ADMINISTRATIVE REPORT

TO:	PUBLIC WORKS COMMISSION
FROM:	DIRECTOR OF PUBLIC WORKS
PREPARED BY:	DEPARTMENT OF PUBLIC WORKS – ENGINEERING
MEETING DATE:	NOVEMBER 12, 2014 – Regular Meeting Starts at 7:30 PM
SUBJECT:	HILLSDALE/US101 BICYCLE/PEDESTRIAN BRIDGE PROJECT – STRUCTURAL DESIGN AND AESTHETICS EVALUATION STUDY

RECOMMENDATION

That the Public Works Commission review the Hillsdale/US101 Bicycle/Pedestrian Bridge Structural Design and Aesthetics Evaluation Study and provide comments.

BACKGROUND

The Hillsdale/US101 Bicycle/Pedestrian Bridge project (Project) provides for a Class I pedestrian and bicycle grade separated crossing over Highway 101 (US101) south of the Hillsdale interchange and a Class II facility on Hillsdale from Norfolk to the San Mateo/Foster City limit. The proposed bridge and Class II facility provides safe and unimpeded bicycle access along Hillsdale Boulevard separate from the high vehicular volume at the US101 interchange. Construction of the bridge and Class II facility would create a fully connected bicycle network in this area connecting San Mateo areas and Foster City east of US101 with the Hillsdale Caltrain Station.

Project Status to Date

The City completed an alignment study in 2007 in response to the community's concern about the ability of pedestrians and bicyclists to use Hillsdale Boulevard to safely cross US101. In 2012, the City was awarded a grant by the San Mateo County Transportation Authority (TA) to begin the required Caltrans project development process since the project will be constructed almost completely within Caltrans right-of-way. In April 2013, the City entered into a cooperative agreement with Caltrans for the first phase of the Caltrans project development process – the Project Initiation Document (PID) phase. Staff anticipates completing this phase in November 2014.

The Project has included a series of public meetings to gauge public interest in bridge types and bridge alignment, landing locations, and bicycle network connections working through the Caltrans process. Primary components of the outreach process included community workshops, Public Works Commission meetings, and City Council meetings.

Structural Design and Aesthetics Evaluation Study

A structural design and aesthetic evaluation study (Study) has been developed through the public outreach efforts completed during this phase. The Study discusses the project's background, existing site conditions, and the purpose and need.

The Study also presents conceptual site-specific structural samples and aesthetic applications that were discussed through the public process. These concepts demonstrate design options for the bridge structure and features that can be potentially incorporated into a signature bridge for the City.

Additionally, the Study includes variations of the main alignment which can include alternative connection points as access points to cross over US101. The additional connection points incorporate alternative access points from Hillsdale Court to the west and from La Selva Street to the east. The alignment options have since been further refined and reintroduced through the public process for further discussion and to gather public interest.

A summary of the public process describes each of the public meetings held and the format of the material presented. Bridge type design concepts are also summarized to compare estimated construction and maintenance costs. The information presented in the Study will be used as a basis for further discussion and development of signature bridge characteristics for the City that may develop into something completely different and only vaguely represent what is shown at this time.

Next Steps

Upon completion of the first phase of the Caltrans project development, the project will proceed into the Project Approval and Environmental Documentation (PA&ED) phase. The City was awarded a grant by the San Mateo County Transportation Authority (TA) for this phase in July 2014. A separate cooperative agreement with Caltrans will be prepared for PA&ED phase activities.

Staff will incorporate received feedback and present the draft Structural Design and Aesthetics Evaluation Study in January 2015.

NOTICE PROVIDED:

A Public Meeting notice was advertised in the newspaper on November 9, 2014.

ATTACHMENTS

A. Draft Structural Design and Aesthetics Evaluation Study

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HILLSDALE PEDESTRIAN OVERCROSSING

STRUCTURAL DESIGN AND AESTHETIC EVALUATION STUDY

MARK THOMAS & COMPANY

CITY OF SAN MATEO CALIFORNIA

T·Y·LIN INTERNATIONAL

CONTENTS

1.0 | PROJECT HISTORY

Local bicyclists first identified the need for improved access across the US 101 freeway in the Hillsdale Blvd area after reconstruction of the US 101/Hillsdale Blvd interchange in 2001, after which the San Mateo Bicycle and Pedestrian Advisory Committee identified the project as a high priority need. The City obtained feedback from the public through two community meetings in 2006 and held a field review meeting with the Caltrans pedestrian/bicycle coordinator. In 2007 the City completed an alternatives analysis study that identified the existing problems, the needs of the bicycle and pedestrian community, and the goals and objectives for improving the connection across US 101. The study evaluated a variety of alternatives for improving the freeway crossing to minimize or eliminate at-grade crossing points of the high speed freeway on/off ramps. A locally-preferred solution was identified as a grade-separated overcrossing structure and path over all the interchange ramps on the south side of the Hillsdale Blvd overcrossing.

During review of the 2007 alternatives analysis study, the City Council indicated an interest in considering a "signature" structure design for the proposed overcrossing to become a landmark for the City of San Mateo. This bridge aesthetics report serves to document the various bridge types that have been introduced to the public, Public Works Commission, Planning Commission and the City Council through a series of public meetings in 2013-2014. This report also gives an overview description and range of costs for the bridge types that have been identified for further study in the next phase of the project.

2.0 | EXISTING CONDITIONS

The US 101/Hillsdale Blvd interchange was converted from a four-quadrant cloverleaf configuration to a partial cloverleaf in 2001, which is reflected in the interchange's existing configuration today. This interchange serves as a major entryway to the Cities of San Mateo and Foster City, and is the southernmost interchange within the City of San Mateo along US 101. Hillsdale Blvd is the only existing pedestrian and bicycle crossing of the US 101 freeway for approximately a two mile stretch between Fashion Island Blvd to the north and the Ralston Ave ped/bike bridge to the south in the City of Belmont. Though Hillsdale Blvd is designated as a Class III bike route, the existing US 101/ Hillsdale Blvd interchange provides limited ped/bike connectivity.

Pedestrian and Bicycle Connectivity:

Hillsdale Blvd within the US 101 interchange area has been identified as a challenging corridor in both the 2011 City of San Mateo Bicycle Master Plan and 2012 Pedestrian Master Plan. Bicyclists and pedestrians in San Mateo have consistently indicated that US 101 is one of the major barriers for walking and bicycling in southeastern San Mateo.

Existing conditions along Hillsdale Blvd provide limited pedestrian and bicycle connectivity across US 101. For pedestrians, the existing 5'-wide sidewalks are narrow, provide limited room for passing, offer little separation from adjacent high-speed traffic, and are often used by bicyclists who do not want to contend with vehicles at the double-lane entrances to the loop on-ramps. Visibility of approaching vehicles is limited for pedestrians attempting to cross at the loop on-ramp crosswalks because of the reduced design speed profile of the Hillsdale Blvd overcrossing and ramps, as well as the position of the crosswalks relative to approaching vehicles.

Safety:

Current vehicle speeds, volumes, lane configurations, sight distances, minimal bicycle accommodation and accident rates at the US 101/Hillsdale Blvd interchange create challenging conditions for peds/bikes. The City has received numerous complaints from pedestrians and bicyclists saying they either minimize use of or completely avoid travelling through the current interchange because they feel unsafe doing so.

In the City's 2011 Bicycle Master Plan, the existing US 101/Hillsdale interchange and the Norfolk/Hillsdale intersection are identified in the Top Ten locations for bicycle collisions over the last five years. In the development of the 2011 City's Pedestrian Master Plan, the Saratoga/Hillsdale and Norfolk/Hillsdale intersections are identified in the Top Twenty intersections for pedestrian collisions. The existing US 101/Hillsdale interchange and the two adjacent intersections (Saratoga/Hillsdale and Norfolk/Hillsdale) have been identified in the Bicycle Master Plan and the needs analysis of the Pedestrian Master Plan as high collision intersections.

Mode shift:

There are a number of residential areas, shopping centers, employment centers and recreation areas less than one-half mile from each other on both sides of the US 101/ Hillsdale interchange. The Hillsdale Caltrain station, Hillsdale Mall, Whole Foods Center and Bay Meadows Park on the west side of US 101 are one mile or less from the Los Prados Park and Lakeshore residential neighborhoods on the east side of US 101. The Marina Lagoon Trail, Bay Trail, Los Prados Park and Marina Plaza Center on the east side of US 101 are less than one mile from George Hall Elementary and the Hillsdale and Glendale Village residential neighborhoods on the west side of US 101. Typically destinations less than three miles from residential areas are attractive for bicycle trips, while destinations one-half mile or less attract pedestrian trips.

3.0 | PURPOSE AND NEED

The basis for the purpose and need of the project was derived from the City's 2007 alternatives analysis study and local planning documents, and was further refined through a series of Project Development Team (PDT) meetings with Caltrans in early 2014.

Need:

- There is a need for better bicycle and pedestrian connectivity in the southern half of the City of San Mateo between the residential/commercial areas west of US 101 and the residential/commercial and recreation destinations east of US 101. US 101 is a barrier between the existing and proposed bikeways on both sides of the freeway. Hillsdale Boulevard is the only crossing for approximately two miles.

- There is a need to reduce pedestrian/vehicle conflict points. Pedestrians and bicyclists attempting to travel east-west on Hillsdale Blvd across US 101 are presented with multiple vehicle conflict points and challenging maneuvers. Low-speed pedestrians and bicyclists crossing at the interchange ramps experience potential high-speed conflicts with vehicles because of the geometry configurations (large radius curves) of the on-ramps. Compounding this safety situation are the double-lane entrances to the loop on-ramps and limited sight distances at the crossing locations of these ramps.

- There is a need for more options for modes of travel in the City of San Mateo. The existing infrastructure is primarily designed to support motorized vehicular travel. Separated bicycle and pedestrian facilities would provide a more legitimate option for people to change their mode of travel from motorized vehicles to other self-propelled modes, increasing health and reducing environmental impacts.

Purpose:

- Provide a continuous path to improve pedestrian and bicycle east-west connectivity across US 101 in the southern half of the City of San Mateo and connect the existing and proposed bikeway and pedestrian networks.

- Improve pedestrian and bicyclist access and safety by providing a route that eliminates vehicle ramp conflict points for pedestrians and bicyclists traveling through the US 101/Hillsdale Blvd interchange and provides an ADA compliant route.

- Provide an alternative travel route for non-motorized travelers (including pedestrians, bicycles, and person with disabilities) to increase travel mode flexibility and encourage a mode shift away from motorized vehicle travel, enabling pedestrians and bicyclists to take longer trips and better support the needs of low-mobility groups.

4.0 | PUBLIC INVOLVEMENT

To date, there have been a total of 5 public meetings with the goal of presenting information on the project as well as to receive feedback from the community on the type of bridge structure and alignment options/treatments preferred. These meetings have been happening in parallel with the preparation of the Caltrans Project Initiation Document (PID) which is required to be approved before moving onto the next Project Approval and Environmental Document (PA&ED) phase. A project website has been active since January 2014 at www.hillsdalebridge.com which gives an overview of the project and allows voting on the different alignment alternatives.

Public Works Commission (Meeting #1) November 13, 2013

This was the first public meeting for the project since 2007, and gave a history of the project location and purpose; an introduction to various bridge types, forms, and aesthetics; proposed public outreach process for soliciting guidance on the type of bridge and aesthetic features of a signature structure; and proposed project schedule.

Joint Public Works and Planning Commission (Meeting #2) February 5, 2014

At this joint public meeting, an overview of the project history (including the 2007 alignment study and the Caltrans) process was presented. A summary of bridge types and aesthetics were presented in "Bridge 101", which prepared the audience to visit the 4 stations throughout the room to vote and present ideas on the bridge type examples they like, write comments on what type of amenities are preferred, what "signature bridge" means to them, and a "draw a bridge" station to allow input on creative visual ideas.

Comments from the public tended to favor an economical, simple and wide bridge structure with easy access that emphasized safety and visibility. Members from the Commissions commented they are looking for an aesthetically pleasing signature bridge that is simple and ageless in design yet functional, and has good connections and landing points.

City Council (Meeting #3) March 3, 2014

The goal for this City Council meeting was to provide an overview of and results from the Joint Public Works and Planning Commissions meeting on February 5, and get feedback from City Council on 2 or 3 preferred bridge types to develop into site specific examples. Results from the various stations at the February 5 meeting were summarized as follows:

Station #1 revealed a fair spread among preferences for bridge types including box girder, arch, cable stay and suspension, with many indicating that the "Spanish mission style" theme and "ultra-modern" truss styles are not preferred.

Station #2 included post-its demonstrating that San Mateo's "signature" can be represented through a timeless, beautiful design that does not contrast with the surrounding environment and can draw from local influences such as the rolling hills, lagoon, or the Bay Meadows racetrack.

Station #3 brought forth differing opinions of preferred amenities, including benches and shelter, but was consistent among amenities such as lighting, visibility and sight lines, safety, security cameras, as well as multiuse accessibility for bicyclists, pedestrians, wheelchairs, elderly and children.

Station #4 had a few drawings submitted generally showing arches, with different features drawn on each.

City Council Study Session (Meeting #4) August 18, 2014

This meeting gave an overview of the project background, and concentrated on the status of the Project Study Report – Project Development Support (PSR-PDS) Project Initiation Document that is being prepared as the first step of approval in the Caltrans project development process.

Public Workshop (Meeting #5) August 19, 2014

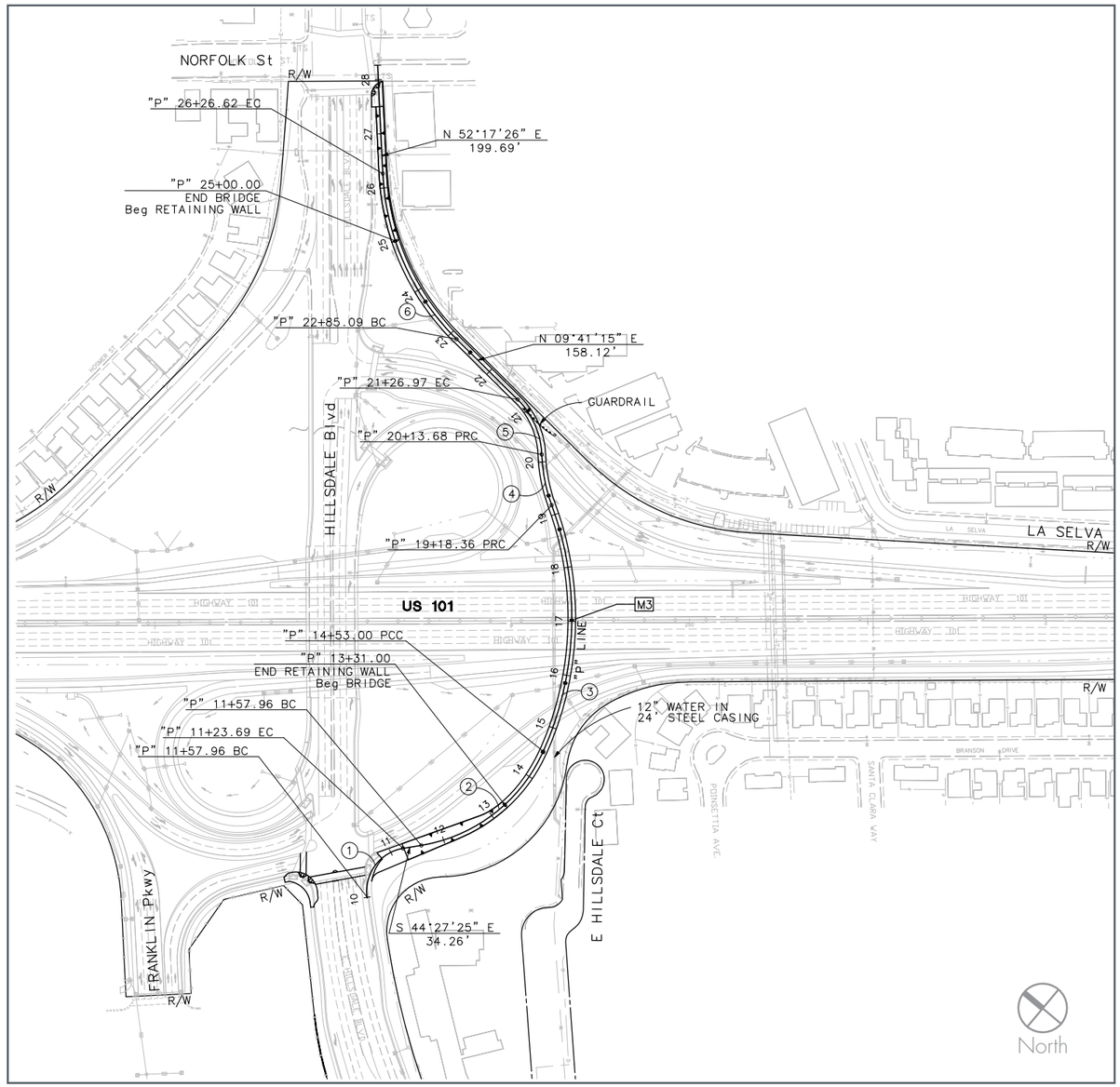
This meeting gave a review of the project and focused on how the bridge alignment connects to the surrounding pedestrian and bicycle networks. An overview of treatments that can be designed at the connection/landing areas on either side of the pedestrian & bicycle bridge was also presented, focusing especially on intersections. Audience members then broke out to visit 3 different stations that included voting on different connection alignments, providing input on safety concerns, and providing input on landing/intersection treatments.

Results from the polling tended to favor Alternative D (east side connector to La Selva) with 8 votes, then Alternative B (both east and west connectors) with 5 votes, and then Alternative A (no connectors, just 1 alignment over freeway and ramps) with 3 votes. There were no votes in favor of Alternative C (west side connector to Hillsdale Court) These alternatives are further described in the next section, Alignment Options.

5.0 | ALIGNMENTS

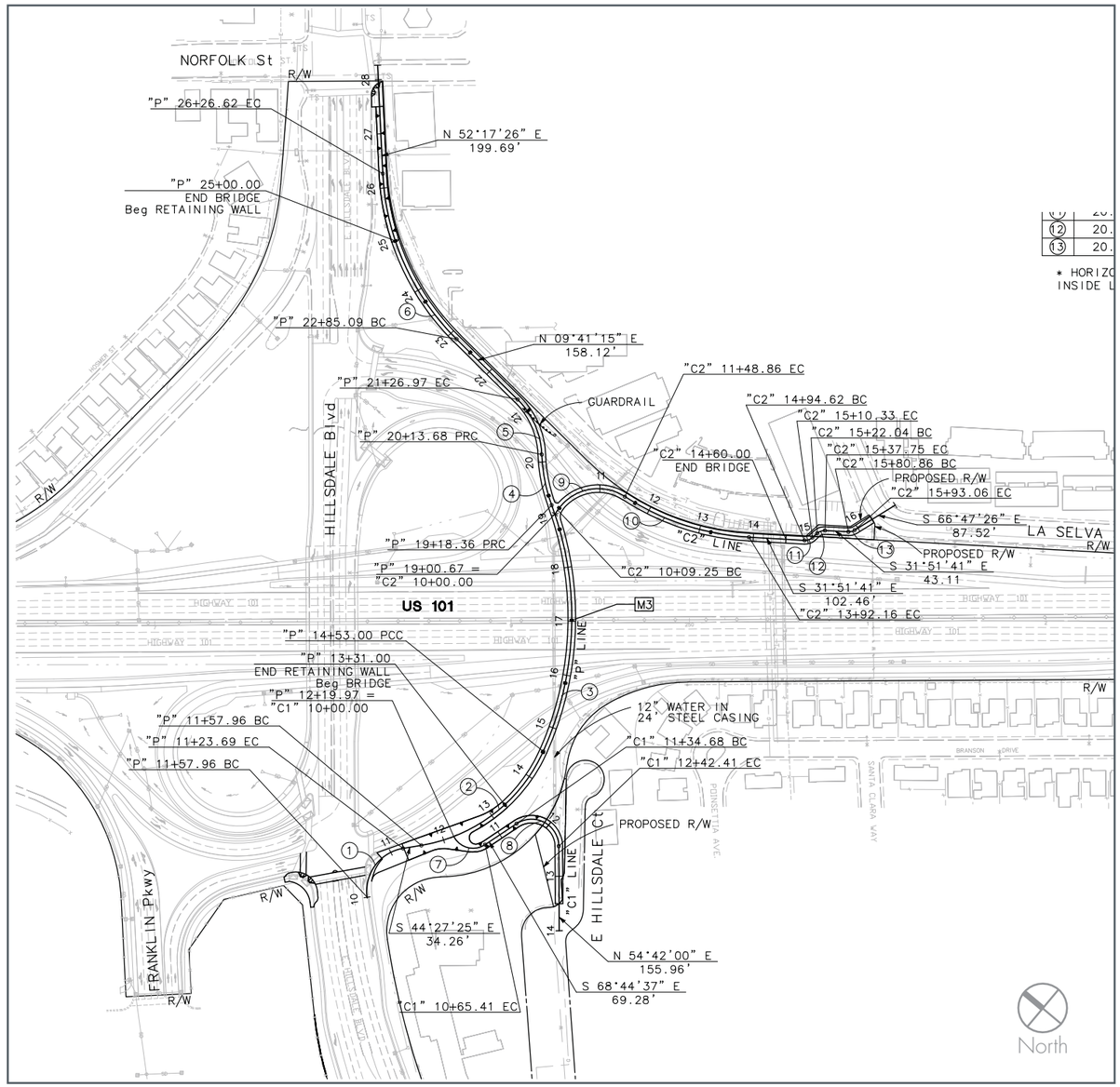
Based on the previous 2007 alternatives analysis study and PDT meetings since then, two build alternatives (Alternatives A and B) are proposed in the Caltrans PSR-PDS document that are based on the locally identified preferred alternative from the 2007 study. The preferred alternative from 2007 proposed a separated Class I path and ped/bike bridge over US 101 on the south side of the Hillsdale Blvd interchange, scoring the highest of all the alternatives reviewed primarily because it provided a route that eliminated all ped/bike crossings at the interchange ramps. This alternative is considered viable because it satisfies the project's purpose and need by providing a continuous ped/bike path across US 101 that improves connectivity, provides a route that eliminates vehicle ramp conflicts for peds/bikes, and would encourage a mode shift away from motorized travel by providing a safe, convenient and low-stress ped/bike link across US 101 between multiple destinations within range of ped/bike activity destinations.

Alternative A:
This alternative proposes a 12' wide Class I path and ped/bike bridge on the south side of the existing Hillsdale Blvd overcrossing that spans over US 101 and all ramp crossings. On the west side of the interchange, the path/bridge would connect at the southwest corner of the Hillsdale Blvd/SB Ramps/Franklin Parkway signalized intersection. The bridge would then extend southeast over the SB on-ramps, US 101, and then continue northeast over the NB directional off-ramp before descending back down to connect at the southwest corner of the Hillsdale Blvd/Norfolk Street signalized intersection. This entire alignment would be entirely within State right of way, would provide a Class I path compliant with ADA design standards, and would provide standard vertical clearance over US 101 and the interchange ramps.



Alternative B:
This alternative includes the same main Class I path and ped/bike bridge alignment as Alternative A, but provides additional connections on both sides of US 101. On the west side of the interchange, a Class I path would branch off the main path alignment approximately 100' south of Hillsdale Blvd and provide a connection to the adjacent Hillsdale Court. Approximately half of this path connection would be in State right of way, and the other half would require acquisition of private right of way. On the east side of the interchange, a bridge connector would branch off the main bridge alignment approximately 100' east of US 101 and provide a connection to La Selva Street to the south. Most of this bridge connection would be within and follow the state right of way, while the remaining 150' of path closest to La Selva Street would require private right of way acquisition.

For the purposes of public meeting #5, two other alternatives were considered that are not in the Caltrans PSR-PDS document. Alternative C includes the basic alignment of Alternative A, but adds the west side connections to Hillsdale Court. Alternative D includes the basic alignment of Alternative A, but adds the east side connection to La Selva Street.



6.0 | BRIDGE CONCEPTS

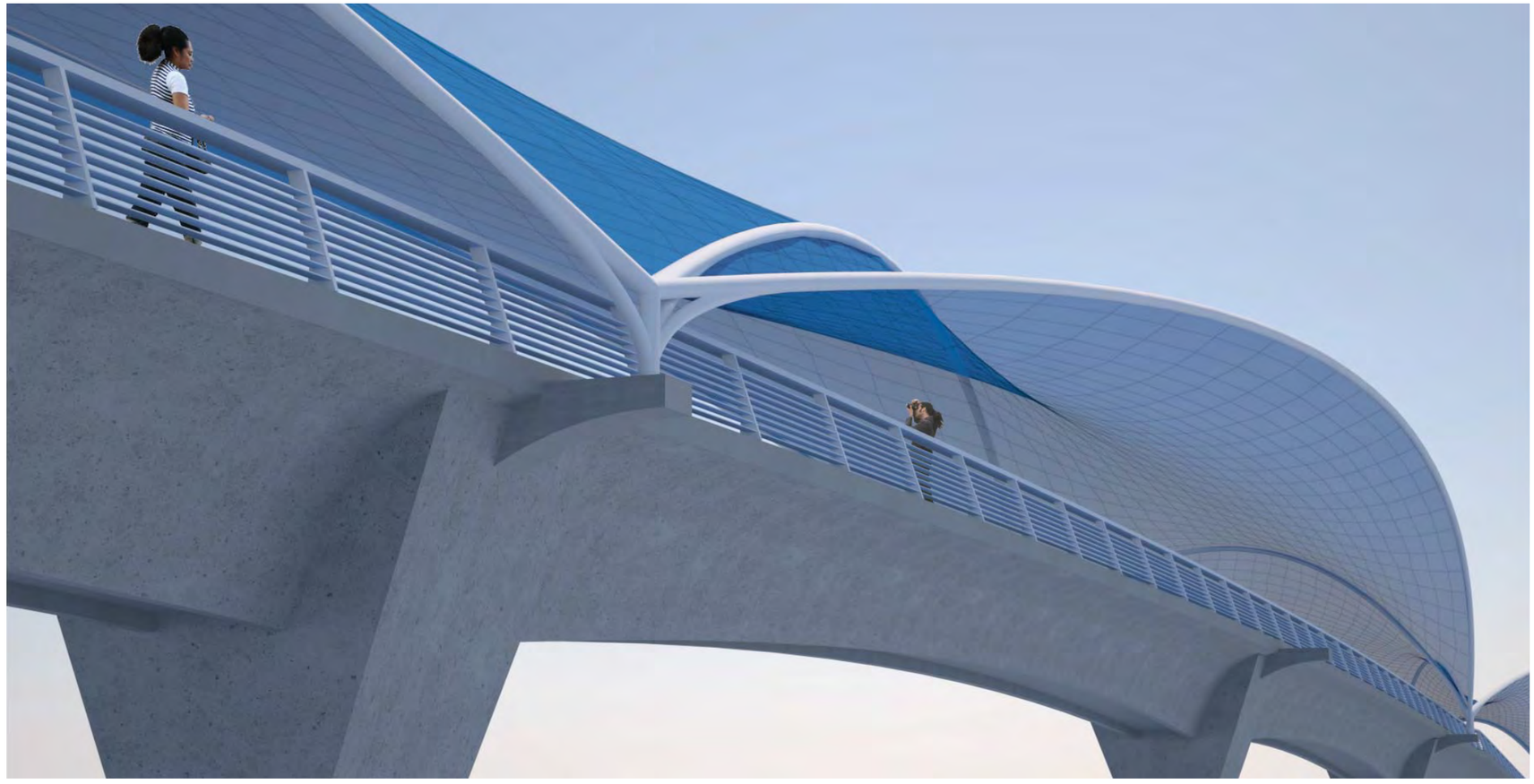
ALTERNATIVE 1
Mission Revival Girder

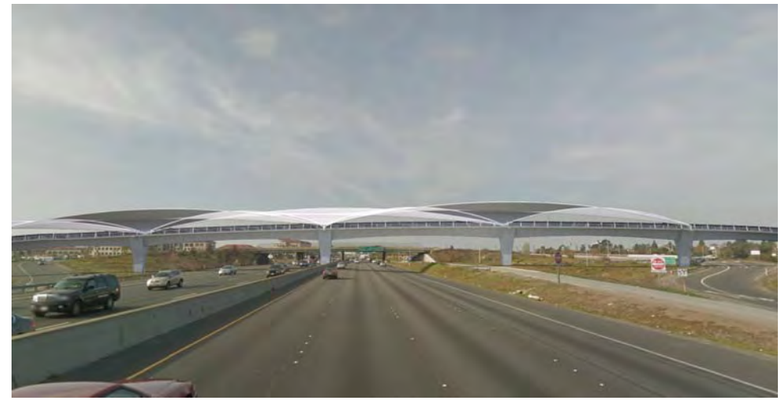
A simple girder structure detailed in the iconic Mission Revival architectural style. This Spanish aesthetic is very common throughout California, with many examples in San Mateo. The basic multi-span girder structure is formed into rectangular shapes sitting on arched piers, and is clad with a warm off-white stucco finish. Ornamentations such as elegant dark railings and distinctive column caps add the extra element of detail that make pedestrians feel at home on the bridge. This design provides both a comfortable crossing experience and an elegant gateway over the highway.

ALTERNATIVE 2

Haunched Girder with Tensile Roof

Multiple spans of haunched concrete box girders hop across the highway. In addition to being very structurally efficient, the curved super-structure shape gives the illusion of lightness and mobility. These dynamic qualities are very welcome on such a long structure. Also beneficial on a long exposed crossing in a sunny climate is a place of refuge from the sun. At the prominent spans over the highway a modern tensile roof structure creates shade below. This lightweight textile form also provides a landmark to the highway below.





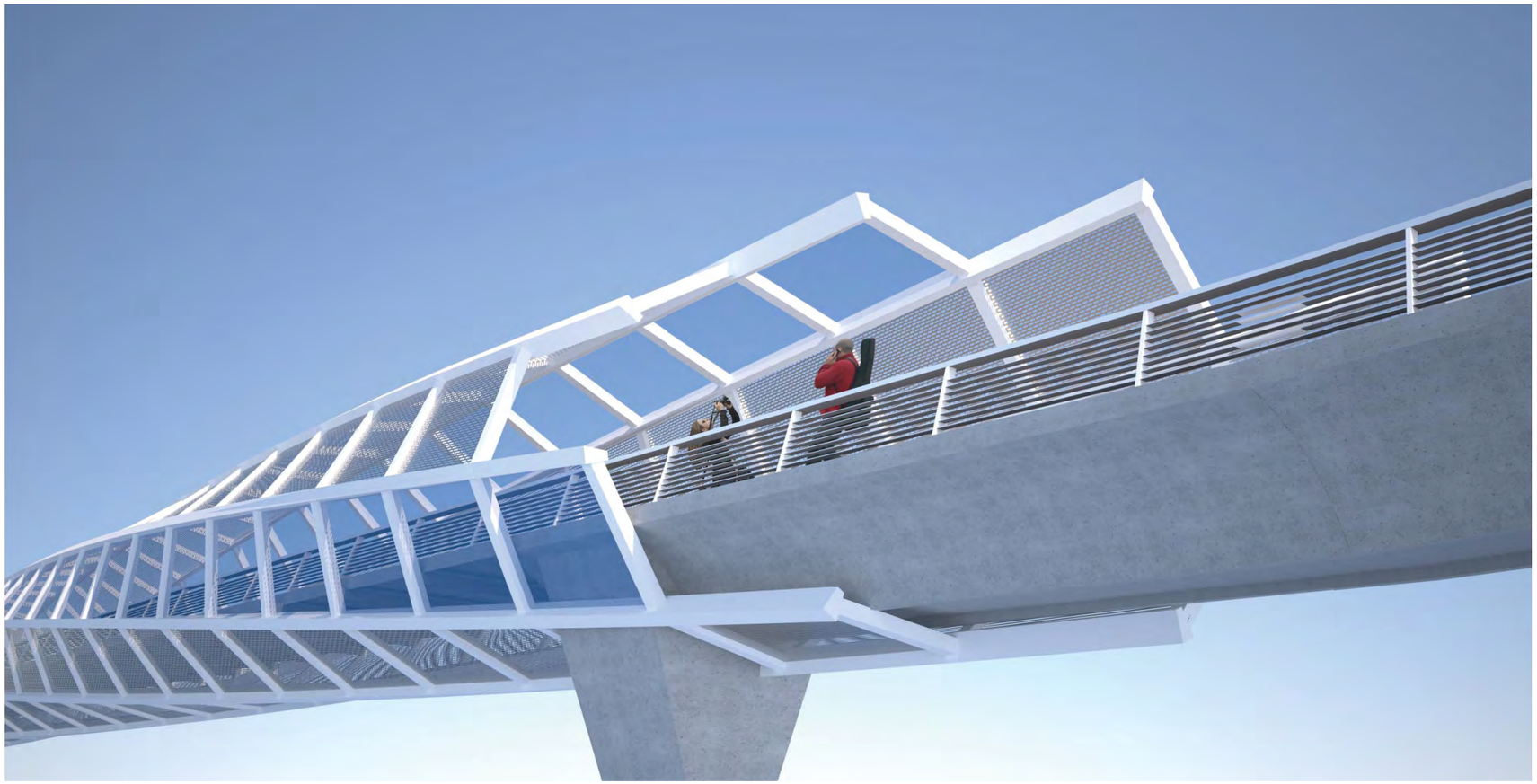
ALTERNATIVE 3

Constant Depth Girder

Multiple spans of constant depth concrete box girders travel across the highway. The constant depth structure is very easy to fabricate. It also creates a very pleasing, smooth, linear line along the entire crossing. This ribbon of structure is highlighted over the highway by a simple screen element. The modern screen satisfies the higher fencing requirements, becomes a landmark for the highway below, and also creates a more enclosed and comfortable space to make the bridge traveler feel safe.

ALTERNATIVE 4
Weave Truss

Constant depth box girder approach structures are met over the highway by a modern, twisting steel truss. An instant landmark, the dynamic shape of the truss is also engaging - the viewers experience of it will change as they walk through or drive under it, appearing to twist or weave its way around the deck. The cells of the truss are filled with different size meshes, creating alternating ribbons of color and translucency that weave along the crossing.



ALTERNATIVE 5
Cable Stay

Constant depth box girder approach structures are met over the highway by an inclined, asymmetrical cable stay structure. An instant landmark, the smooth, organic, A-frame tower appears to grow out of the ground. With a central plane of cables it supports a slender concrete deck. As the cables meet the deck they are integrated into the armature of a shade canopy. All together, the structure goes beyond simply providing safe passage - it creates a desireable experience that can become its own destination.

ALTERNATIVE 6
Arch

Constant depth box girder approach structures are met over the highway by an inclined, asymmetrical arch structure. Dynamic yet elegant by nature, this structure allows the pedestrian bridge to clear span Highway 101 and act as the perfect gateway and symbol to the city. Its asymmetric stance provides uniquely different experiences traveling north and south and reads visually very different depending on the point of view whether that be pedestrian or vehicular. Furthermore the repetition and detail of the cable hardware and structure help to reinforce the character and essentiality of the main span.

7.0 | COST AND MAINTENANCE

Construction Cost Estimates

Critical to the conceptual development of architectural alternatives is a solid understanding of the construction costs. For our analysis to date, we have used our Team's experience with unique and innovative solutions to give us the ability to accurately cost the alternatives. Typically, at this stage, rough cost numbers are based on historic square foot values. We have done this using our extensive database which includes both standard and unique structure types, as well as Caltrans's database. However, for some of our more unique structure concepts, square foot values can be highly misleading. Costs can be highly dependent on a number of factors including, contractor operations, unusual forming and formworks, and construction staging to name just a few. Therefore, we have also performed a much more in depth analysis – similar to the methods used by contractors to prepare bids – in order to ensure construction cost accuracy. This was done by performing an engineering analysis, roughly designing member sizes, calculating quantities and looking at quantity unit prices. For non standard items we will looked at a complete analysis method that looks at the construction operation, production rates, and materials. This is how contractors do it, and we have done this using our field engineers on staff to employ this method.

Since this stage of the design is very conceptual in evaluating relative alternatives, we have shown a rough matrix of relative costs:

1. Simple Box Girder – relative cost low. Construction cost between $xx and $xx.
2. Simple Box Girder with canopy – relative cost low. Construction cost between $xx and $xx.
3. Arch - relative cost moderate to high. Construction cost between $xx and $xx.
4. Cable stay - relative cost moderate to high. Construction cost between $xx and $xx.

All the costs for these costs are highly dependent on materials used, finishes, railings types, and lighting to name a few. A more accurate costing for these items will be performed in the subsequent phases of the project.

Maintenance

All our bridge alternatives propose to use cast-in-place concrete for the bridge substructure (foundations and columns) as well as for the bridge superstructure (bridge girders and decking). This is very reliable, cost effective and low maintenance system. In fact, about 85% of all bridges in last several years are constructed in this way. For each of our bridge concepts they are based on this basic configuration. The only differences, for example, would be the use of cable for the cable stay alternative. However, the rest of the structure is the same basic materials as the conventional concrete box.

Maintenance of the presented alternatives is very similar to any conventional concrete box girder bridge. These include any drain cleaning, vandalism removal, railing maintenance, and expansion joint replacement (30+ years). The railing maintenance will depend on the type of railing and finish material. For instance, a painted metal railing will depend on the paint types and application of paint, but it will require repainting about every 10 years. Whereas as stainless steel railing, while much more expensive, will be nearly maintenance free. An aluminum railing, while also virtually maintenance free is also an option, although it is much easier to vandalize.

In addition, the more unique structures such as a cable supported bridge will require replacement of the cables. Galvanized cables, while less expensive than stainless steel cables, will require replacement in the 50 year range – stainless steel should last 75 or even more. This is all relative to our bridge design life of 75 years – although with good maintenance it can last much longer.

8.0 | RECOMMENDATIONS

Geometric alignment alternatives and various bridge types will continue to be developed with input from the community, Public Works Commission, Planning Commission and the City Council during the next PA&ED phase. The goal is to incorporate context sensitive solutions that integrate and balance community, aesthetic, multimodal and environmental values with transportation safety, maintenance, and performance goals.

The PA&ED phase is expected to wrap up towards the beginning of 2016, at which point the City must secure funding to perform the final design work of Plans, Specifications and Estimate (PS&E) which would take approximately two years to complete. The City has not yet secured construction funding for the project, but once the PA&ED or PS&E phases have been completed, the project is in a much better position to receive funding because the project has been approved (PA&ED complete) or is "shovel ready" (PS&E complete). There are a variety of funding sources available for this type of pedestrian and bicycle facility , including Federal funds (OBAG, RTS, SR2S), State (ATP, BTA), Regional (RBPP) and Local (Measure A).