I-680 Sabercat Bridge & Trail (Irvington BART to Ohlone College)

Scoping Report

HNTB

December 2018

CITY OF
Fremont

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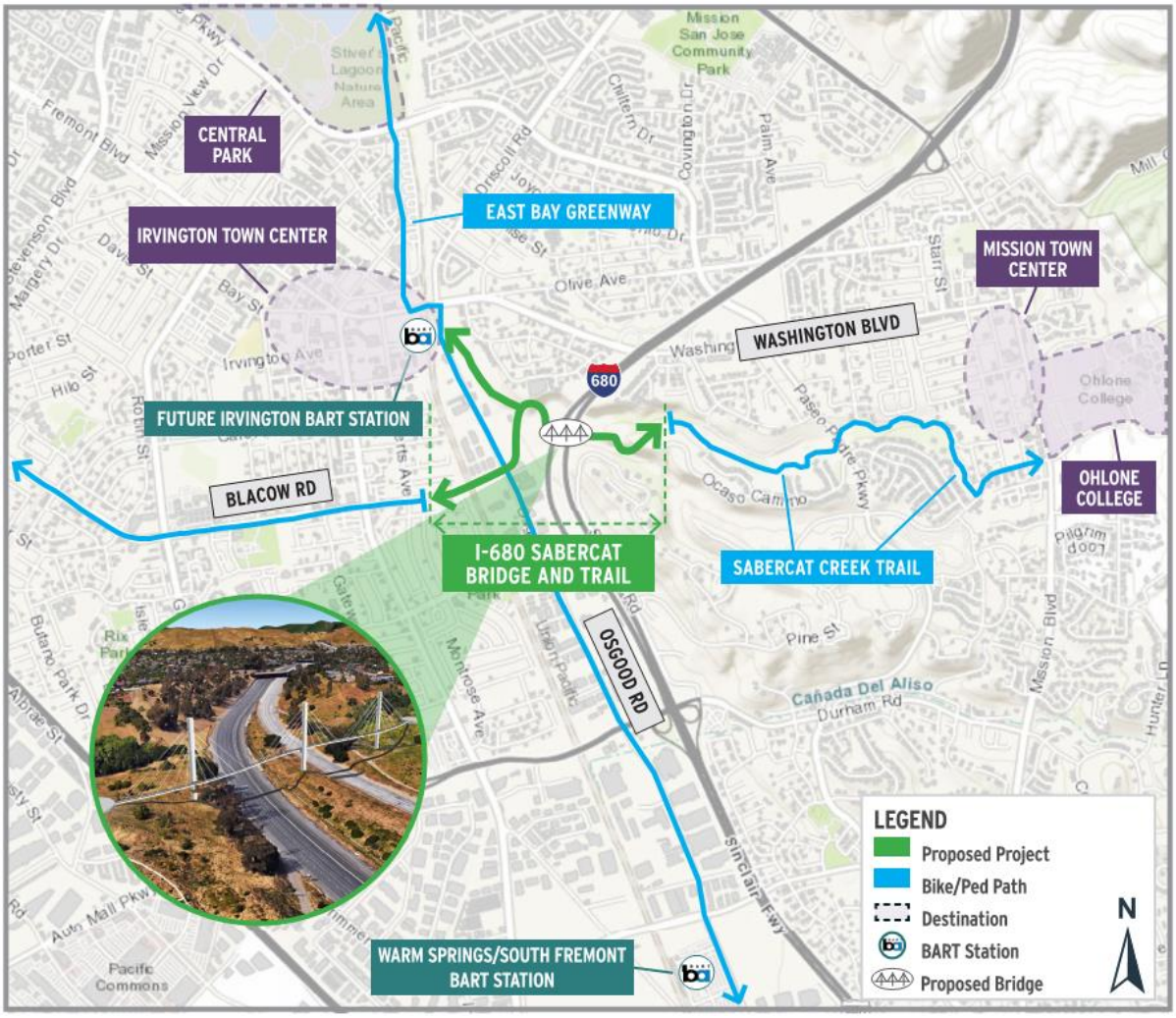
Section 1. Executive Summary

Project Overview

This Scoping Report defines the project scope and delivery strategy for the City of Fremont's I-680 Sabercat Bridge & Trail (Irvington BART to Ohlone College), which will build a landmark bicycle and pedestrian gateway into the City of Fremont. The trail will cross the canyon of I-680 currently bisecting the Irvington District, East Bay Greenway (EBGW), and future Irvington Bay Area Rapid Transit (BART) Station from the Sabercat Historical Park, Ohlone College, and Fremont Hills, as shown in **Figure 1**. The project, marked by an architecturally significant bicycle and pedestrian bridge over I-680, will create a safe and convenient Class I multi-use bicycle and pedestrian path forging a critical link in Fremont's city-wide cycling and pedestrian network, enhancing connectivity through and to the rapidly developing Irvington District.

Figure 1: I-680 Sabercat Bridge & Trail Location Map



Source: HNTB 2018

Project Need

- The existing bikeway network lacks a direct, comfortable route connecting the Irvington Town Center, East Bay Greenway, and future Irvington BART Station to the Sabercat Historical Park, Ohlone College, and East Bay Regional Parks District (EBRPD) areas in the Fremont Hills – primarily impeded by the Union Pacific Railroad (UPRR)/BART rail corridor and I-680.
- The existing available bikeways are generally on arterial roadways that carry significant traffic volumes, creating the potential for conflict between bicyclists, pedestrians, and automobiles.
- The Irvington District anticipates growth and revitalization consistent with the Irvington Community Plan in Fremont's General Plan.

Project Benefits

- **Increased Access to Regional Transit** and the future Irvington BART station by creating a bicycle/pedestrian connection under the UPRR/BART tracks and over I-680
- **Enhanced Regional Trail Connectivity** between the East Bay Greenway, Sabercat Historical Park, and EBRPD trails in the Fremont Hills
- **Improved Safety** for Irvington District residents, employees, and students
- **Supports California's Environmental Goals** by promoting alternative transportation options that reduce greenhouse gas emissions

Additionally, this Scoping Report provides an initial concept plan for future development of a Museum integrated into the site and highlighting the paleontological importance of the Irvington District and the Bell Quarry area. The proposed Museum will be built on a high plateau between I-680 and Osgood Road. An overview of the estimated costs and approximate schedule for the I-680 Sabercat Bridge & Trail (including the UPRR/BART underpass and excluding the Museum and Gallegos Winery Trail connection) is provided in **Table 1.** A detailed Project Delivery Plan with schedule, conceptual cost estimates (including the Museum), and prospective funding sources can be found in **Section 6**.

Table 1: I-680 Sabercat Bridge & Trail Estimated Cost and Schedule (in 2018 dollars, millions)

PHASE	ESTIMATED COST	BEGIN	END
PE/Environmental	$ 2.7	2020	2022
Right-Of-Way	TBD with Caltrans	2022	2023
Final Design	$ 3.0	2022	2023
Construction	$ 40.2	2024	2025
Agency Costs	*$4.0*	*2018*	*2025*
TOTAL	**$ 49.9**	**2018**	**2025**

Section 2. Project Description

The I-680 Sabercat Bridge & Trail (Irvington BART to Ohlone College) Project will provide a new Class I bicycle and pedestrian trail linking the east end of Blacow Road, west of I-680, with the current west end of the Sabercat Canyon trail in the Sabercat Historical Park, east of I-680. Project elements (described from west to east) include:

- A pedestrian/bicycle underpass of the UPRR/BART rail corridor;
- Improvements within the block of Blacow Road between the rail corridor and Osgood Road;
- Improvements at the intersection of Blacow and Osgood Roads, including a signalized crossing;
- A future Paleontological Museum on the plateau between Osgood Road and I-680;
- An access road and ADA-compliant Class I trail segment from the intersection of Blacow and Osgood Roads to a trailhead/Museum parking lot with 90 parking spaces;
- An ADA-compliant Class I trail segment connecting the Museum to the existing Sabercat Historical Park and trails, featuring a signature bicycle and pedestrian bridge over I-680.

A Project Map is shown in **Figure 2** and design alternatives are further explored in **Section 5**.

Figure 2: I-680 Sabercat Bridge & Trail Project Map

Source: HNTB 2018

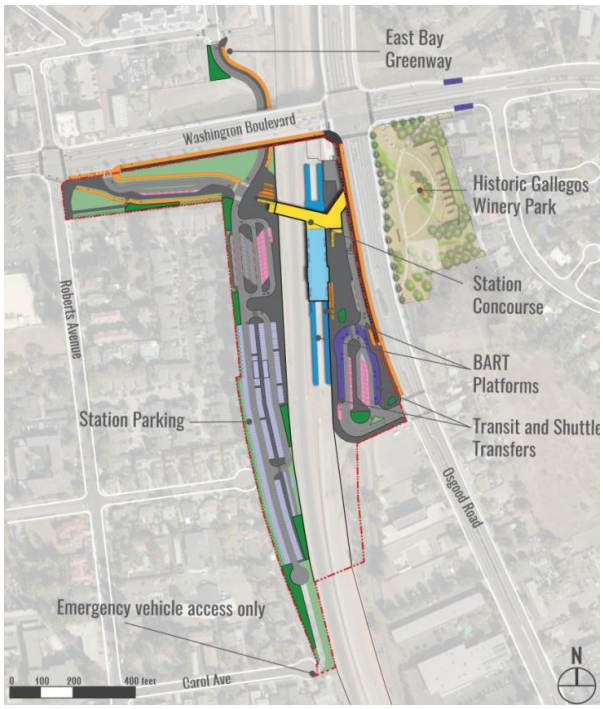
Section 3. Project Purpose & Need

3.1. Background & Existing Plans

The City of Fremont and Alameda County have multiple plans that form the base justification for the I-680 Sabercat Bridge & Trail (Irvington BART to Ohlone College) Project:

- The **City of Fremont General Plan 2030 (2011)** is the foundation upon which all development decisions are based and sets priorities and goals for the future. The Mobility section highlights the opportunity to connect the future Irvington BART Station, shown in **Figure 3,** with the Sabercat Historical Park, shown in **Figure 4**, and calls for an increase in pedestrian and bicycle networks. The Community Plans section identifies a goal of ultimately building a continuous trail from the Irvington District to neighborhoods and the East Bay Regional Parks District in the Fremont hills.
- The **City of Fremont Bike Master Plan (2018)** details the City of Fremont's goals to be a thriving and sustainable community that strives to meet the needs of its citizens, workforce, and visitors in an environmentally sensitive manner. The Plan notes that bicycling as a means of transportation to work, home, and recreational activities requires safe and accessible infrastructure.
- The **Alameda County Transportation Commission (Alameda CTC) Countywide Pedestrian and Bicycle Plans (2015)** establish a vision of a more walkable and bikeable county, and indicate a need for more bike and pedestrian facilities in the City of Fremont.
- The **Irvington BART Station: Station Site Plan Alternatives Study**, released May 24, 2018, defines three conceptual alternatives for the Irvington BART Station, located at the corner of Washington Boulevard and Osgood Road. The preferred site plan alternative shown at the right provides intermodal access to the station and is anticipated to increase access to and through the Irvington District, particularly by bicyclists and pedestrians, with up to 4,200 daily riders accessing this new BART station.

Figure 3: Irvington BART Station Site Plan



Source: City of Fremont, Irvington BART Station Site Plan and Area Plan, Community Meeting #3 November 15, 2018

Figure 4: Sabercat Historical Park with I-680 Sabercat Bridge

Source: City of Fremont 2018

Additionally, the City of Fremont has recently undertaken or is currently advancing several Sabercat Creek and Historical Park developments:

- The **Sabercat Historical Park Sign Program** highlights the Park's unique resources and features and facilitates a self-guided outdoor classroom by providing interpretive educational information including the park's archeological importance, rich history, flora and fauna, and natural resources.
- The **Sabercat Creek Public Access and Riparian Improvement** program is providing critical creek and habitat restoration and other improvements to Sabercat Creek within the Sabercat Historical Park. The project greatly improves public access by connecting two pedestrian access links under Paseo Padre Parkway, providing safety vehicle and ADA access, and repairing existing trails along Sabercat Creek.

3.2. Purpose, Needs & Benefits

Purpose

The I-680 Sabercat Bridge & Trail (Irvington BART to Ohlone College) will increase connectivity by providing a direct, convenient, and safe route for bicyclists and pedestrians to travel from the future Irvington BART Station and East Bay Greenway Trail through Fremont's Irvington District and over the new I-680 Bike & Pedestrian Bridge, connecting to the Sabercat Historical Park, Ohlone College, residential communities and EBRPD areas in the Fremont Hills.

Needs

Lack of Access to Regional Transit and Major Destinations

A connection is needed to create safe bicycle and pedestrian access to and from communities, jobs, schools, and other destinations within the Irvington District. The Irvington BART Station Alternatives Analysis Study projects up to 4,200 new daily riders at the future Irvington BART Station[1], located west of I-680 at the corner of Washington Boulevard and Osgood Road. With BART's Station Access Policy designating pedestrian and bicycle access as the priority modes of access systemwide, multimodal access to this new station is needed. East of I-680, the City of Fremont is highlighting the Sabercat Historical Park as an important regional paleontological destination, as evidenced by a recent program to develop and install interpretive signage throughout the Sabercat Historical Park and along the trail. Additionally, Ohlone College, also east of I-680, serves more than 11,000 students and does not currently have a dedicated, convenient, and safe path from the college to the BART system.

Disconnected Regional and Local Trails

Currently, there is no continuous safe bicycle and pedestrian link from the East Bay Greenway and local bicycle trail network west of I-680 to the local and regional trails east of I-680, including the Sabercat Historical Park and EBRPD trails in the Fremont Hills. The primary impedance of safe and convenient bicycle/pedestrian trail connectivity is the Union Pacific Railroad (UPRR)/BART rail corridor and I-680.

Safe Bicycle and Pedestrian Access Throughout Irvington District

The Metropolitan Transportation Commission's (MTC) Plan Bay Area designates the Irvington District as a Priority Development Area (PDA), categorized as a Transit Town Center. The planned vision includes a walkable neighborhood with mixed use development, infill housing, and walking and biking connectivity improvements around the future Irvington BART Station. The City of Fremont is currently experiencing development demand in the Osgood subarea of the Irvington District. Currently, the Irvington District lacks sidewalks and other bicycle and pedestrian facilities in many places, and is primarily comprised of industrial- and manufacturing-oriented development, which discourages walking and biking. The existing available bikeways are generally on arterial roadways that carry significant traffic volumes, creating the potential for conflict between bicyclists, pedestrians, and automobiles – further exacerbating the unsafe environment for bicyclists and pedestrians.

[1] City of Fremont and BART, Irvington BART Station, Station Site Plan Alternatives Analysis Study, p. 29, May 24, 2018

Benefits

Increased Multimodal Access to Pedestrian, Bicycle, and Regional Transit Network

The I-680 Sabercat Bridge & Trail will increase bicycle and pedestrian access to the regional transit network by creating a dedicated bicycle/pedestrian connection under the UPRR/BART trail corridor and over I-680, developing a link between and increasing access to the future Irvington BART Station and Ohlone College. The future Irvington BART Station is projected to add up to 4,200 new daily BART trips, with more than one-third of boardings occurring by bicyclists and pedestrians[1]. This project will help support anticipated growth in the Irvington District

Enhanced Regional Trail Connectivity between East Bay Greenway, Sabercat Historical Park, and East Bay Regional Parks District Trails in Fremont Hills

The I-680 Sabercat Bridge & Trail will provide connectivity between the East Bay Greenway to the west of I-680 and the Sabercat Historical Park and EBRPD trails on the east of I-680, currently disconnected by the UPRR/BART railroad tracks and the canyon of I-680. The project will close a key gap in the local City of Fremont bicycle network and connect the local network to the regional network, including both the East Bay Greenway trail and the EBRPD trails.

Improved Safety for Irvington District Residents, Employees, and Students

As previously noted, the Irvington District is primarily comprised of industrial- and manufacturing-oriented development, and is lacking in sidewalks and other bicycle and pedestrian facilities, discouraging walking and biking. The trail will create safe access and connectivity for the Irvington District's residents, employees, and students, providing a safe and dedicated bicycle and pedestrian crossing of I-680 between the future Irvington BART station, East Bay Greenway, and other destinations on the west side to residential and recreational destinations to the east, including the Sabercat Historical Park and Ohlone College, which serves over 11,000 students.

Supports California's Environmental Goals to Reduce Greenhouse Gas Emissions

The State of California plans to reduce greenhouse gas emissions by 40% by 2030. This project supports that goal by promoting alternative transportation options, biking and walking, that reduce greenhouse gas emissions. Additionally, this project ties into and supports a multimodal transportation network, supporting a desirable and viable alternative to driving.

Section 4. Issues and Opportunities

The following issues and opportunities, shown in **Figure 5**, form the basis of our conceptual development:

1. **Visionary Interpretation:** The Paleontological Museum is the highlight and anchor of the future I-680 Sabercat Bridge and Trail. Perched on the plateau between I-680 and Osgood Road, the Museum has visibility in all directions and provides a great opportunity for iconic expression.

2. **Curves and Grades:** In connecting the bluff east of I-680 to the intersection of Osgood and Blacow Roads, the trail may descend more than 80 feet in elevation. Driven by accessibility, safety, and drama, creative trail and bridge alignments are a key design consideration.

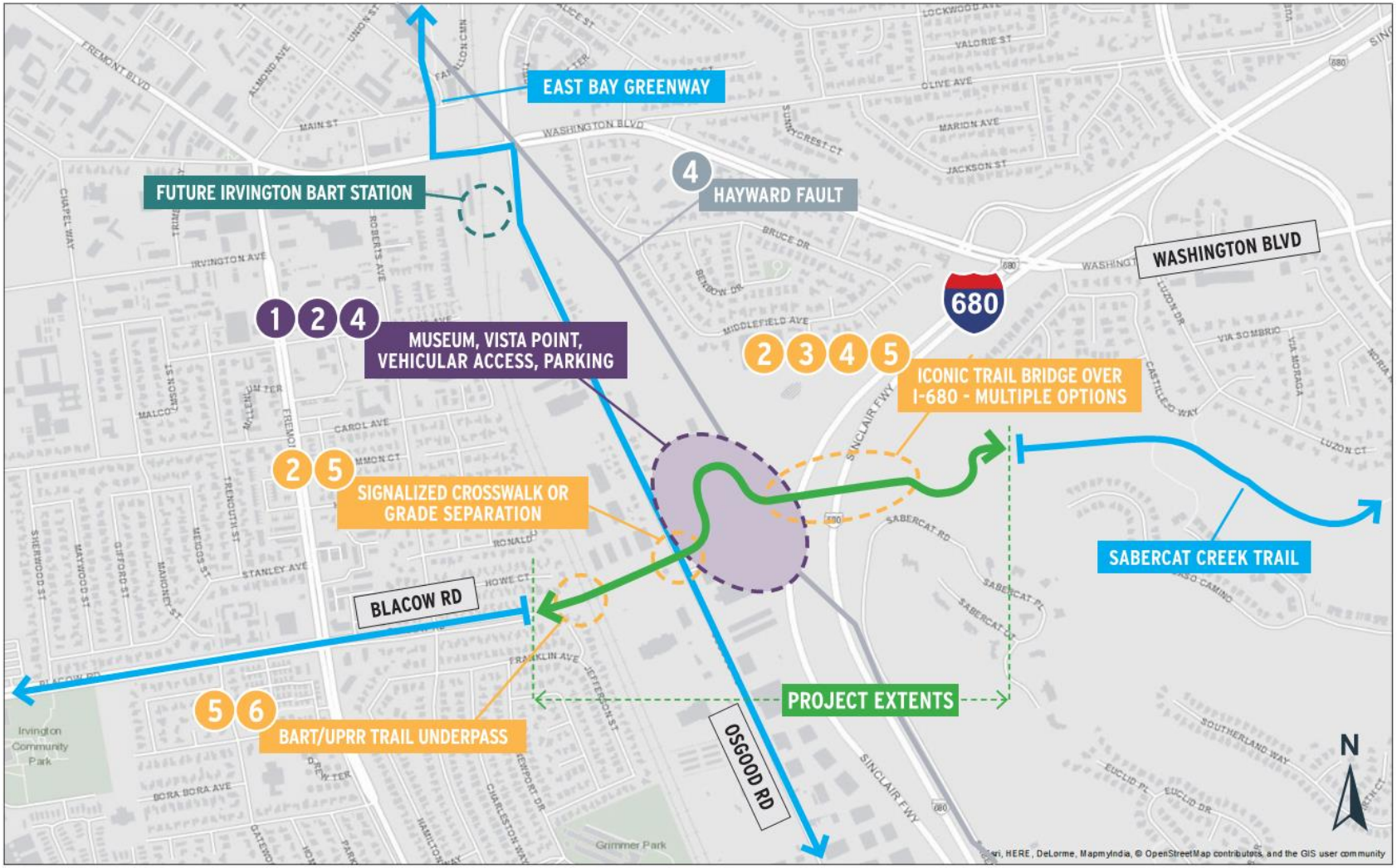
3. **Iconic Bridge:** The site's visibility, topography, and need for long spans call out for a dramatic, iconic bridge. Alternatives of particular interest include a multiple span tied-arch and curved cable-stayed bridge sweeping across I-680, further explored in Section 5.

4. **Shaky Ground:** The Hayward Fault passes through the site, between Osgood Road and I-680. Locating structures to avoid the fault's impact zone is instrumental in site planning.

5. **Over and Under:** Under the UPRR/BART corridor, over or across Osgood Road, and crossing over I-680 – each of these options has specific design and regulatory considerations.

6. **A Trail Nexus:** The intersection of Blacow Road and the UPRR/BART is a major crossroads and could carry the East Bay Greenway from the west to east side of the corridor.

Figure 5: I-680 Sabercat Bridge & Trail Project Issues and Opportunities



Source: HNTB 2018

Section 5. Concept Development

The I-680 Sabercat Bridge & Trail (Irvington BART to Ohlone College) Project involves the following project elements explored in this section:

1. **Blacow Road Elements**
   - A pedestrian/bicycle underpass of the UPRR/BART rail corridor, including approach segments and landscape improvements within the Blacow Road right-of-way (ROW).
   - Improvements within the isolated block of Blacow Road between the rail corridor and Osgood Road to include the trail while maintaining existing vehicular access.
   - Improvements at the Blacow Road and Osgood Road intersection, including an at-grade signalized trail crossing of Osgood Road.
2. **Proposed Museum, Access Road, and Parking**
   - A future Paleontological Museum on the plateau between Osgood Road and the I-680 freeway, including an access road from the intersection of Blacow and Osgood Roads to a combined trailhead/Museum parking lot with 90 parking spaces.
   - An ADA-compliant Class I trail segment connecting the intersection of Blacow and Osgood Roads to the Museum.
   - An ADA-compliant Class I trail segment connecting the Museum to the existing Sabercat Canyon Trail and Sabercat Historical Park, featuring a signature bicycle and pedestrian high-level long-span bridge over the I-680 freeway.
3. **Trail Alignment and Profile**
   - Segment 1 – Osgood Road to Paleontological Museum
   - Segment 2 – Paleontological Museum to West Landing of the Bridge
   - Segment 3 – West Landing of the Bridge to East Landing of the Bridge
4. **Proposed Bridge Alternatives**
   - 3-Tower Curved Deck Cable-Stayed Bridge
   - 4-Span Tied-Arch Bridge

The proposed site plan is shown in **Figure 7.** Additionally, an ADA-compliant trail segment connecting the Museum parking lot to the Gallegos Winery and Irvington BART Station has been explored and is presented in **Appendix A**.

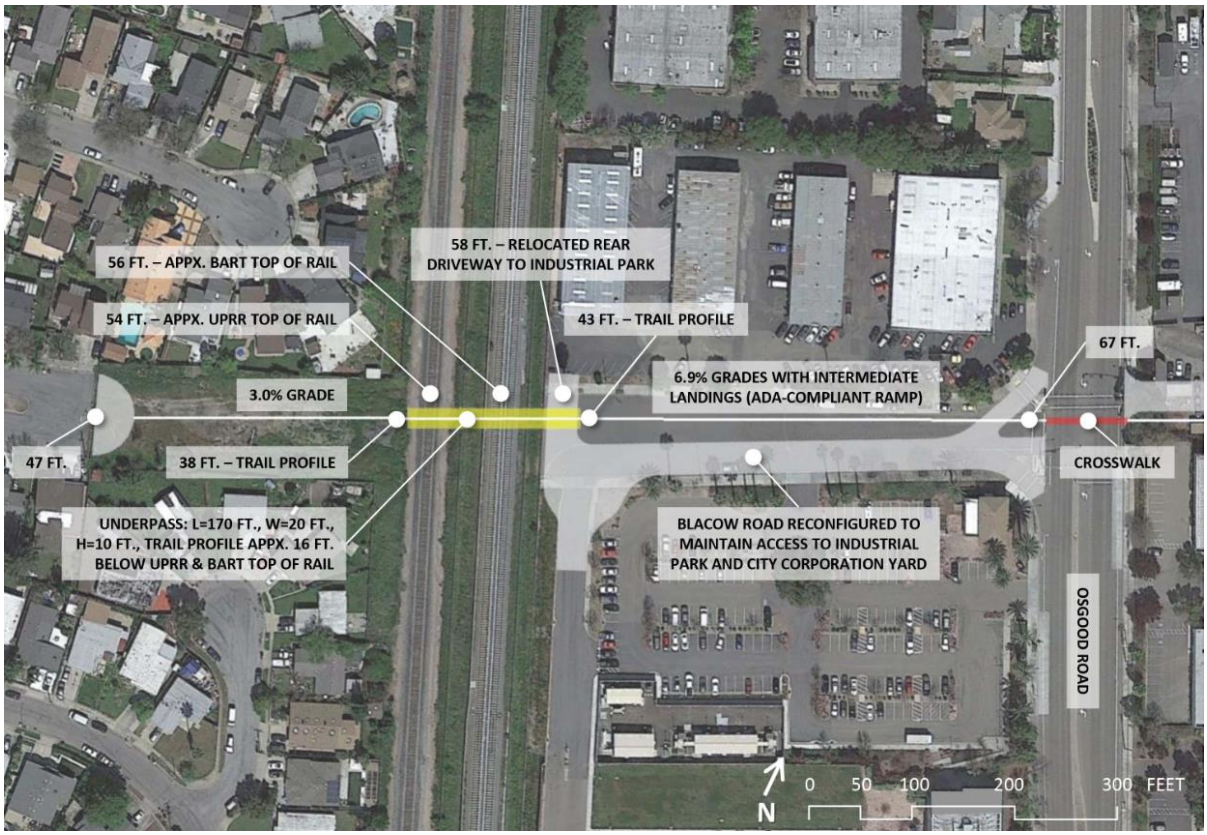
5.1. Blacow Road Elements

At this stage of project scoping, a conceptual profile analysis confirms the feasibility of a tangent (straight, without curves or switchbacks) ADA-compliant trail alignment between the east end of Blacow Road (west of the UPRR/BART rail corridor) and the isolated segment of Blacow Road between the rail corridor and Osgood Road. As this is primarily a technical analysis, urban design, topographic, and landscape elements of the layout should be further developed in the next stage of

project design. The conceptual layout shown in **Figure 6** includes the following elements (in order, from west to east):

- **Blacow Road turnaround to UPRR/BART rail corridor –** Trail descends through an open cut at a gradient of approximately 3% from the turnaround to the west portal of the UPRR/BART underpass. This section is not considered as a ramp under ADA requirements and does not require features such as level landings and handrails.
- **UPRR/BART rail corridor underpass –** For purposes of scoping, the underpass profile is set at approximately 16 feet below UPRR and BART top-of-rail elevations, a generous (conservative) vertical separation that allows a range of structural alternatives to be examined in the next stage of design.
- **UPRR/BART rail corridor to Osgood Road –** Trail ascends through an open cut from the east portal of the underpass to a new crosswalk at the Blacow/Osgood Road intersection. Due to steep topography in this section, an ADA-compliant ramp with intermediate level landings is required. With approximate gradients of 7%, ramp sections are less than the ADA maximum gradient of 8.3% (or 1 in 12).
- **Modifications to Blacow Road –** The layout includes suggested modifications to Blacow Road that maintain the current access to the City of Fremont's Corporation Yard (south of Blacow) and a small industrial park (north of Blacow).

Figure 6: Blacow Road Pedestrian/Bicycle Connection Conceptual Layout



Source: HNTB 2018

5.2. Proposed Museum, Access Road, and Parking

Celebrating and curating the rich paleontological history of the Bell Quarry, the proposed Museum is anticipated to preserve and showcase the history of the area as a public educational center. The conceptual Site Plan generated for this report, shown in **Figure 7**, was developed around the vision of this Museum situated on top of the plateau west of I-680, with potential access to the active Hayward Fault for exploration and educational purposes. The Site Plan is based on the following assumptions developed in the Preliminary Museum Parking Analysis technical memorandum included as **Appendix B**:

- Total area of the Museum: maximum 40,000 square feet over two floors
- Assumed Museum footprint: maximum 20,000 square feet
- Public parking: 90 spaces
- Museum components: Information center, exhibits, library, auditorium, café, scenic overlooks, and back of house spaces for administration, research activities, and curated storage of fossils and other historic artifacts.

The Museum is suggested to occupy a prominent location overhanging the south edge of the plateau between Osgood Road and I-680, overlooking the South Bay and highly visible from northbound traffic on the freeway. The footprint is located 100 feet from the assumed trace of the Hayward Fault. The trace of the fault is shown on the Site Plan with approximation for preliminary planning purposes only, and is to be confirmed prior to the next study phase. Sharing a common path with the trail, vehicular access to the Museum is by a 30-foot-wide, 2-way access road ascending from the intersection of Blacow and Osgood Roads to a pick-up/drop-off curbside in front of the Museum. The roadway curves around a parking lot occupying the center of the plateau. The access road and parking lot are intended for development in the initial construction phase of the trail and bridge and can be used for trailhead parking prior to the development of the Museum.

The site considered for the Museum, parking lot, and access road between I-680 and Osgood Road is currently California Department of Transportation (Caltrans) ROW. Most of the existing soil is deposited fill from the construction of I-680. Per a preliminary coordination meeting with Caltrans, some of the fill in the site contains aerially deposited lead (ADL). This will require further study during the environmental clearance phase to identify how ADL will impact future developments and the construction process. All structural development, including the Museum, will require geotechnical studies to identify proper type of foundation or pre-construction consolidation of the fill. Given the high-likelihood of encountering large fossils of the pre-historic era in the site, it is recommended to perform a paleontological investigation or use advanced technologies such as LIDAR (Light Detection and Ranging) to scan and identify the location and depth of existing artifacts in order to determine impacts on design alternatives in terms of placement of structural foundations, such as deep piles.

Figure 7: I-680 Sabercat Bridge & Trail Project Site Plan

Source: HNTB 2018

5.3. Proposed Trail Alignment and Profile

This study assumes the trail to have an easement width of 20 feet, allowing a comfortable cross-section for later refinement of a 12 to 16-foot-wide paved trail with safety shoulders. The bridge deck is estimated at 16 feet wide. Elevation gain is the principal controlling factor determining the alignment and profile of the trail. From the intersection of Blacow and Osgood Roads to the west end of the existing Sabercat Canyon trail, as extended to the bluff overlooking I-680, the trail climbs 84 feet over a straight line distance of 1600 feet. The approximately 2,700-foot curved route of the trail is designed to never exceed a gradient of 5% so that it does not trigger ADA required elements such as handrails and regularly-spaced intermediate landings. This alignment is based on conceptual-level topography from the Digital Terrain Model (DTM) in Google Earth shown in **Figure 8**, thus all spot elevations are approximate. From west to east, the trail includes the following segments:

- **Segment 1 – Osgood Road to Paleontological Museum**

  The trail follows the alignment of the proposed access road climbing from an elevation at Osgood Road of 70 feet to an elevation at the Museum of 110 feet. The length of Segment 1 is 890 feet with an average gradient of 4.5%.
- **Segment 2 – Paleontological Museum to West Landing of the Bridge**

  The trail follows a curving path up the hill toward the bridge, climbing from an elevation at the Museum of 110 feet to an elevation at the bridge's west landing of 135 feet. The length of Segment 2 is 548 feet with an average gradient of 4.6%.
- **Segment 3 – West Landing of the Bridge to East Landing of the Bridge**

  Starting at the highest point on the plateau between Osgood Road and I-680, the alignment of the bridge ascends at a gentle gradient, extending the benefits of ADA-compliant access to the east landing. The elevation at the west landing is 135 feet and the elevation at east landing is 154 feet. The length of the bridge is 820 feet with an average gradient of 2.3%.

5.4. Proposed Bike & Pedestrian Bridge Alternatives

During development of this Scoping Report, three conceptual bridge alternatives were discussed with the City of Fremont: a 4-span tied-arch bridge, a 3-span (twin-tower) cable-stayed bridge with a tangent deck, and a 4-span (3-tower) cable-stayed bridge with a curved deck (shown in **Appendix C**). Two alternatives have been carried forward into this report: the 4-span tied-arch bridge, and the 4-span (3-tower) cable-stayed bridge with curved deck. Both alternatives are further detailed in this section.

Elements common to both alternatives include the locations and layouts of the west and east landings, the span length and profile including elevations and gradients, and an assumed deck width of 16 feet. For both alternatives, the median support between I-680 NB and SB is recommended due to the vicinity of the active Hayward fault. The near-fault impact on relatively soft superstructure could pose large lateral displacement on the towers, and a median support would increase structural stiffness and reduce the displacement considerably. The median support should be studied and placed such that it accommodates both a median support with large pile cap and future highway widening, including the current effort to add express lanes on I-680 (**see Appendix D**), without impact on the bridge structure.

Figure 8: Preliminary Topographic Analysis

Source: HNTB 2018

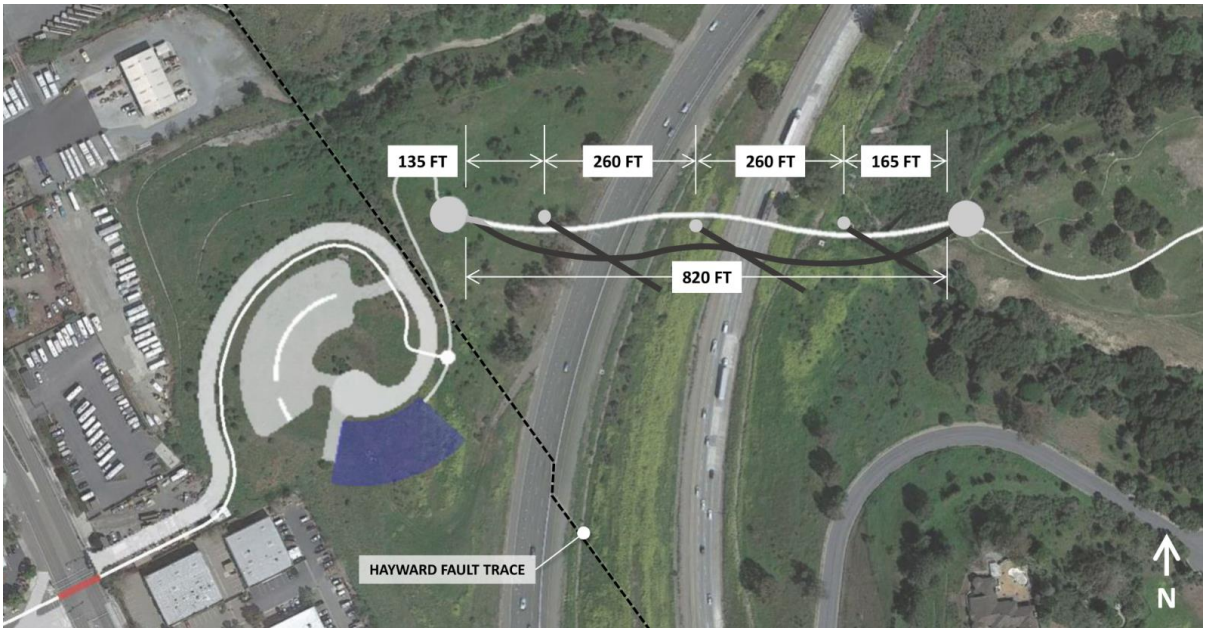
Alternative 1: 4-Span Cable-Stayed Bridge with Curved Deck

This alternative provides a polished and modern aesthetic consisting of three cable-stayed segments. As shown in **Figure 9**, each segment consists of a central tower supporting two spans of roughly equal length, resulting in two main spans of 260 feet each and two approach spans of 135 feet (west approach) and 165 feet (east approach). The proposed design offers a dynamic architectural feature with a deck that curves gracefully back and forth and wraps around the bridge towers. Like the piers of the tied-arch alternative, the bridge towers are placed to avoid impacts on freeway operations and natural conditions in the Sabercat Creek drainage area between the freeway and the east landing.

The maximum clearance height from the ground level to the deck is about 28 feet with towers reaching a height above the deck of about 80 feet. The conceptual sketch in **Figure 10** shows simple vertical tubular towers – however, as with the tied-arch alternative, other design variations and aesthetics may be explored and addressed during further study. Some of these include the shapes and proportions of the towers, the use of twin-member ("V" or "A-Frame") instead of single-member towers, towers that lean out or lean in, aspect ratios (tower heights in comparison to span lengths), a variety of cable patterns and densities, and viewing areas along the span that wrap around the towers.

In comparison to the self-contained nature of tied-arches, a cable-stayed bridge is likely to be more time consuming to construct with additional potential traffic delays over an active freeway. Often, such bridges are constructed on falsework, or ground-based temporary support spans with portals that allow traffic to pass through. However, an option that may minimize freeway impacts involves launching the spans from the already-constructed towers. Launching is feasible if the spans from each tower are roughly of equal length, as is the case with this alternative. This approach can reduce the construction impacts on active highway but is likely to result in an increase of the construction cost.

Figure 9: Bridge Alternative 1 – 4-Span Cable-Stayed Bridge with Curved Deck Plan



Source: HNTB 2018

Figure 10: Bridge Alternative 1 – 4-Span Cable-Stayed Bridge with Curved Deck Sketch

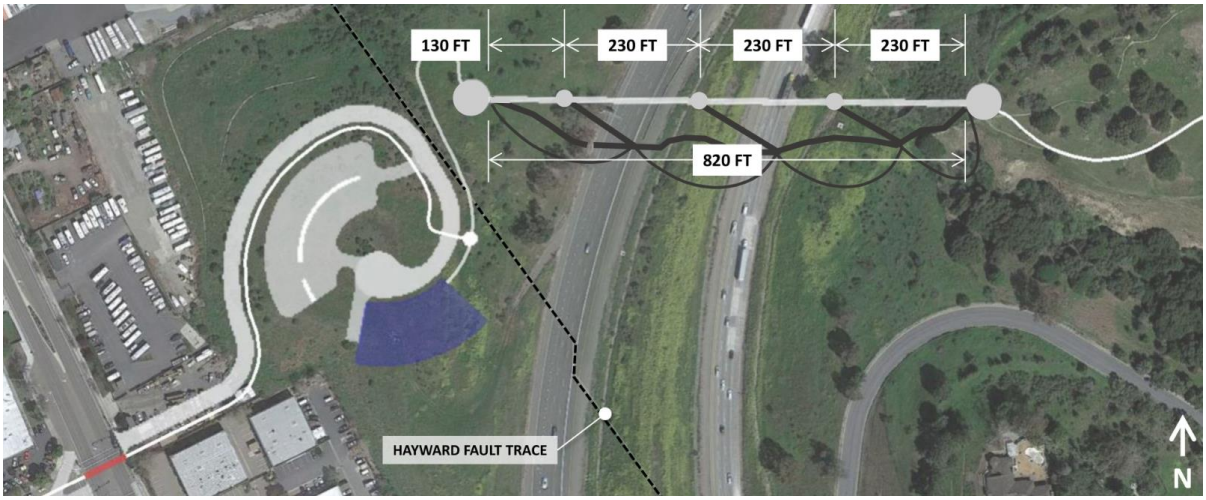
Source: HNTB 2018

Alternative 2: 4-Span Tied-Arch Bridge

As shown in **Figure 11** and
Figure 12, the 4-Span Tied-Arch alternative consists of a tangent (straight) deck with an overall span length of about 820 feet. The total bridge length is divided into four spans: three tied-arch spans of 230 feet each, augmented by a shorter tied-arch span of 130 feet at the western end of the bridge. The spans are supported at the west and east landings and by three tall columns (or "piers"), one west of the freeway and two between the freeway and the east landing. The maximum pier height is about 25 feet from the ground level to the deck, and the main height of the arches above the deck are about 30 feet for the short span and 45 feet for the long spans. The arch dimension could vary depending on the desired aesthetics of the bridge and structural requirements. Although the conceptual sketch
Figure 12 shows vertical double-member arches for clarity, many exciting variations can be explored in future design development. Examples include double-member arches that lean out ("butterfly") or lean in ("basket handle"), single member arches, aspect ratios (arch heights in comparison to arch lengths), "network" arches (use of crossed, diagonal deck hangers in lieu of straight hangers), and the use of dramatic parabolic or elliptical arch curvatures. While complex geometric elements would positively impact the aesthetics of the design, they are also likely to result in cost increases.

The tied-arch bridge alternative is generally easier to construct as it minimizes freeway closure and results in a reduction in cost due to some of the pre-fabricated and redundant pieces and independent adjacent spans that allow the structure to be lifted in place. Tied-arches are self-contained structural units that can be assembled off-site or in an adjacent staging area and lifted into place by cranes, resulting in limited impact on freeway operations. It is estimated that placing the spans of this bridge could be accomplished within a 24-hour freeway shutdown. Due to the structural redundancy and use of less steel, the tied-arch bridge alternative is typically less expensive than the cable-stayed bridge alternative. Additionally, the independent adjacent spans make it easier to predict the behavior of the bridge caused by seismic or wind impacts and result in less costly future maintenance and repairs. For cohesive visual harmony of the bridge with the natural environment, the height of the arches can vary to mimic a cascade look of the variable height of hills in the area.

Figure 11: Bridge Alternative 2 – 4-Span Tied-Arch Bridge Plan



Source: HNTB 2018

Figure 12: Bridge Alternative 2 – 4-Span Tied-Arch Bridge Sketch

Source: HNTB 2018

Bridge Option Comparison

Each proposed option offers multiple benefits as well as constraints. Both the tied-arch and cable-stayed bridges are visually compelling, and can be further enhanced by the use of materials, height and scale, fencing, lighting, and other aesthetic treatments. Both bridge options offer Class I connections to the Sabercat Historical Park over an architecturally iconic bridge structure.

Both bridge options will also require significant coordination with Caltrans regarding ROW encroachments and operations over I-680 and may result in temporary I-680 shutdowns, lane closures or traffic delays. Depending on the bridge type, the duration and extent of potential impacts will vary. Coordination with other state and local regulatory agencies to obtain other permits may be necessary.

A ranking of the impacts of each of the bridge options is detailed in **Table 2** below.

Table 2: Comparison of Project Impacts by Bridge Type

Type of Impact	Alternative 1: 4-Span Cable-Stayed Bridge with Curved Deck	Alternative 2: 4-Span Tied-Arch Bridge
Environmental	More Complex	More Complex
Traffic	Low	Low
Future Maintenance and Inspections	Low	Low
Constructability	More Complex	Less Complex
Bridge Costs (in 2018 dollars, exclusive of UPRR/BART underpass)	~$42.1 M	~$23.4 M

Each of the proposed bridge options provides the City of Fremont with several choices and tradeoffs. For the sole purpose of refining a focused delivery plan in this scoping report, the 4-Span Cable-Stayed Bridge with Curved Deck alternative shown in **Figure 13** has been used due to its monumental design. In selecting a final bridge option, the City of Fremont will continue to include local stakeholder input as this project progresses.

Figure 13: Selected Alternative – 4-Span Cable-Stayed Bridge with Museum

Source: HNTB 2018

Section 6. Project Delivery Plan

6.1. Caltrans Coordination

The City conducted an informational meeting with Caltrans to understand the extent of the permit procedure for the I-680 Sabercat Bridge & Trail project. The City of Fremont intends to use the information gathered from the meeting to connect with the Alameda CTC to ensure alignment with all coordinating and funding agency guidelines.

Permitting

To identify the ideal permit process for this project, it is recommended that the City of Fremont identifies available funding sources. However, assessing the current scope of work and the conceptual level design documents, it is suggested that the project proceeds with a Project Study Report – Project Development Support (PSR-PDS) for Caltrans.

The PSR-PDS is a streamlined Project Initiation Document (PID) documentation process that does not require the same level of engineering completion as required by a conventional PSR. The PSR-PDS process was adopted by Caltrans in 2011 and includes the following:

- Identification of available funding in order to achieve project approval;
- Project cost estimates of engineering, construction, and ROW acquisition;
- Programming and planning of capital outlay support for Project Approval and Environmental Document (PAED).

The PSR-PDS process typically requires a pre-PID meeting with Caltrans to properly develop the scope, cost and schedule for the improvement of the Caltrans ROW and to establish performance measures that ensure projects goals are achieved. The PSR-PDS is expected to expedite project funding through PAED and improve clear communication between Caltrans and local agencies such as the City of Fremont. Caltrans has responded positively from the initial phase of project development to meeting requests and approves of being included throughout the project.

Right-of-Way

Caltrans is aware that the Sabercat project will not require additional on-ramp or off-ramp connections to I-680; however, there is the potential of including a bridge column in the median of I-680. To address this matter, it is advised that the following items be considered during the design process:

- The bridge profile and column placement of the median located adjacent to the shoulders will require accommodation for the ultimate build option of the I-680 freeway (this includes the express lanes and future auxiliary lanes on both northbound and southbound). More specifically, column placement should be positioned in such a way that future freeway widening will not require any bridge modification in its configuration. The width of the existing median has been determined to be wide enough to securely place the column while concurrently complying with Caltrans requirements. Additionally, it has been determined that Caltrans will

provide the vision for the future expansion of the I-680 that will be considered during the bridge design and support placement.

- The area west of I-680 is currently a part of Caltrans ROW. This site has been identified by the City of Fremont for the bridge abutment, trail(s), museum, access roadway (from Osgood Road) and parking lot. Due to Caltrans ownership of this area, there is the potential that this area will be utilized by Caltrans for construction staging activities and maintenance during I-680 Express Lane project. Caltrans will confirm this need and coordinate with the City of Fremont to seek the potential for ROW transition to the City and establish proper easement agreements with the City.

6.2. Environmental

Caltrans has identified that the area West of I-680 includes a significant amount of artificial fill dating back to the 1960's. The fill activities have been recorded by Caltrans since 2001 and can be shared with the City of Fremont in order to identify the impact on the design. It has also been noted that the fill is contaminated with Aerially Deposited Lead (ADL) and applies to the fill in the median of I-680. Although the area can be disturbed, the City will need to properly remove and dispose the contaminated soil. This will be more expensive than disposing of regular soil and will require the involvement of Caltrans' Environmental Engineering group during the initial stage of the project.

Caltrans has informed the City of Fremont that there is a considerable chance that the project will encounter pre-historic fossils at the site for the bridge abutment west of the freeway and for the median as well. This will require the involvement of a Paleontology team that shall investigate the site and recommend the relocation site of the fossils. It is anticipated that fossils within the project development site will need to be removed prior to the start of construction and properly stored until they are transferred to the proposed project museum.

A CEQA Initial Study/Mitigated Negative Declaration (IS/MND) is the initial recommendation as the appropriate level of environmental document for the project; however, this is contingent on mitigation measures reducing impacts to less-than-significant. The I-680 Bike & Pedestrian Trail is located on or near known sensitive and unique environmental resources from paleontological, historical, biological, and hydrological standpoint. Scoping, as part of an Initial Study, is needed to determine agency, stakeholders, and public concerns, the feasibility and availability of mitigation measures and design refinements, and if there is a fair argument that there is the potential for significant environmental impacts. If documentation, mitigation, and design refinements do not conclusively show that there will not be a significant impact, an EIR will need to be prepared. This project does not qualify for any Statutory or Categorical Exemptions.

NEPA documentation will likely be needed in the event that:

- The project seeks funds from California's Active Transportation Program (ATP), which includes federal funds;
- Initial scoping identifies potential impacts to federally-listed species or their habitats (e.g., California red-legged frog, California tiger salamander, or Alameda whipsnake);

- Other federal permits are required, such as U.S. Army Corps of Engineers permit (e.g., for impacts to jurisdictional waters such as Sabercat Creek).

Determination of the NEPA lead agency will need to be done to assess if there is a Categorical Exclusion available for the project. Although the FHWA has a Categorical Exclusion for construction of bicycle and pedestrian paths and facilities, significant impacts on the environment may require a FONSI or EIS to be prepared.

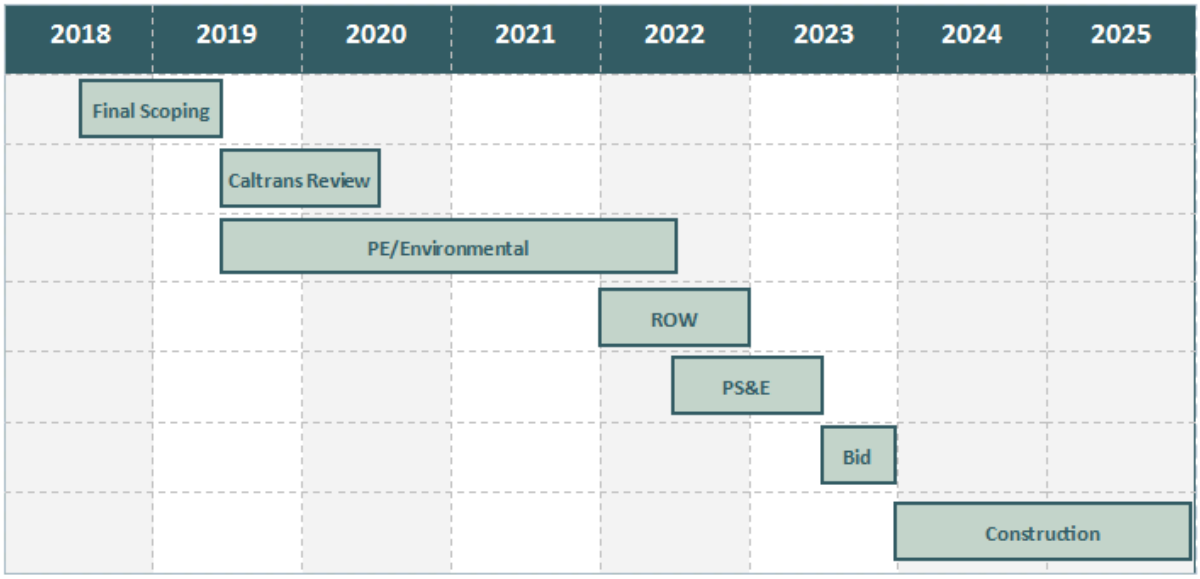
The following environmental factors will require analysis and documentation in support of CEQA/NEPA documents:

- Aesthetics – visual impacts of the bridge and the museum building;
- Cultural Resources – impacts to unique paleontological and historic/archaeological resources;
- Geology and Soils – proximity to Hayward fault requires assessment of seismic risks to the public;
- Hazards/Hazardous Materials – assess presence of aerially deposited lead on the site, as well as potential for other soil contaminations;
- Hydrology and Water Quality – impacts to Sabercat Creek and other jurisdictional waters, storm water pollution due increase in impermeable surfaces with 40,000 square foot visitor center plus parking lot. Project footprint may overlap special flood hazard areas (100- year flood zones around Sabercat Creek and Line K;
- Recreation, pedestrian and bike path connectivity and coherence with the master bike plan developed by the City of Fremont;
- City and other stakeholders/agencies operation and public services – assess impacts and effects of the project construction and operation on recreational resources as well as local utility owners within the future development site;
- Biology – impacts to special-status species and natural riparian habitat;
- Transportation – addition of grade separation or signalized crosswalk, bridge over 680, BART/UPRR underpass could affect transportation on Caltrans facilities, public transit, and bike and pedestrian facilities.

6.3. Approximate Schedule

Caltrans has determined that their review process will take between 6 months and a year. Following Caltrans review, the schedule shown in **Figure 14** is approximated assuming funding beginning in fiscal year 2020-2021. The preliminary engineering (PE) and environmental work could start in 2020 and be completed in 2022. ROW acquisition can start and be completed in 2022. Project Plans, Specifications, and Estimates (PS&E) can be finalized in 2023 and the project can go out to bid for construction. Construction of this project can be completed by the end of 2025. This is an approximate schedule based on the estimated duration for each process. A more accurate schedule will be detailed in the next phase of project development.

Figure 14: Approximate Delivery Plan Timeline (in calendar years)



6.4. Conceptual Cost Estimate

Scoping level cost estimates are summarized in **Table 3** and represent probable project costs based on currently available information. Further refinement is needed as project definition and details are determined. While the bridge alternatives, UPRR/BART underpass, and Museum cost estimates are each shown as standalone pieces (so that the project can be developed in phases), all environmental work is assumed to be completed with the initial bridge and trail phase. Agency costs of 10% are assumed regardless of bridge type. ROW costs are not included and are to be determined as the City of Fremont will negotiate ROW acquisition with Caltrans. A detailed cost estimate is included in **Appendix E**.

Table 3: Cost Estimate Summary (in 2018 dollars, millions)

Phase	*Alternative 1: Cable-Stayed Bridge*	*Alternative 2: Tied-Arch Bridge*	*UPRR/BART Underpass*	*Museum*
PE/Environmental	$ 2.5	$ 2.1	$ 0.2	$ 0.7
Final Design	$ 2.5	$ 1.3	$ 0.5	$ 2.0
Construction	$ 33.7	$ 16.7	$ 6.5	$ 26.0
Agency Costs	$ 3.4	$ 3.4	$ 0.7	$ 2.6
Total Project Cost	**$ 42.1**	**$ 23.4**	**$ 7.8**	**$ 31.2**

Minor discrepancies in totals are due to rounding.

6.5. Prospective Funding

In order to effectively and strategically deliver this project, the City of Fremont should consider a segmented approach to funding – identifying and pursuing those sources focused on bicycle and pedestrian facilities as well as sources focused on the Museum.

Bicycle and Pedestrian Funding

Funding sources for bike and pedestrian trails and bridges is commonly derived from several programs at the local, state, and federal levels. While Federal funding is facing increasing uncertainty, State transportation funding is experiencing a boon starting in Fiscal Year 2018 with the establishment of Senate Bill 1 (SB1). Local Alameda County funding increased after the passage of Measure BB in 2014, and Regional Measure 3, passed in June 2018, is providing a further influx of funding to transportation projects in the Bay Area.

Many successfully funded bicycle and pedestrian trail projects have utilized the following strategies:

- Pursue multiple funding sources;
- Incorporate project in City, County, and Regional Master Plans and other Planning documents to ensure funding eligibility;
- Garner public support amongst stakeholders, including local officials and community members;
- Remain flexible with project development and use project phasing to stagger funding over time.

Local Funding – Alameda CTC

In November 2014, more than 70% of Alameda County voters approved Measure BB, a sales tax measure dedicated to supporting transportation projects in Alameda County. Measure BB augments the existing Measure B half-cent transportation sales tax by an additional half-cent and extends the full-cent tax through spring of 2045.

Measure BB dedicates 8% of total available funding to bicycle and pedestrian projects, an increase from the previous transportation sales tax in Alameda County, Measure B – a result of increasing demand and support for active transportation projects.

- Two percent of total funds, or $154 million, support a discretionary grant program for bicycle/pedestrian projects – funding for which the I-680 Sabercat Bridge & Trail is eligible. It is worth noting, however, that the regional funding needs for bicycle and pedestrian projects far outweigh the funding likely to be available through Measure BB. The 2012 Alameda Countywide Pedestrian and Bicycle Plans identify a $1.9 billion funding gap for Alameda County's bicycle and pedestrian infrastructure needs between 2012 and 2040[2].

[2] Alameda CTC, Alameda County Priority Development Area Investment and Growth Strategy, p. 44, May 2017

- Three percent of total revenues are allocated directly to cities in Alameda County to support bicycle and pedestrian projects. The City of Fremont's bicycle and pedestrian Direct Local Distributions (DLDs) for fiscal year 2019 are projected to total $615,594.60[3].

Alameda CTC administers Measure BB and other local, regional, state, and federal funds through their 5-year Comprehensive Investment Plan (CIP). Alameda CTC is currently determining how to program their 2020 CIP, which will go to the Commission for approval in the Spring of 2019. Funding allocations in the 2020 CIP will be for fiscal years 2020-2024.

In order for bicycle and pedestrian projects to be eligible for funding sources administered through Alameda CTC, implementing agencies must have adopted Pedestrian and Bicycle Master Plans as well as a Complete Streets policy. The City of Fremont adopted an updated Bicycle Master Plan in 2018 and adopted a Complete Streets Policy in 2013.

Regional Funding – Regional Measure 3

Regional Measure 3 (RM3), passed in June 2018, will address the region's population and jobs growth by raising bridge tolls to invest $4.5 billion in the region's transportation network to relieve traffic congestion and improve travel through the Bay Area. While much of the funding is focused on public transit improvements and traffic bottleneck relief, $150 million is dedicated to expanding the San Francisco Bay Trail and improving public transit access for bicyclists and pedestrians. Given the I-680 Sabercat Bridge & Trail's potential to improve access for bicyclists and pedestrians to the BART system and other transit operators, the project could be competitive for RM3 funding.

State and Federal Funding – Active Transportation Program

The State of California administers the Active Transportation Program (ATP), which consolidated federal and state transportation programs into a single program focused on increasing active modes of transportation such as walking and biking. ATP funding cycles cover four fiscal years and are programmed every other year in the odd-years. In July 2018, the California Transportation Commission (CTC) concluded the application period for ATP Cycle 4, which will program $440 million for fiscal years 2020-2023. The next round of ATP funding is anticipated in 2020 for fiscal years 2022-2025. Sources of funds administered through the ATP include:

- Federal funds from the Recreational Trails Program (RTP), which provides funds to the States to develop and maintain recreational trails and trail-related facilities for both nonmotorized and motorized recreational trail uses. The RTP is an assistance program of the Department of Transportation's Federal Highway Administration (FHWA). The Fixing America's Surface Transportation (FAST) Act reauthorized the Recreational Trails Program (RTP) for Federal fiscal years 2016 through 2020 as a set-aside of funds from the Transportation Alternatives (TA) Set-Aside under Surface Transportation Block Grant Program (STBG). For FY2018, the State of California received $5.76 million for the RTP.
- State funds from Senate Bill 1 (SB1), signed on April 28, 2017, which increased funding through the ATP by $1 billion over the next ten years ($100 million annually).

[3] Alameda CTC, 2014 Measure BB Sales & Use Tax Revenue Allocations, Projection May 10, 2018

Funding from the ATP program will support California's ambitious goals to double walking and triple bicycling trips by 2020, reduce bicycle and pedestrian fatalities by ten percent each year, and enhance public health and improve air quality by reducing greenhouse gas emissions. The program is directed to encourage increased use of active modes of transportation by funding bicycle and pedestrian projects that will lead to improved connections between local and regional roads, public transit, and intercity and passenger rail. As well, at least ¼ of ATP funds are designated for use in disadvantaged communities. Currently, ATP grants require a 20% local match to maximize project scoring, which allows the City of Fremont to leverage local funding to secure additional State funding.

State Funding – Urban Greening Grant

The California Natural Resources Agency administers the Urban Greening Grant Program, which funds projects that transform the built environment into places that are more sustainable, enjoyable, and effective in creating healthy and vibrant communities. The Urban Greening Grant seeks to establish and enhance parks and open space, using natural solutions to improving air and water quality and reducing energy consumption, and creating more walkable and bikeable trails. Round 3 of the Urban Greening Grant Program, which will administer $19 million in grants to selected projects, is anticipated to begin workshops in early 2019.

Museum Funding

There are a number of different types of funding sources for which the Museum could be eligible, including parks funding, and the City should stay apprised of and track these opportunities for availability. Sources include:

- The California Department of Parks and Recreation and its Office of Grants and Local Services (OGALS) has administered grant programs which generally address park, recreation and resources related needs. Some of these have been one-time only (Outdoor Environmental Education Facilities Grant Program) or focus on the state's most critically underserved communities.
- The California Natural Resources Agency administers the Museum Grant Program and is anticipated to award a total of $1 million biennially for small museum projects. The next solicitation is anticipated in 2020 with awards in 2021.

APPENDICES

APPENDIX A

GALLEGOS WINERY TRAIL AT IRVINGTON BART STATION STUDY

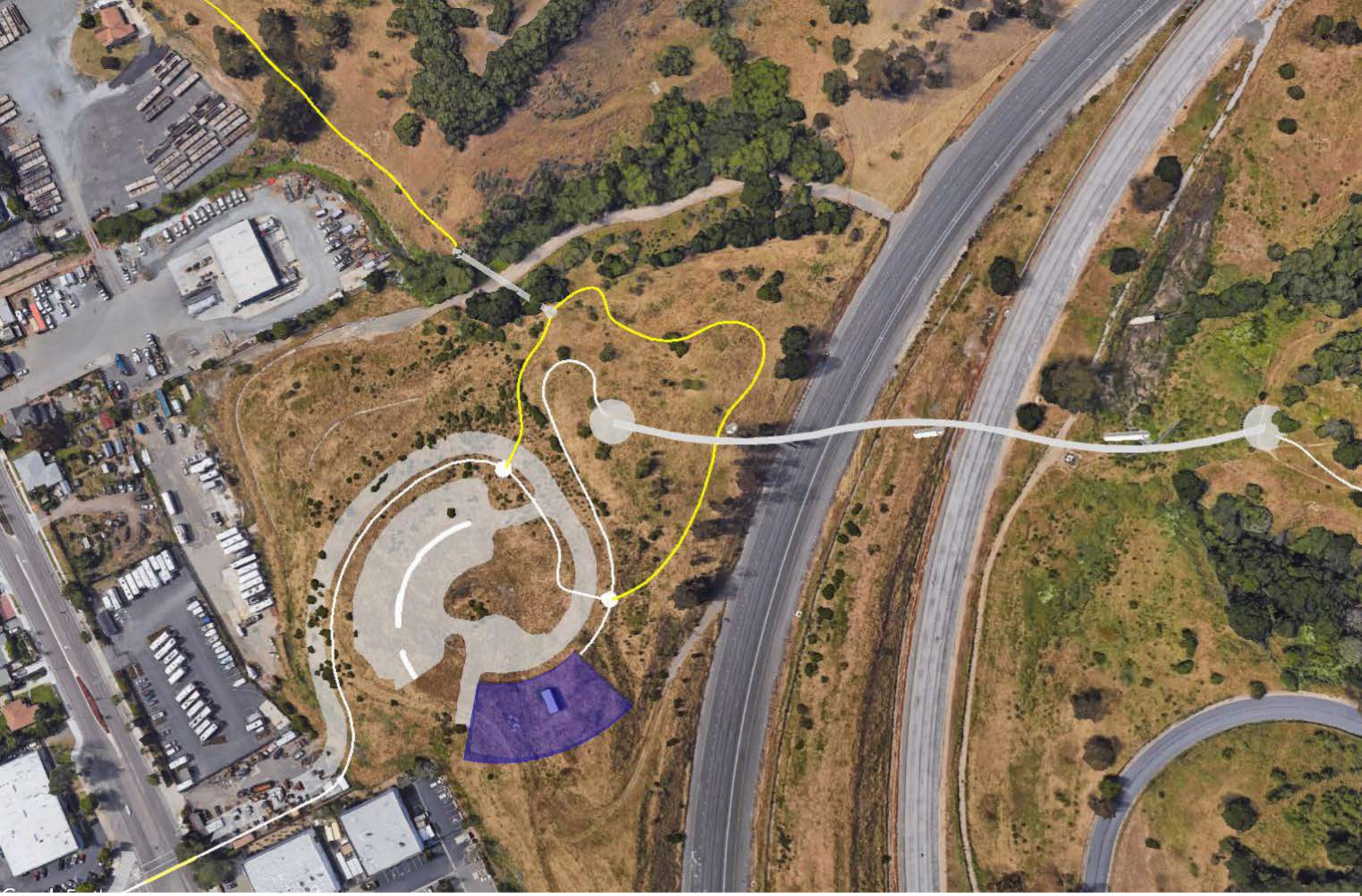
SABERCAT BRIDGE & MUSEUM – CONCEPTUAL FOOTPRINT AND SITE PLAN

SABERCAT BRIDGE & MUSEUM – RELATIVE TOPOGRAPHY (5 FOOT CONTOURS)

Gallegos Winery Trail Study

Potential Trail Connection Between Irvington BART Station and Proposed Paleontological Musuem, I-680 Bike & Pedestrian Trail, and Bridge

Aerial View of Gallegos Winery Trail connecting Irvington BART Station with I-680 Sabercat Bridge and Trail and Museum



Aerial View of Gallegos Winery Trail connection at I-680 Sabercat Bridge and Trail and Museum

View of Gallegos Winery Trail connection at I-680 Sabercat Bridge and Trail and Museum - Looking East toward I-680

View of Gallegos Winery Trail connection at I-680 Sabercat Bridge and Trail and Museum - Looking Northeast toward I-680

View of Gallegos Winery Trail connection at I-680 Sabercat Bridge and Trail and Museum - Looking North toward Irvington BART Station

View of Gallegos Winery Trail connection at Irvington BART Station - Looking North toward Washington Boulevard

View of Gallegos Winery Trail connection at Irvington BART Station - Looking Southeast toward I-680 Sabercat Bridge & Trail

APPENDIX B

PRELIMINARY MUSEUM PARKING ANALYSIS

SABERCAT PALEONTOLOGICAL MUSEUM - PRELIMINARY PARKING ANALYSIS

Conceptual Planning Assumptions:

Gross floor area (GFA):	40,000 sq. ft.	
Number of floors:	2	
Ground area ("footprint"):	20,000 sq. ft.	
Spatial allocation:		
Public areas (PFA):	1/3 GFA = 13,333 sq. ft.	– Includes exhibit spaces, theater, food service, restrooms, library, book shop, corridors, etc.
Staffed areas:	1/3 GFA = 13,333 sq. ft.	– Incudes offices, laboratories, break room, restrooms, kitchens, back-of-counter service areas, etc.
Non-staffed areas:	1/3 GFA = 13,333 sq. ft.	– Includes curatorial storage, general storage, mechanical rooms, shipping/receiving, etc.
Parking site area:	300 sq. ft. per space	– Assumes 200 sq. ft. per space plus 100 sq. ft. for vehicular circulation.

Examples of Museum Parking Standards:

Buellton, CA:	1 space per 300 sq. ft. GFA, + 1 space per 2 employees
Houston, TX:	1 space per 300 sq. ft. GFA of exhibit space
Malibu, CA:	1 space per 250 sq. ft. GFA
Savannah, GA:	1 space per 400 sq. ft. PFA
Santa Ana, CA:	1 space per 200 sq. ft. PFA
	1 space per 300 sq. ft. of staffed areas
ITE Peak Parking Demand rate:	2.61 spaces per 1000 sq. ft. PFA

Example 1 – Sabercat Museum Parking Calculation – Same requirements for public and staffed areas:

Total GFA:	40,000 sq. ft.
Public and staffed areas:	26,666 sq. ft. @ 1 space per 300 sq. ft. = 89 spaces
Non-staffed areas:	13,333 sq. ft. (no parking assumed)
TOTAL spaces:	**89 spaces**
Parking site area:	26,700 sq. ft.

Example 2 – Sabercat Museum Parking Calculation – Example 1 with ITE Peak Parking Demand rate:

Total GFA:	40,000 sq. ft.
Public areas (PFA):	13,333 sq. ft. @ 2.61 spaces per 1,000 sq. ft. = 35 spaces
Staffed areas:	13,333 sq. ft. @ 1 space per 300 sq. ft. = 45 spaces
Non-staffed areas:	13,333 sq. ft. (no parking assumed)
TOTAL spaces:	**80 spaces**
Parking site area:	24,000 sq. ft.

Example 3 – Sabercat Museum Parking Calculation – Based on Savannah parking standards:

Total GFA:	40,000 sq. ft.
Public areas (PFA):	13,333 sq. ft. @ 1 space per 400 sq. ft. = 34 spaces
Staffed areas:	13,333 sq. ft. @ 1 space per 300 sq. ft. = 45 spaces
Non-staffed areas:	13,333 sq. ft. (no parking assumed)
TOTAL spaces:	**79 spaces**
Parking site area:	23,700 sq. ft.

Recommendation:

89 parking spaces (parking area of 26,700 sq. ft.). Although 89 (Example 1) is the highest parking count of the three examples, the lot also supports a regional trailhead and must accommodate trail users in addition to museum patrons. For purposes of Project Scoping, a more conservative (higher) parking count is considered as prudent for conceptual planning. (Note that the Museum Conceptual Footprint and Site Plan rounds the parking count to 90 spaces.)

Rick Phillips, 11/23/18

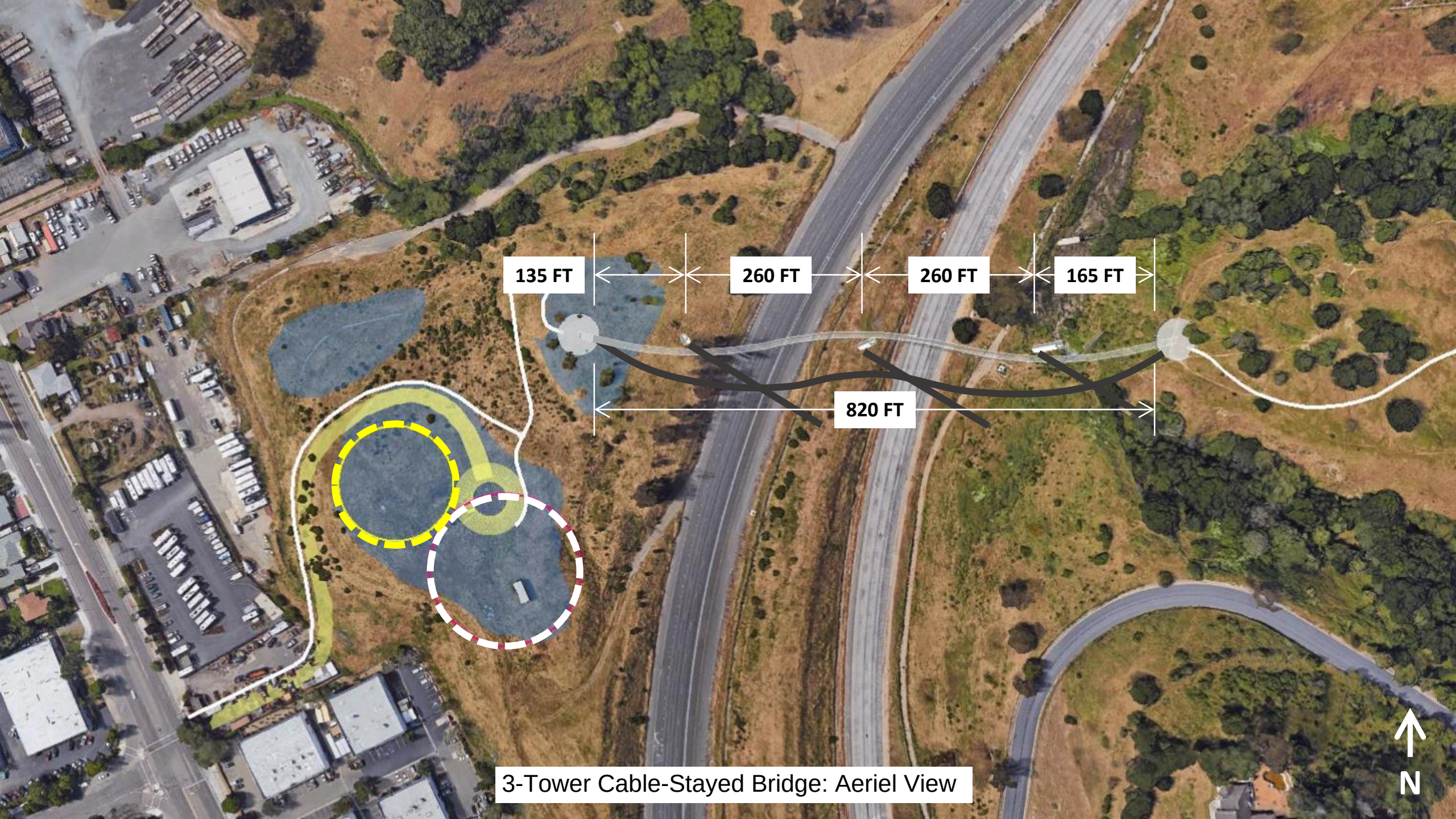
APPENDIX C

I-680 SABERCAT BRIDGE & TRAIL (IRVINGTON BART TO OHLONE COLLEGE) ALTERNATIVES

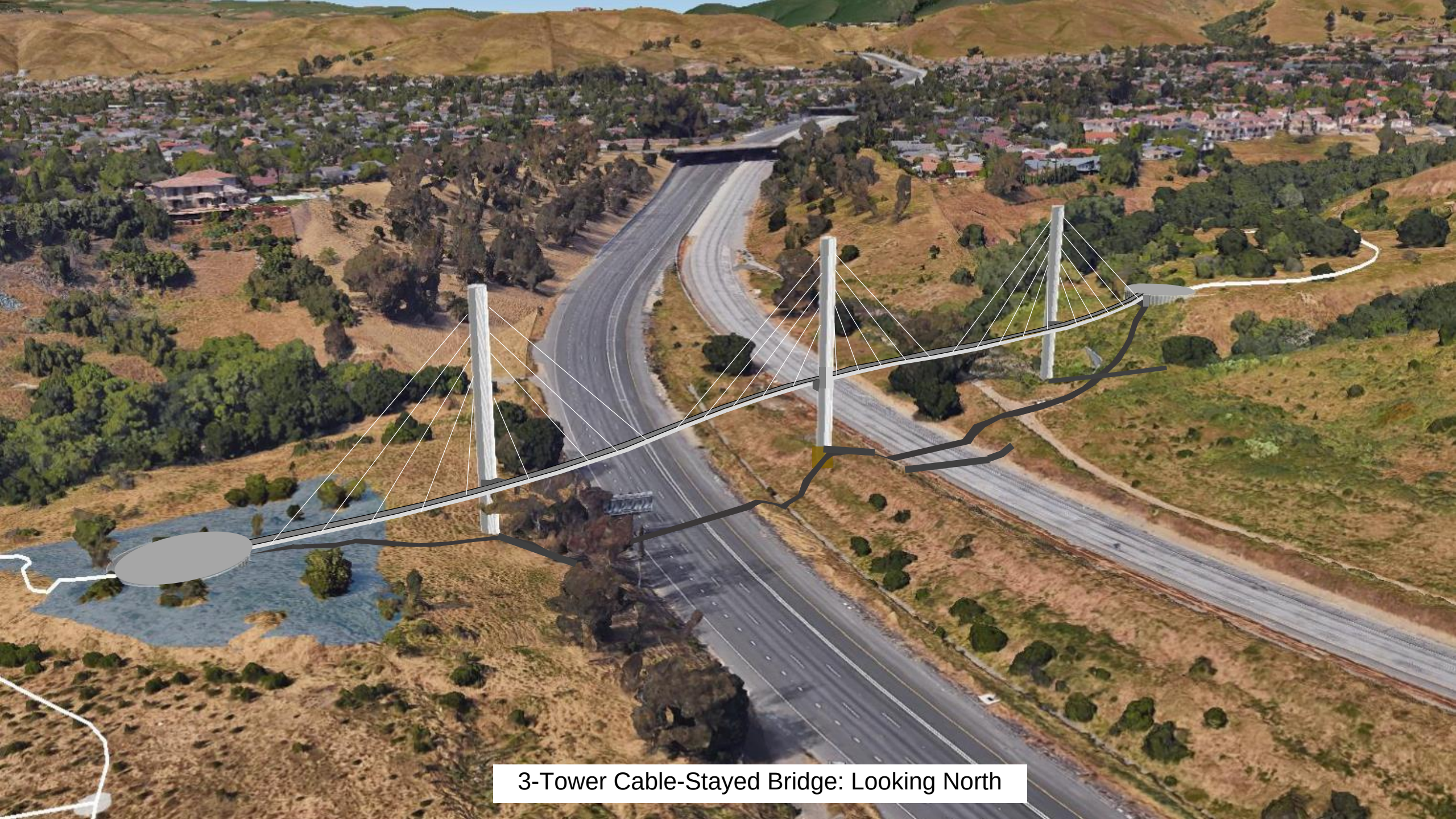
I-680/SABERCAT PEDESTRIAN/BICYCLE OVERPASS PRELIMINARY CONCEPTS

06/21/18

ALTERNATIVE 1 – 3-TOWER CABLE-STAYED (CURVED DECK OPTION)



3-Tower Cable-Stayed Bridge: Aeriel View



3-Tower Cable-Stayed Bridge: Looking North

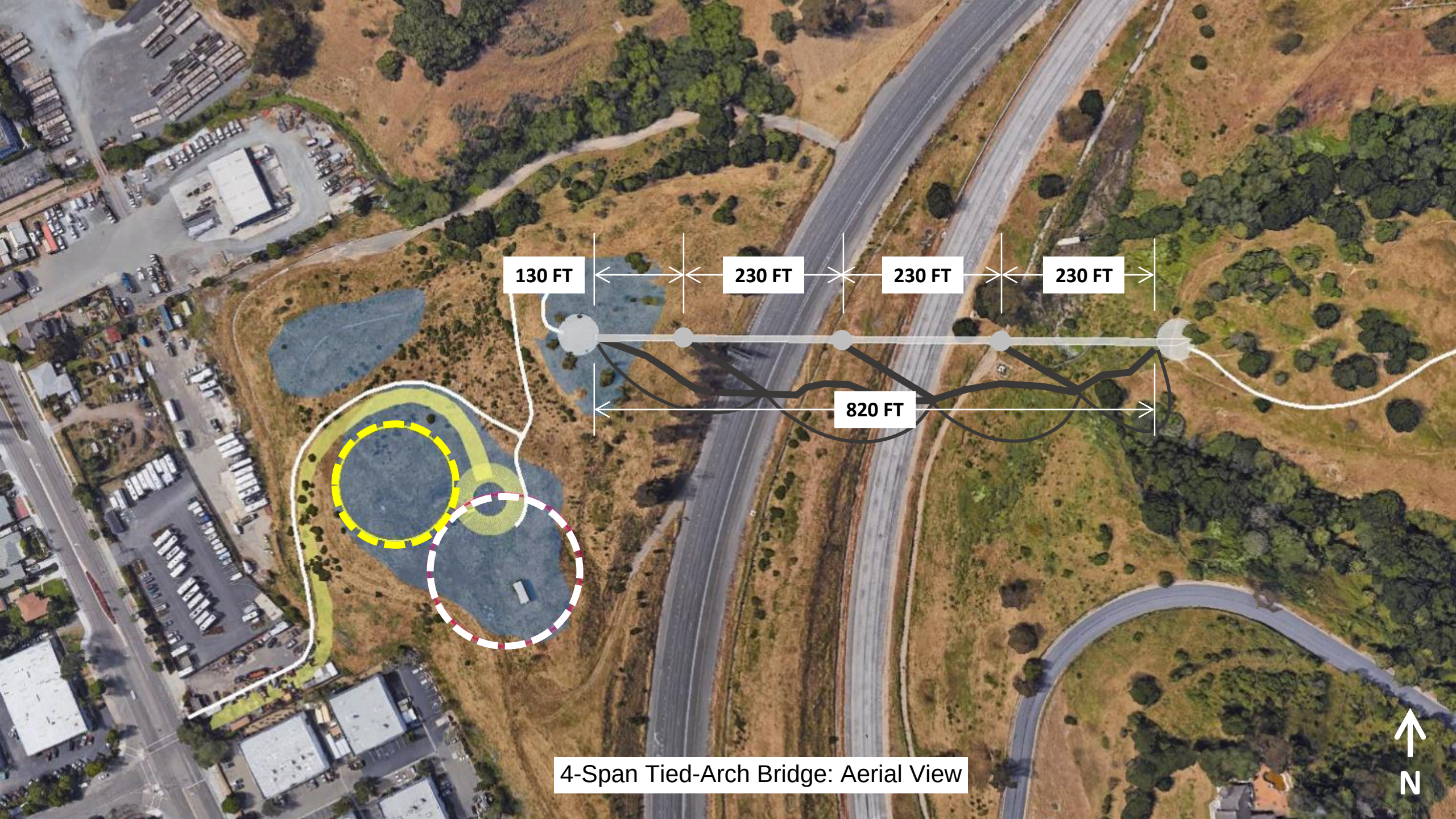
3-Tower Cable-Stayed Bridge: Looking South

3-Tower Cable-Stayed Bridge: Looking West

I-680/SABERCAT PEDESTRIAN/BICYCLE OVERPASS PRELIMINARY CONCEPTS

06/21/18

ALTERNATIVE 2 – 4-SPAN TIED ARCH



4-Span Tied-Arch Bridge: Aerial View

4-Span Tied-Arch Bridge: Looking North

4-Span Tied-Arch Bridge: Looking South

4-Span Tied-Arch Bridge: Looking West

APPENDIX D

CALTRANS I-680 EXPRESS LANES PLANS

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCl,Ala	680	M6.5/M9.9, M0.0/R12.4		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

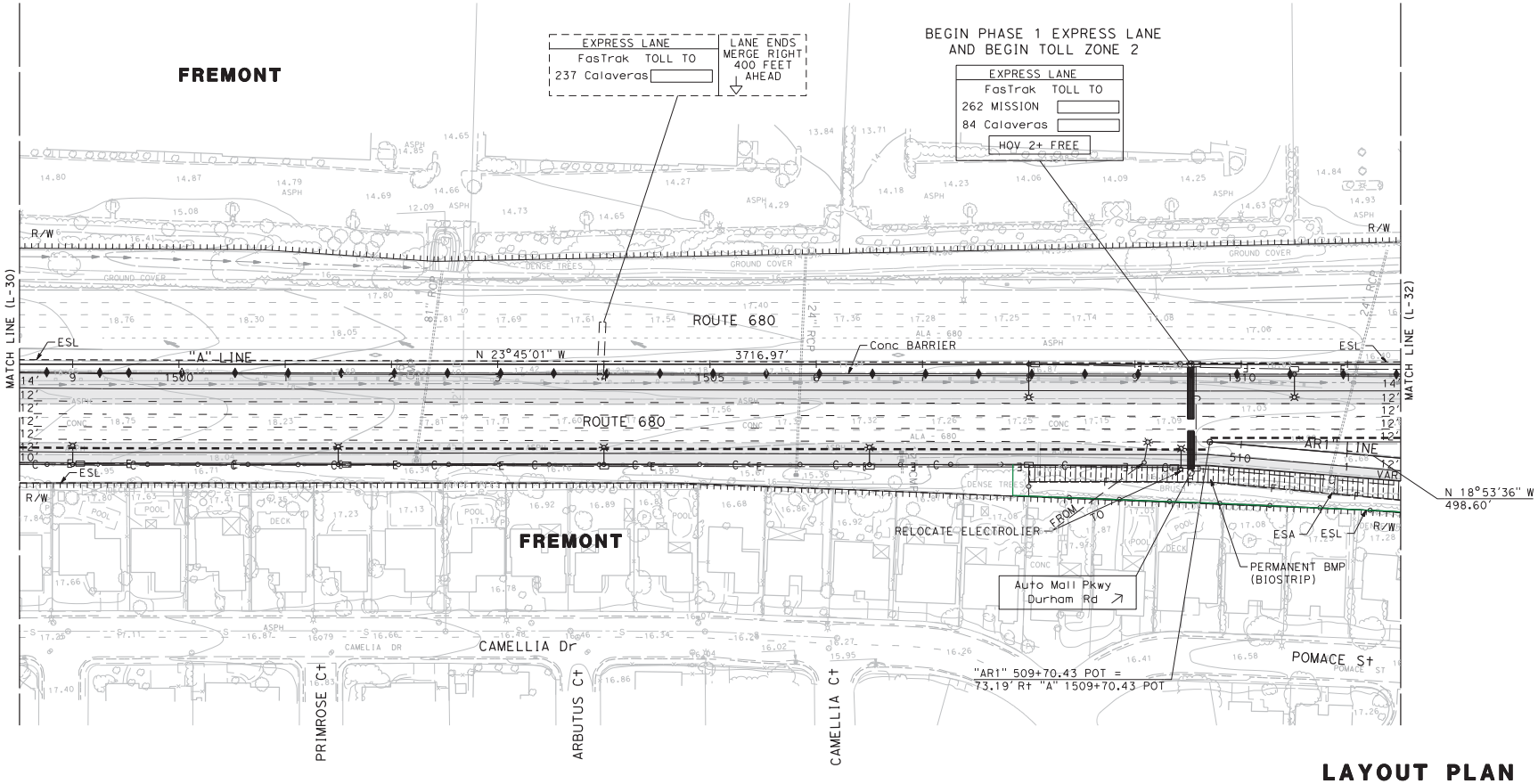
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

WMH CORPORATION
555 12th Street
Suite 1900
Oakland, CA 94607

ALAMEDA CTC
1111 Broadway
Suite 800
Oakland, CA 94607

NOTE:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.
2. POINT AND CONTOUR ELEVATIONS ARE IN METRIC.



FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET L-1

LAYOUT PLAN

SCALE: 1" = 50'

L-31

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	CHECKED BY
E. ANJORIN/S. VOGTMAN	B. RAZEGHI

CONSULTANT FUNCTIONAL SUPERVISOR: TIMOTHY J. LEE

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

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UNIT 0000

PROJECT NUMBER & PHASE 04120004370

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCl,Ala	680	M6.5/M9.9, M0.0/R12.4		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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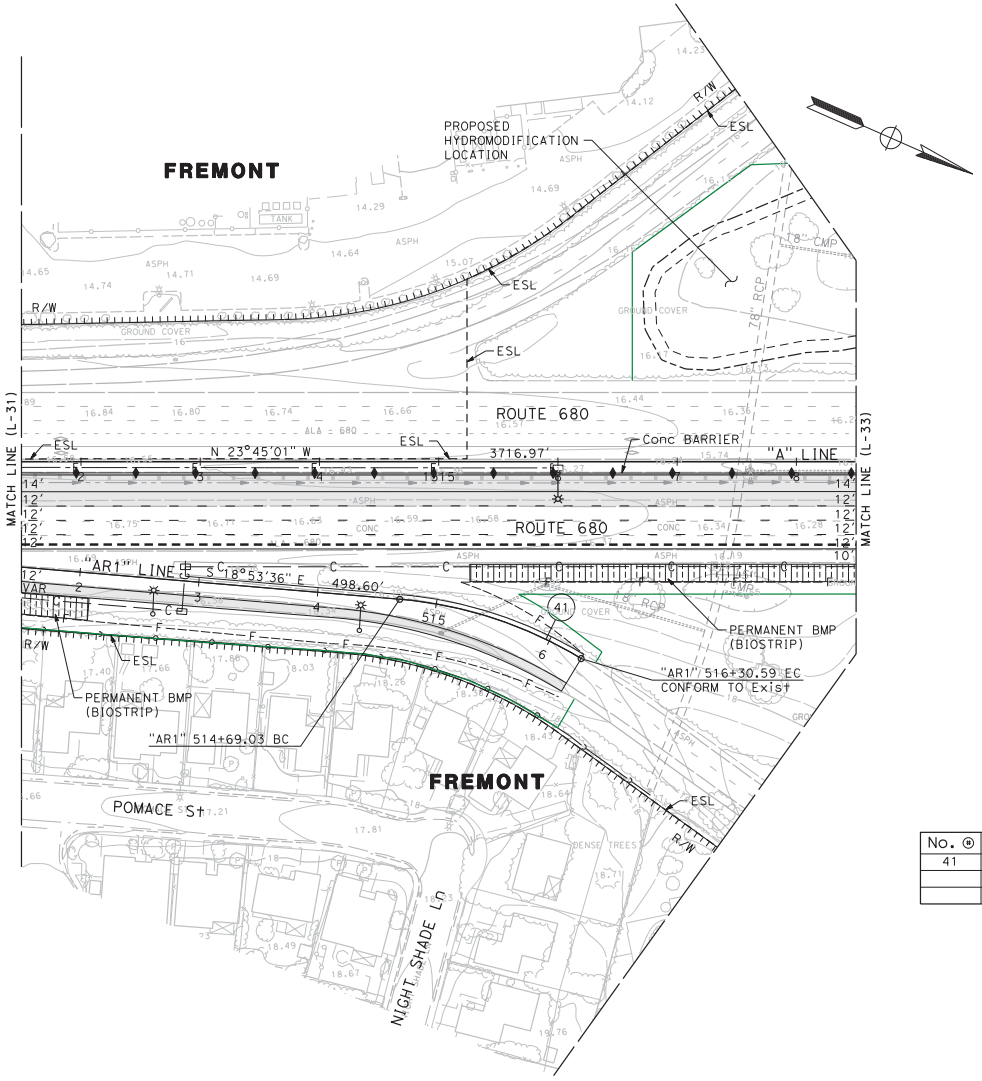

CURVE DATA

No. ⊛	R	Δ	T	L
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FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET L-1

LAYOUT PLAN

SCALE: 1" = 50′

L-32

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY	E. ANJORIN/S. VOGTMAN
CHECKED BY	B. RAZEGHI
CONSULTANT FUNCTIONAL SUPERVISOR	TIMOTHY J. LEE

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LAST REVISION 00-00-00 DATE PLOTTED => 10/1/2014 TIME PLOTTED => 12:41:33 PM

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04	SCl,Ala	680	M6.5/M9.9, M0.0/R12.4		

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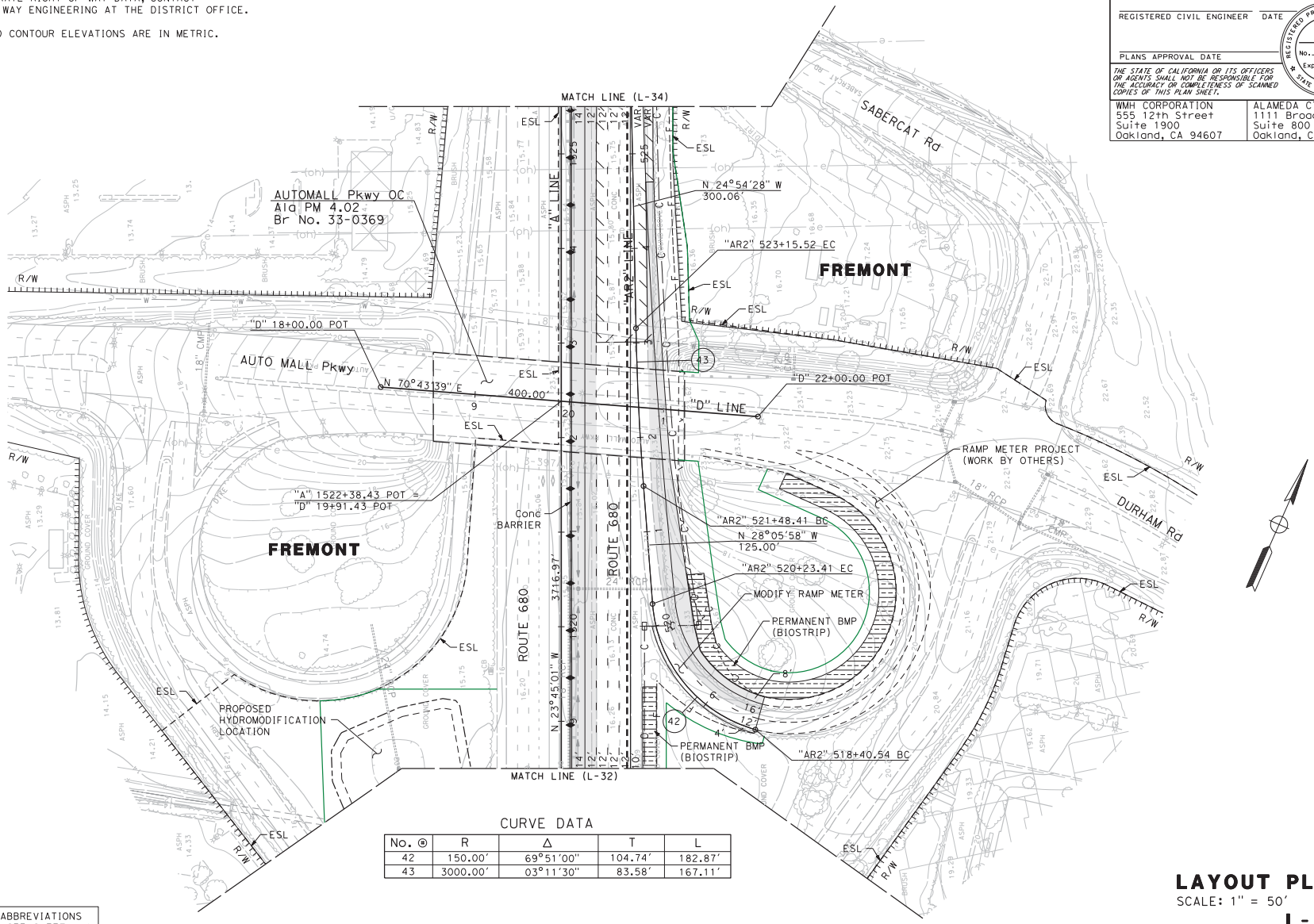

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43	3000.00′	03°11′30″	83.58′	167.11′

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET L-1

LAYOUT PLAN

SCALE: 1" = 50′

L-33

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DGN FILE => 0412000437ea033.dgn

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UNIT 0000

PROJECT NUMBER & PHASE 04120004370

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCl,Ala	680	M6.5/M9.9, M0.0/R12.4		

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CURVE DATA

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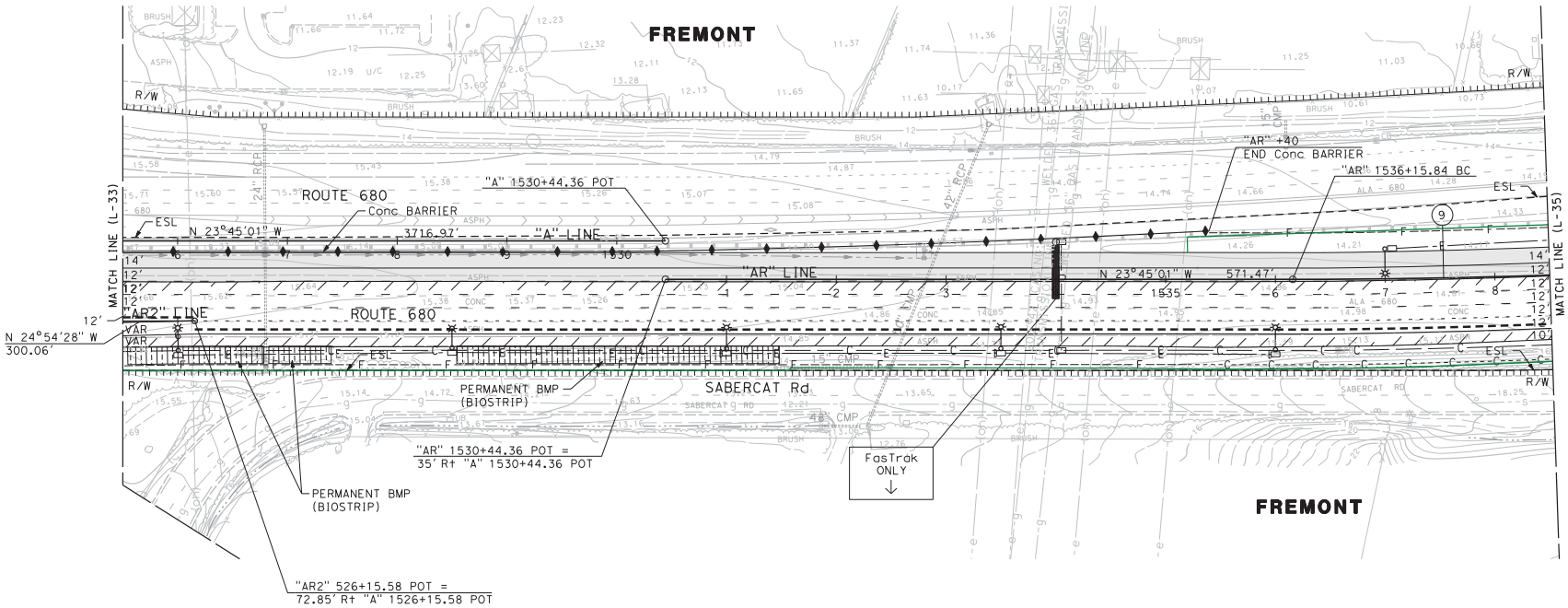

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET L-1

LAYOUT PLAN

SCALE: 1" = 50′

L-34

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCl,Ala	680	M6.5/M9.9, M0.0/R12.4		

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PLANS APPROVAL DATE

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CURVE DATA

No. ⊛	R	Δ	T	L
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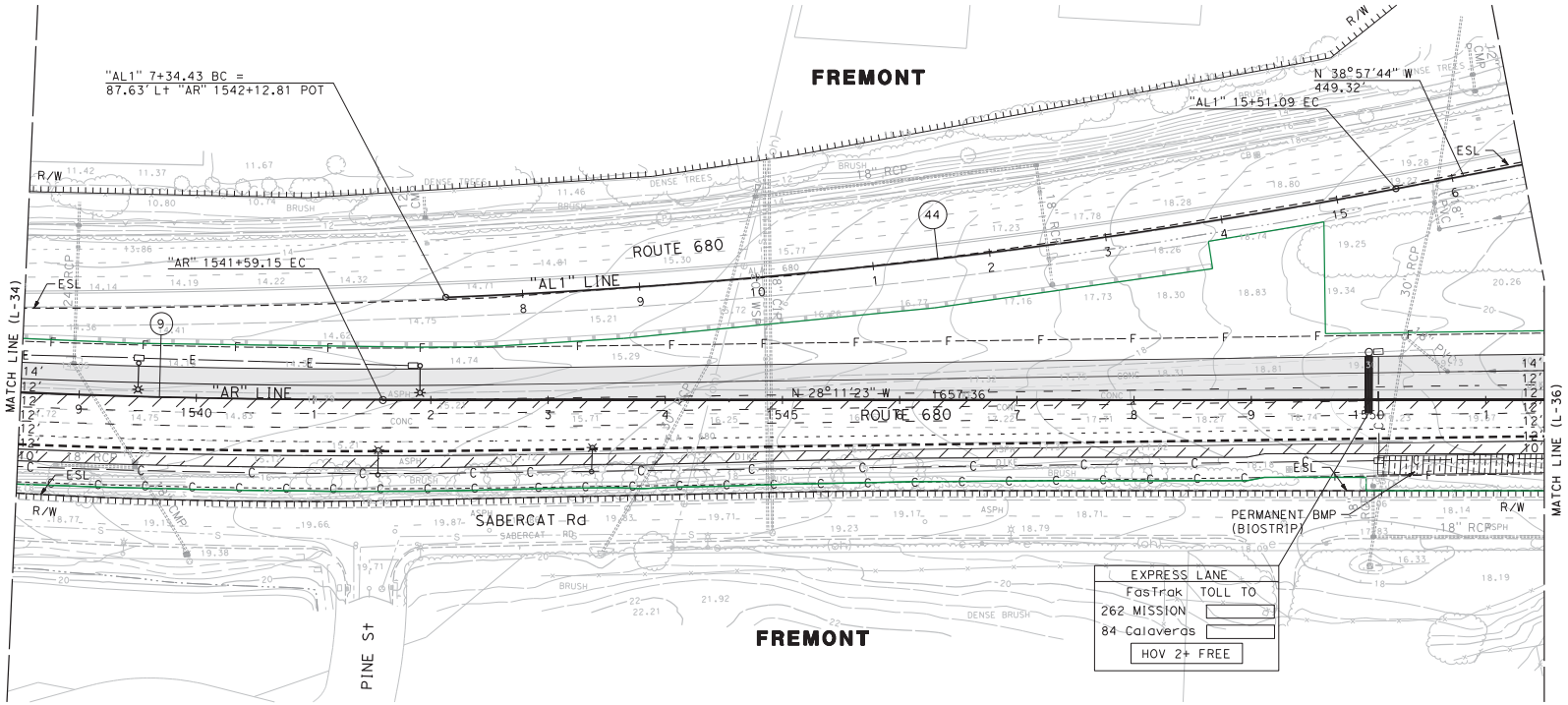

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET L-1

LAYOUT PLAN

SCALE: 1" = 50′

L-35

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CURVE DATA

No. ⊙	R	Δ	T	L
10	1750.00′	78°16′45″	1424.19′	2390.90′
45	1750.00′	89°03′06″	1721.27′	2719.93′

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCl,Ala	680	M6.5/M9.9, M0.0/R12.4		

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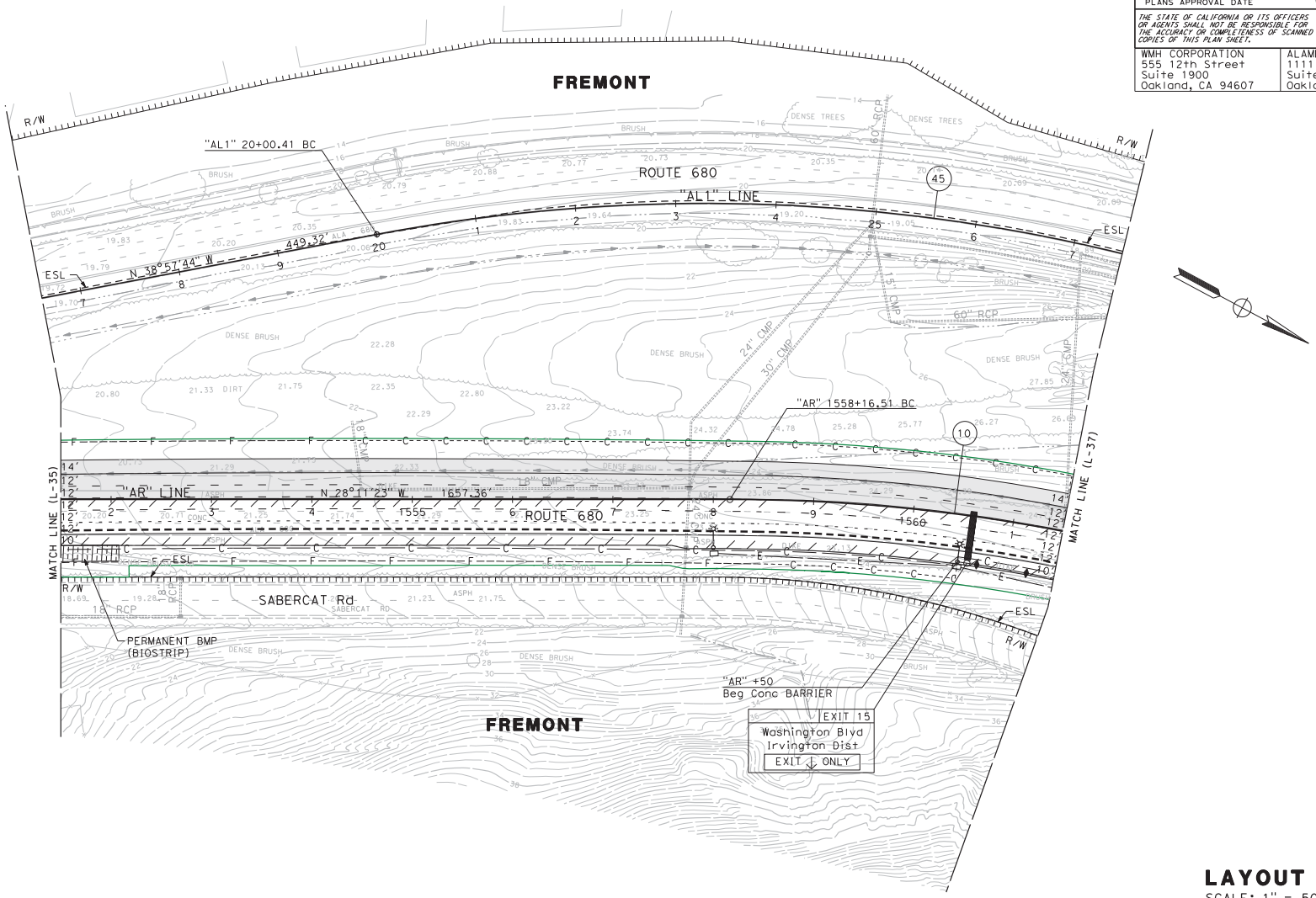

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET L-1

LAYOUT PLAN

SCALE: 1" = 50′

L-36

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCl,Ala	680	M6.5/M9.9, M0.0/R12.4		

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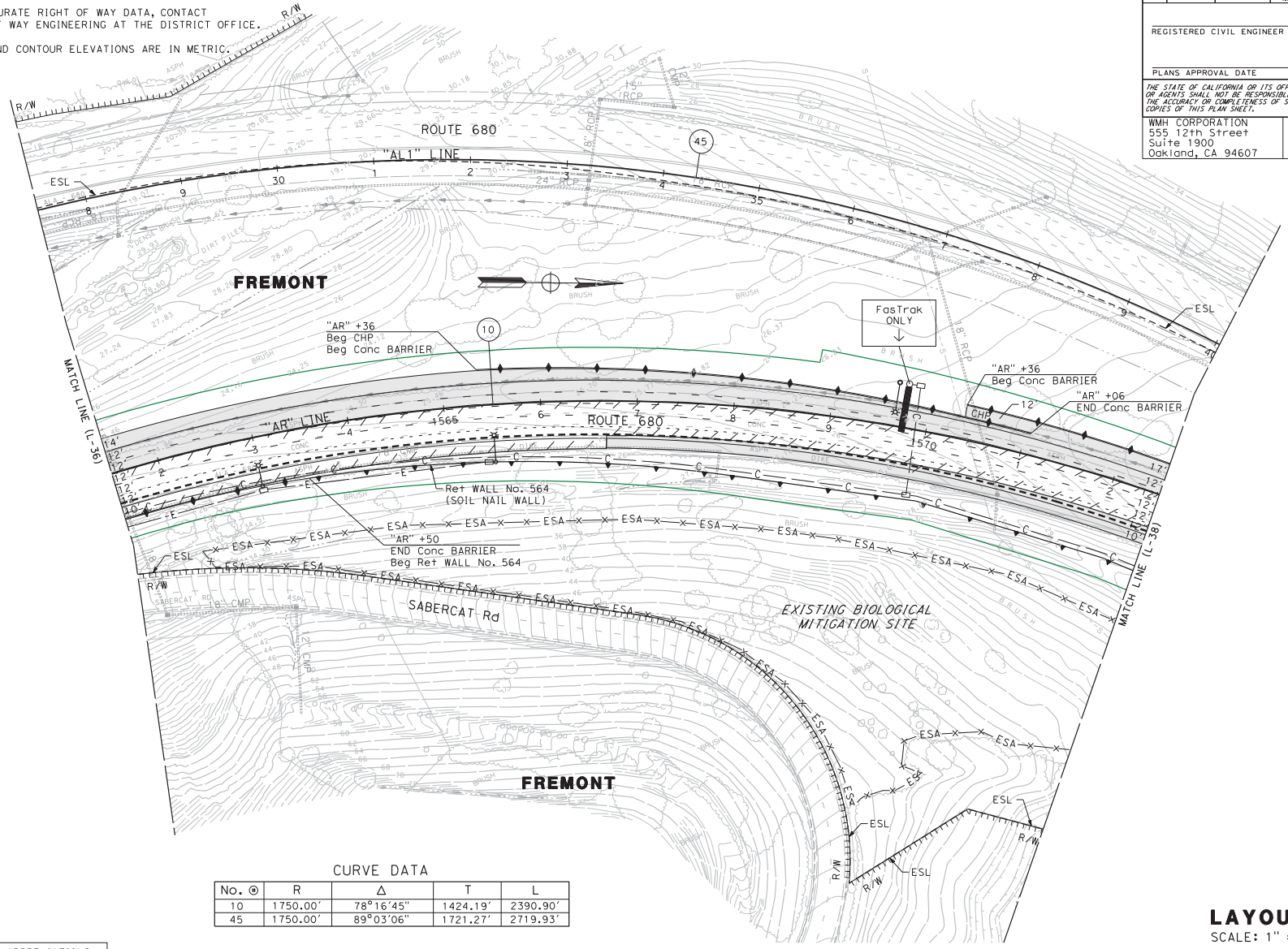

CURVE DATA

No. ⊛	R	Δ	T	L
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45	1750.00′	89°03′06"	1721.27′	2719.93′

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET L-1

LAYOUT PLAN

SCALE: 1" = 50′

L-37

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BORDER LAST REVISED 7/2/2010 | USERNAME => lhatch | DGN FILE => 0412000437ea037.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 0000 | PROJECT NUMBER & PHASE 04120004370

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCl,Ala	680	M6.5/M9.9, M0.0/R12.4		

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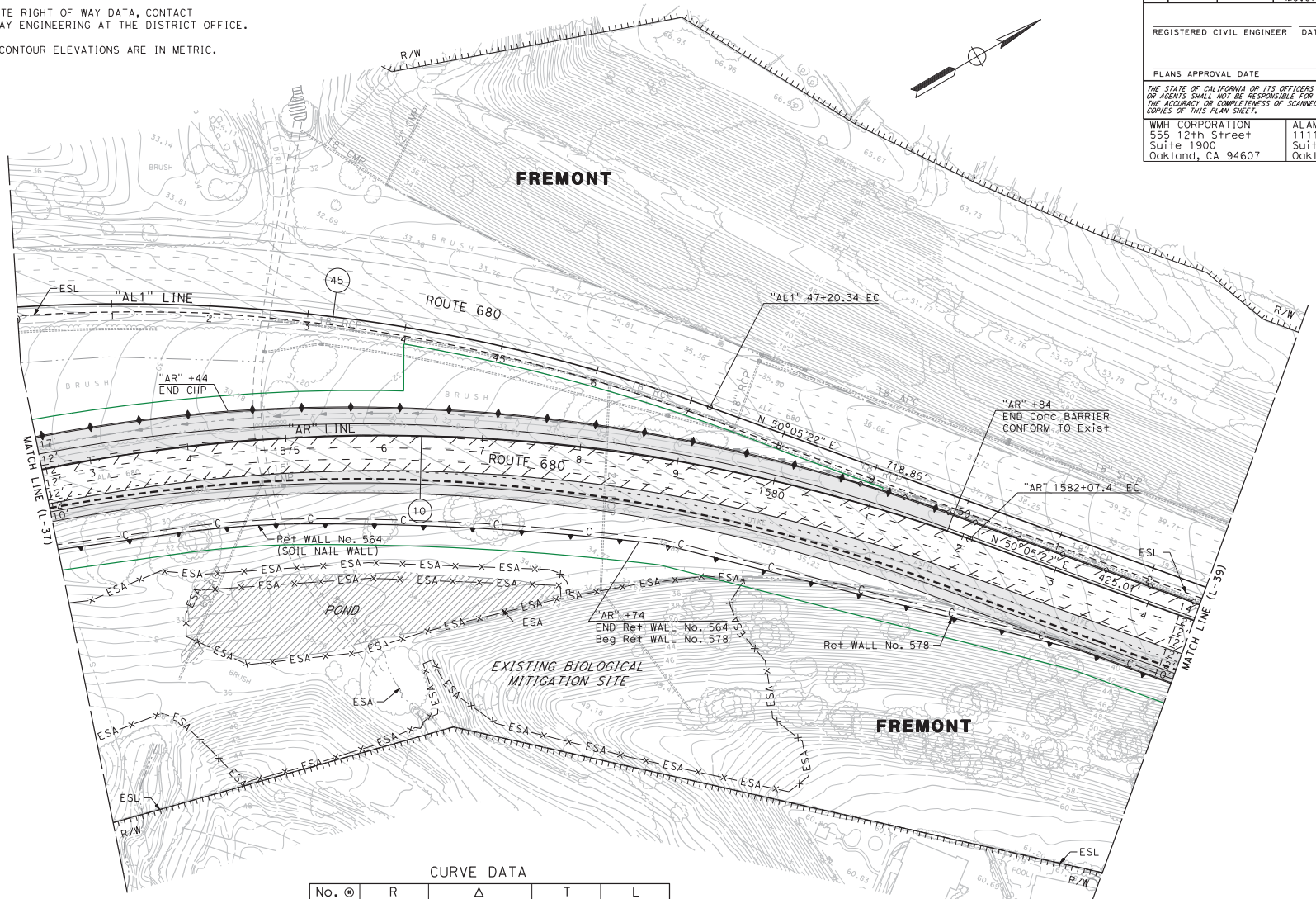

CURVE DATA

No. ⊛	R	Δ	T	L
10	1750.00′	78°16′45"	1424.19′	2390.90′
45	1750.00′	89°03′06"	1721.27′	2719.93′

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET L-1

LAYOUT PLAN

SCALE: 1" = 50′

L-38

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USERNAME => lhatch
DGN FILE => 0412000437ea038.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 0000

PROJECT NUMBER & PHASE 04120004370

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCl,Ala	680	M6.5/M9.9, M0.0/R12.4		

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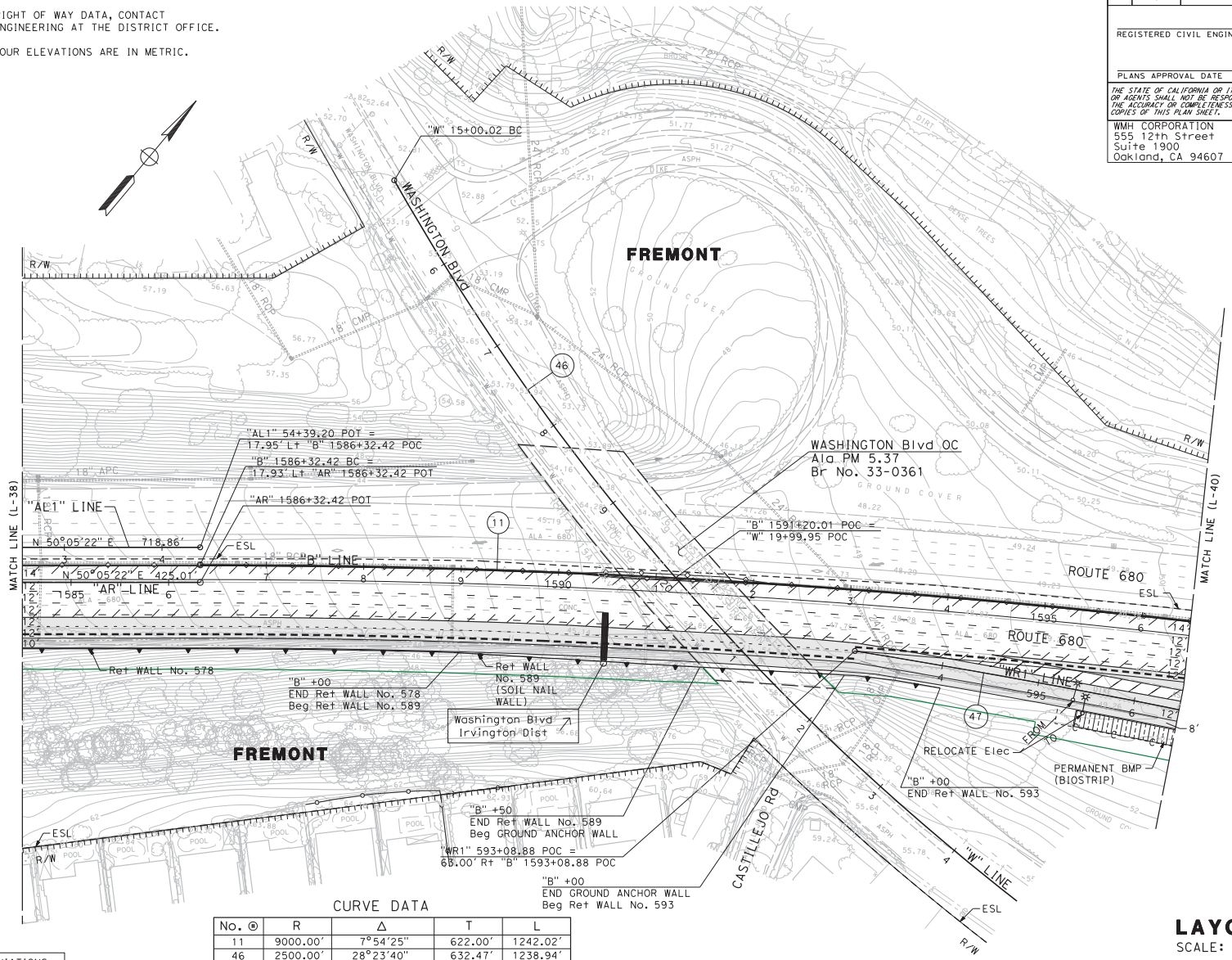

CURVE DATA

No. ⊛	R	Δ	T	L
11	9000.00'	7°54'25"	622.00'	1242.02'
46	2500.00'	28°23'40"	632.47'	1238.94'
47	8925.02'	2°55'49"	228.28'	456.46'

FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET L-1

LAYOUT PLAN

SCALE: 1" = 50'

L-39

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SCl,Ala	680	M6.5/M9.9, M0.0/R12.4		

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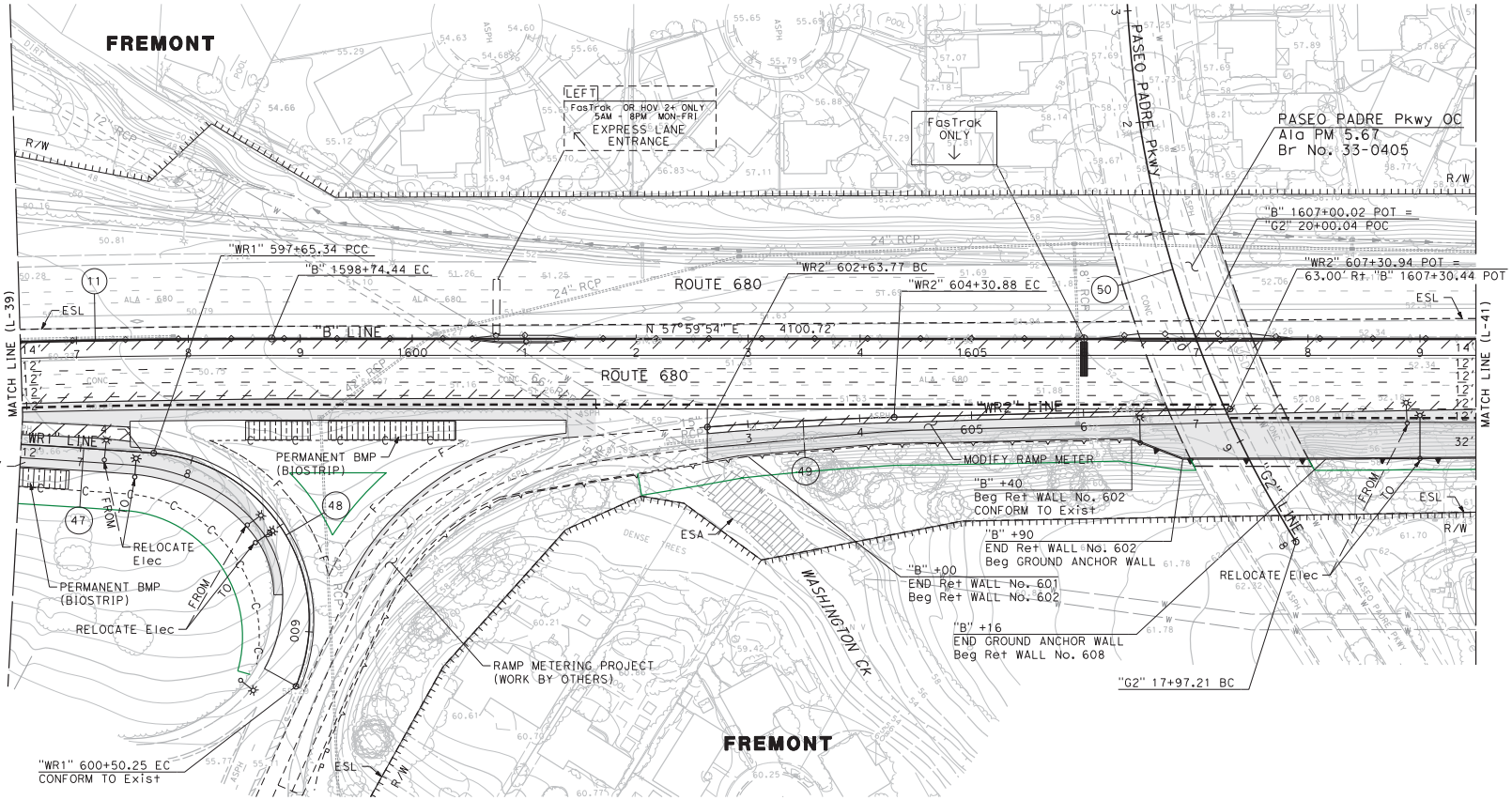
CURVE DATA

No. ⊙	R	Δ	T	L
11	9000.00′	7°54′25″	622.00′	1242.02′
47	8925.02′	2°55′49″	228.28′	456.46′
48	150.00′	108°49′40″	209.63′	284.91′
49	3000.00′	3°11′30″	83.58′	167.11′
50	1000.00′	56°27′06″	536.78′	985.27′



FOR NOTES, ABBREVIATIONS AND LEGEND, SEE SHEET L-1

LAYOUT PLAN

SCALE: 1" = 50′

L-40

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APPENDIX E

CONCEPTUAL COST ESTIMATE

I-680 Bike & Pedestrian Trail Project

Estimate of Possible Costs

2018 Dollars

Note: This preliminary cost estimate provides an opinion of what costs could be included. Project elements and level of work involved in each are to be further refined as the project definition and details are determined. Cost and quantities shown are based on engineering judgment on preliminarily developed conceptual designs.

ALTERNATIVE 1: CABLE STAYED CURVED BRIDGE

Section	Item No.	Item	Qty	Unit	Cost/Unit	Total	Notes/Assumptions
Structural	1	Steel	4,633	Kips	$3,000	$13,898,781	
	2	Concrete					
	2.1	Deck	479.4	CY	$5,000	$2,396,919	
	2.3	Abutment	2	LS	$600,000	$1,200,000	
	2.4	Pile Cap	533	CY	$5,000	$2,666,667	
	2.5	Piles	54	LS	$50,000	$2,700,000	
	3	Electrical Lighting	1.0	LS	$750,000	$750,000	
					STRUCTURAL SUBTOTAL	**$23,613,000**	
Civil	4	Access Road					
	4.1	Pavement	53,000	CF	$8	$424,000	
	4.2	Lighting	1,300	LF	$75	$97,500	
	4.3	Grading	1,667	CF	$25	$41,675	
	4.4	Retaining Wall	7,000	SF	$115	$805,000	
	4.5	Signage and Striping	1,300	LF	$5	$6,500	
	5	Trail					
	5.1	Pavement	11,620	CF	$8	$92,960	
	5.2	Grading	778	CY	$25	$19,444	
	6	Parking Lot					
	6.1	Pavement	37,500	CF	$8	$300,000	
	6.2	Grading	4,167	CY	$25	$104,167	
	6.3	Misc (Signage, Striping, Lighting, Etc.)	37,500	SF	$6	$225,000	
	7	Utilities	1	LS	$150,000	$150,000	
	8	Traffic Improvements					
	8.1	Intersection Changes	1	LS	$5,000	$5,000	
					CIVIL SUBTOTAL	**$2,272,000**	
	9	Contingencies (30% Constr. Cost)				**$7,765,500**	

TOTAL CONSTRUCTION COST $33,700,000

COST BY PHASE

Environmental	5% Const Costs	**$1,685,000**
Preliminary Engineering	25% Engrg (Engrg = 10% Const Cost)	**$842,500**
Right-of-Way	TBD w/Caltrans	**$0**
Final Design	75% Engrg (Engrg = 10% Const Cost)	**$2,527,500**
Construction		**$33,700,000**
Agency Costs	10% Const Cost	**$3,370,000**

ALTERNATIVE 1: CABLE STAYED CURVED BRIDGE TOTAL $42,125,000

DRAFT

I-680 Bike & Pedestrian Trail Project

Estimate of Possible Costs

2018 Dollars

Note: This preliminary cost estimate provides an opinion of what costs could be included. Project elements and level of work involved in each are to be further refined as the project definition and details are determined. Cost and quantities shown are based on engineering judgment on preliminarily developed conceptual designs.

ALTERNATIVE 2: TIED ARCH BRIDGE

Section	Item No.	Item	Qty	Unit	Cost/Unit	Total	Notes/Assumptions
Structural	1	Steel	664	Kips	$3,000	$1,990,896	
	2	Concrete					
	2.1	Deck	511	CY	$5,000	$2,555,556	
	2.2	Columns	24	CY	$5,000	$117,810	
	2.3	Abutment	2	LS	$600,000	$1,200,000	
	2.4	Pile Cap	333	CY	$5,000	$1,666,667	
	2.5	Piles	45	LS	$50,000	$2,250,000	
	3	Electrical Lighting	1	LS	$750,000	$750,000	
					STRUCTURAL SUBTOTAL	**$10,531,000**	
Civil	4	Access Road					
	4.1	Pavement	53,000	CF	$8	$424,000	
	4.2	Lighting	1,300	LF	$75	$97,500	
	4.3	Grading	1,667	CF	$25	$41,675	
	4.4	Retaining Wall	7,000	SF	$115	$805,000	
	4.5	Signage and Striping	1,300	LF	$5	$6,500	
	5	Trail					
	5.1	Pavement	11,620	CF	$8	$92,960	
	5.2	Grading	778	CY	$25	$19,444	
	6	Parking Lot					
	6.1	Pavement	37,500	CF	$8	$300,000	
	6.2	Grading	4,167	CY	$25	$104,167	
	6.3	Misc (Signage, Striping, Lighting, Etc.)	37,500	SF	$6	$225,000	
	7	Utilities	1	LS	$150,000	$150,000	
	8	Traffic Improvements					
	8.1	Intersection Changes	1	LS	$5,000	$5,000	
					CIVIL SUBTOTAL	**$2,272,000**	
	9	Contingencies (30% Constr. Cost)				**$3,840,900**	
					TOTAL CONSTRUCTION COST	**$16,700,000**	

COST BY PHASE

Environmental	5% Const Costs of Alt. 1	**$1,685,000**
Preliminary Engineering	25% Engrg (Engrg = 10% Const Cost)	**$417,500**
Right-of-Way	TBD w/Caltrans	**$0**
Final Design	75% Engrg (Engrg = 10% Const Cost)	**$1,252,500**
Construction		**$16,700,000**
Agency Costs	10% Const Cost of Alt. 1	**$3,370,000**

ALTERNATIVE 2: TIED ARCH BRIDGE TOTAL $23,425,000

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I-680 Bike & Pedestrian Trail Project

Estimate of Possible Costs

2018 Dollars

Note: This preliminary cost estimate provides an opinion of what costs could be included. Project elements and level of work involved in each are to be further refined as the project definition and details are determined. Cost and quantities shown are based on engineering judgment on preliminarily developed conceptual designs.

BART/UPRR UNDERPASS

Section	Item No.	Item	Qty	Unit	Cost/Unit	Total	Notes/Assumptions
	1	Excavation & Backfill, Ballast	6,402	CY	$100	$640,247	
	2	Reinforced Concrete (Invert, walls, roof slab combined)	472	CY	$3,000	$1,416,667	
	3	Approach Slab on grade on both sides (1'-0" thick)	31	CY	$2,500	$77,778	
	4	Aggregate base material (8" thick)	52	CY	$500	$25,926	
	5	Electrical Lighting	1	LS	$25,000	$25,000	
	6	Rail Modification & Sequencing	1	LS	$100,000	$100,000	
					STRUCTURAL SUBTOTAL	**$2,186,000**	
Civil	7	Blacow Road Reconfigured					
	7.1	Pavement	27,400	CF	$8	$219,200	
	7.2	Lighting	500	LF	$75	$37,500	
	7.3	Curb	1,400	LF	$30	$42,000	
	4.4	Signage and Striping	500	LF	$5	$2,500	
	8	Trail					
	8.1	Pavement	6,300	CF	$8	$50,400	
	8.2	Grading	3,000	CY	$25	$75,000	
	8.3	Lighting	900	LF	$50	$45,000	
	8.4	Retaining Wall	19,800	SF	$115	$2,277,000	
	9	Utilities	1	LS	$50,000	$50,000	
	10	Traffic Improvements					
	10.1	Intersection Changes	1	LS	$5,000	$5,000	
					CIVIL SUBTOTAL	**$2,804,000**	
	11	Contingencies (30% Constr. Cost)				**$1,497,000**	
					TOTAL CONSTRUCTION COST	**$6,500,000**	

COST BY PHASE

Environmental	Completed in Bridge Phase	**$0**
Preliminary Engineering	25% Engrg (Engrg = 10% Const Cost)	**$162,500**
Right-of-Way	TBD w/Caltrans	**$0**
Final Design	75% Engrg (Engrg = 10% Const Cost)	**$487,500**
Construction		**$6,500,000**
Agency Costs	10% Const Cost	**$650,000**

BART/UPRR UNDERPASS TOTAL $7,800,000

Sabercat Museum Project

Estimate of Possible Costs

2018 Dollars

Note: This preliminary cost estimate provides an opinion of possible cost based on square footage of building only. Project elements and level of work involved are to be further refined as the museum structure and details are determined.

MUSEUM

Section	Item No.	Item	Qty	Unit	Cost/Unit	Total	Notes/Assumptions
Museum	1	Museum	1	LS			
	1.1	Museum	40,000	SF	$500	$20,000,000	
	2	Contingencies (30% Constr. Cost)				**$6,000,000**	
					TOTAL CONSTRUCTION COST	**$26,000,000**	

COST BY PHASE

Environmental	Completed in Bridge Phase	**$0**
Preliminary Engineering	25% Engrg (Engrg = 10% Const Cost)	**$650,000**
Right-of-Way	TBD w/Caltrans	**$0**
Final Design	75% Engrg (Engrg = 10% Const Cost)	**$1,950,000**
Construction		**$26,000,000**
Agency Costs	10% Const Cost	**$2,600,000**
	MUSEUM TOTAL	**$31,200,000**

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