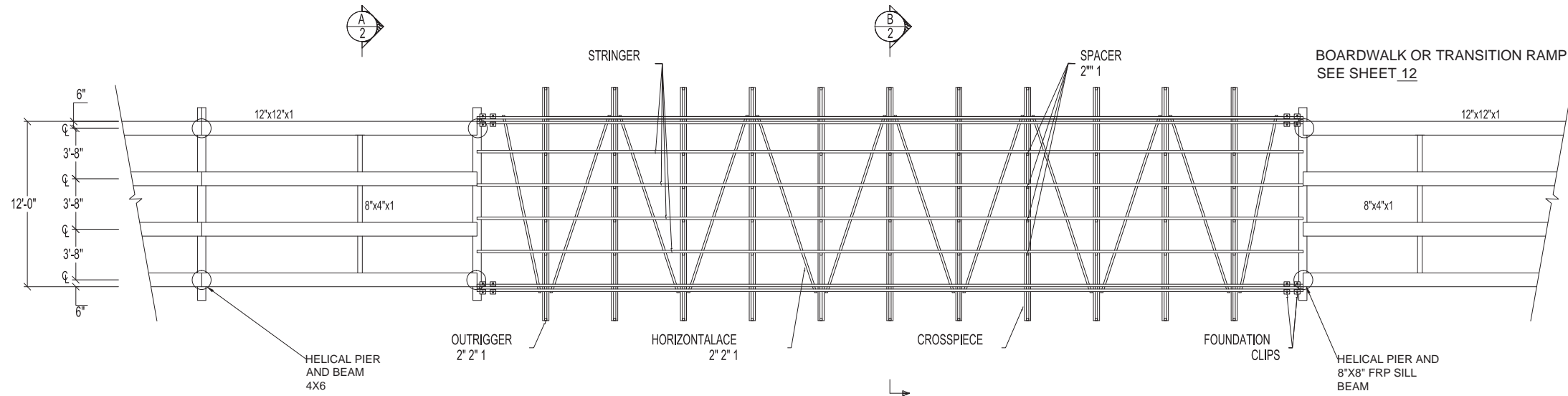
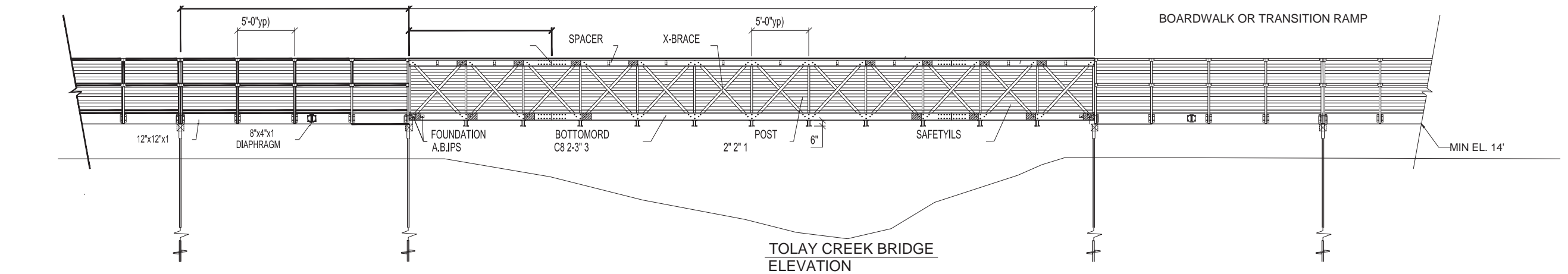


Shr	Rev	Date	By	Description	App'd	Design
						JP
						SY
						MH
						MH

Design:	JP
Drawn:	SY
Checked:	MH
App'd:	MH

SECTIONS DD-2  
MID TO LONG-TERM PROJECT  
OPTION 1

Size	Project
D	1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	10 OF 13



30% NOT FOR CONSTRUCTION

BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA

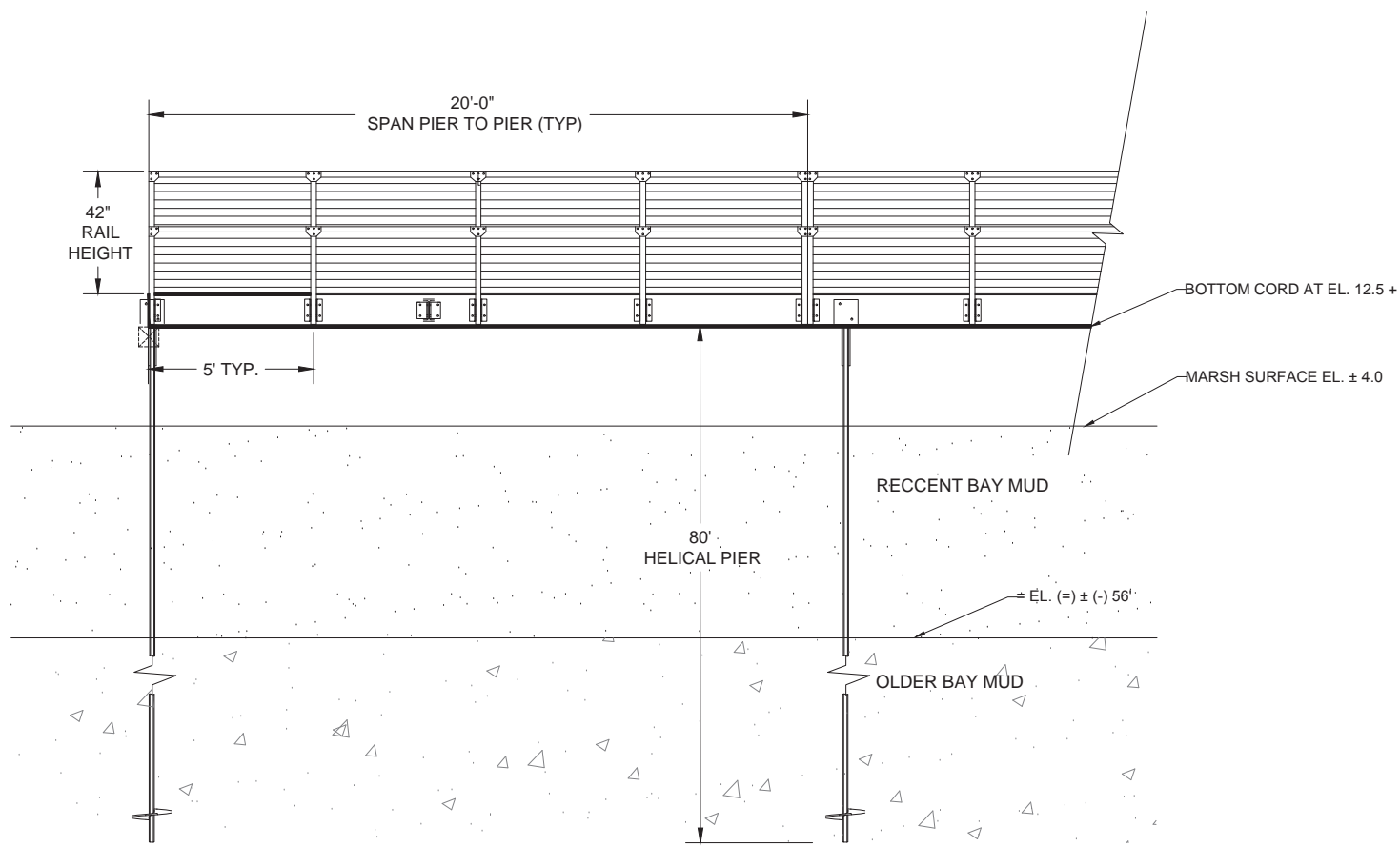


Shr	Rev	Date	By	Description	App'd

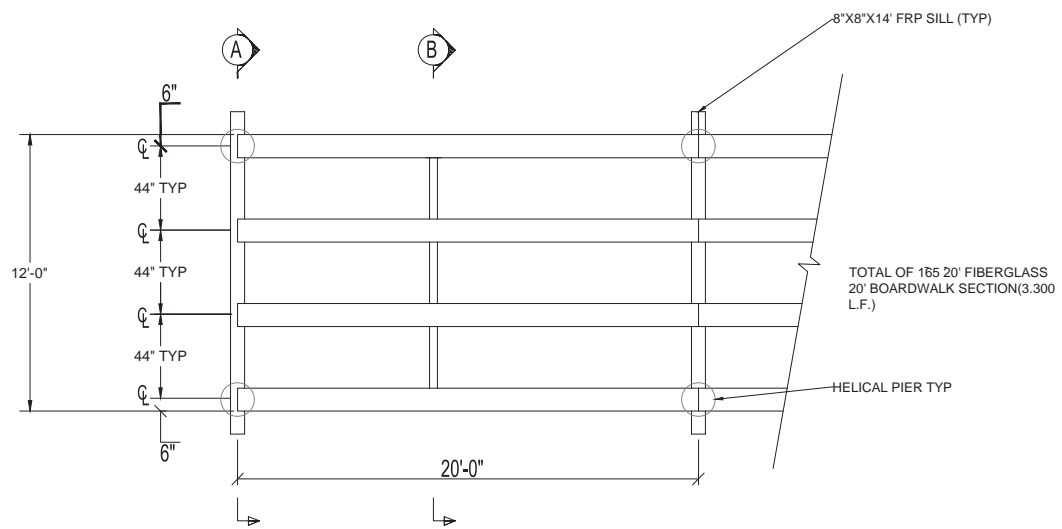
Design:	JP
Drawn:	SY
Checked:	MH
App'd:	MH

12' X 60' FIBERGLASS BRIDGE DETAILS

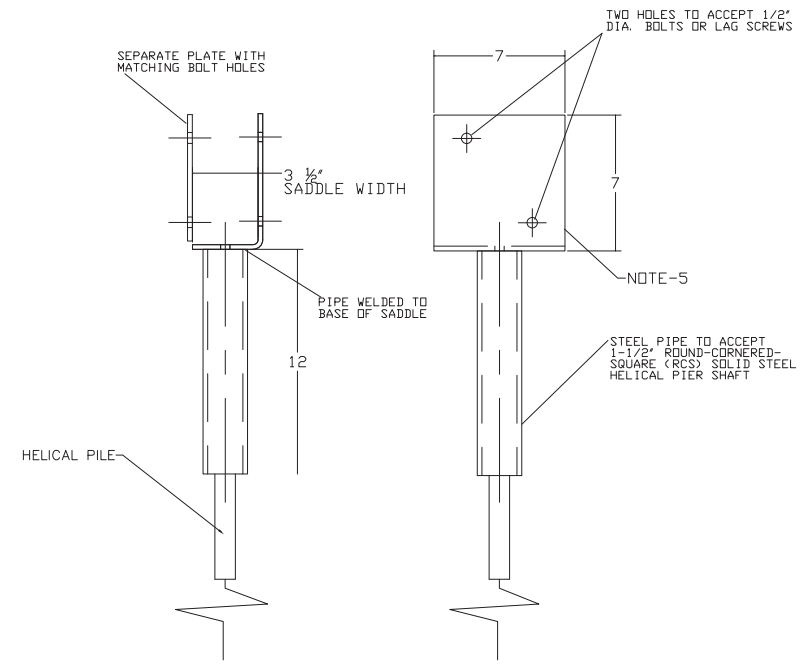
Size	Project
D	1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	11 OF 13



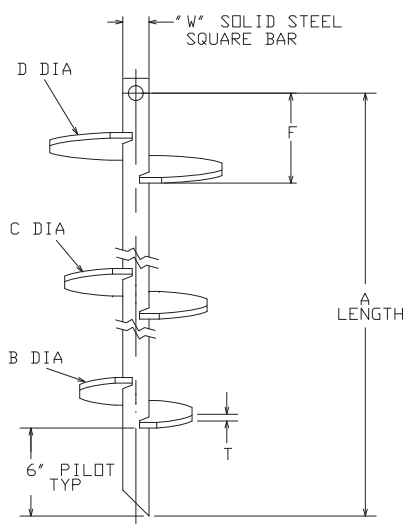
BOARDWALK ELEVATION



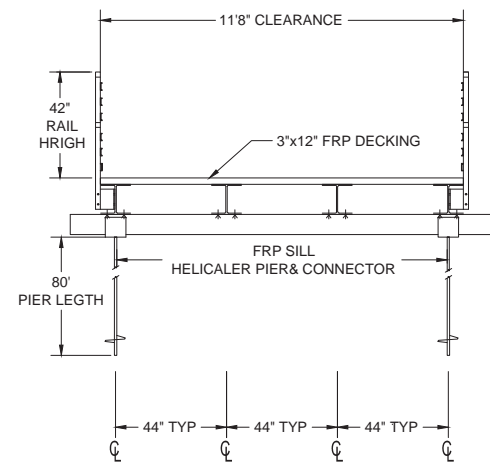
BOARDWALK PLAN VIEW  
(N.T.S)



HELICAL PIER TO 4"X6" BEAM  
BOARDWALK CONNECTION



HELICAL PIER DETAILS (N.T.S.)



BOARDWALK SECTION AT HELICAL PIER  
(N.T.S)

30% NOT FOR CONSTRUCTION

BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA



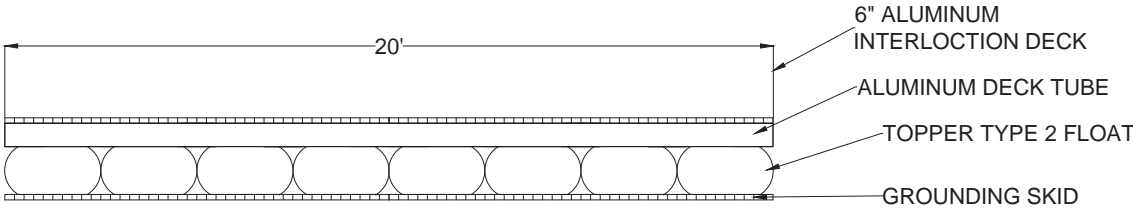
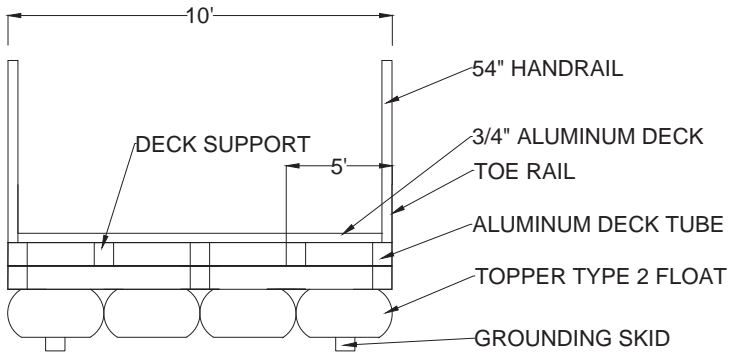
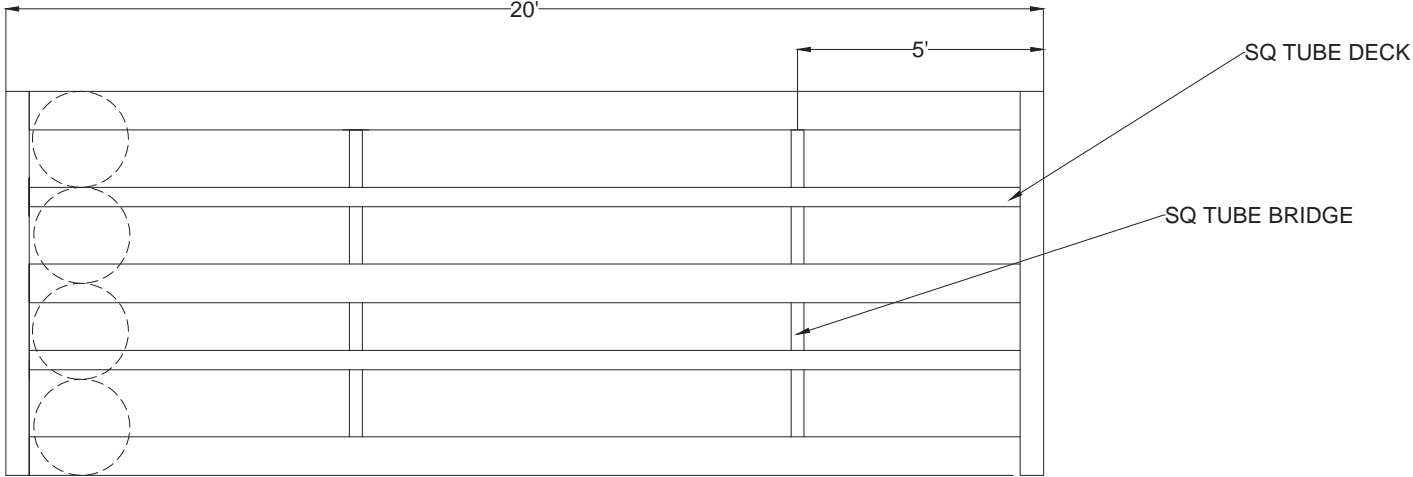
Sht.	Rev.	Date:	By:	Description:	App'd:

Design: JP  
Drawn: SY  
Checked: MH  
App'd: MH

12' X 20' FIBERGLASS BOARDWALK  
DETAILS

Size D	Project 1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	12 OF 13

PLT: 2018\1600049\_SEARS\_POINT\_TRAIL\_2018\CAD\MODEL\SEARS\_POINT\_TRAILS\_SECTION.DWG LAST SAVED: 1/10/2018 PLOT DATE: 2/12/2018 PLOT STYLE: sct.dwt IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY



30% NOT FOR CONSTRUCTION

BAY TRAIL SEARS POINT CONNECTOR

SEARS POINT  
SONOMA, CA



Sht.	Rev.	Date:	By:	Description:	App'd:

Design:	JP
Drawn:	SY
Checked:	MH
Appr'd:	MH

FLOATING BOARDWALK DETAILS

Size	Project
D	1600049
Scale:	AS NOTED
Date:	02-21-18
SHEET:	13 OF 13

F:\2018\1600049\_SEARS\_POINT\_TRAIL\2018\CAD\MODEL\SEARS\_POINT\_TRAIL\_SECTION.DWG PLOT DATE: 2/12/2018 PLOT STYLE: sct.dwt LAST SAVED: 1/10/2018 IF BAR DOES NOT MEASURE 1" DRAWING IS NOT TO SCALE - ADJUST ACCORDINGLY