CITY OF MOUNTAIN VIEW

MEMORANDUM

Public Works Department

DATE: March 28, 2018

TO: Parks and Recreation Commission and Urban Forestry Board

FROM: Joy Houghton, Associate Engineer
Jacqueline Andrews Solomon, Assistant Public Works Director/ City Engineer
Michael A. Fuller, Public Works Director

SUBJECT: **Stevens Creek Trail Bridge Improvements Feasibility Study, Project 17-42**

RECOMMENDATION

Receive an update regarding the Stevens Creek Trail Bridge Improvements Feasibility Study, Project 17-42, including staff-recommended alternatives.

BACKGROUND

The Stevens Creek Trail Bridge over Evelyn Avenue, Caltrain tracks, VTA Light Rail tracks, and Central Expressway was constructed in 1999 and runs parallel along the east side of Stevens Creek. The existing bridge is 10' wide with a deck surface consisting of timber planks. The north and south approaches each have 180-degree switchbacks that connects to the Stevens Creek Trail at grade.

In 2012, the 180-degree switchbacks were resurfaced with Portland cement concrete to enhance safety of trail users by providing a more slip-resistant surface. Although the switchbacks were resurfaced with slip-resistant concrete, the switchbacks continue to be challenging to navigate for many bicyclists. A more direct route is desired for trail users making through movements along the Stevens Creek Trail that does not include 180-degree turns. The bridge timber decking has not been replaced since it was installed in 1999 and is continuing to deteriorate due to weather and wear and tear. An alternative material to replace the timber decking is needed to provide a more slip-resistant and longer-lasting surface on the trail bridge.

In 2017, the City retained Mark Thomas and Company (Mark Thomas) to conduct a feasibility study to evaluate bridge improvements, including modifications to the

bridge approaches/switchbacks to provide a more direct route to and from the bridge and resurfacing the existing bridge with alternative materials to improve safety for all trail users.

ANALYSIS

The Stevens Creek Trail Bridge Improvements Feasibility Study, Project 17-42 (Study) evaluated several alternative materials to replace the existing timber decking and different alignments to improve the north and south bridge approaches.

Bridge Decking

The bridge was originally intended to be designed with a concrete surface deck but, due to funding, the concrete decking material was changed to treated timber and the bridge was designed with a lower design loading. City staff was interested in replacing the timber decking with lightweight concrete due to it being durable, long-lasting, and available in many finishes and colors. However, the lightweight concrete is heavy in comparison to other materials and exceeds the design loading of the existing steel bridge structure.

The Study evaluated four feasible options for decking material for the bridge, including: timber, composite wood, fiber reinforced polymer (FRP), and aluminum. Each material was evaluated for advantages, disadvantages, life expectancy, unit weight, and estimated cost per square foot. The table, shown as Exhibit A, summarizes the findings:

Material	Advantages	Disadvantages	Life Expectancy	Unit Weight (PSF)	Cost per Square Foot (Total)
Ipe	• Durable • Natural Look • Low Maintenance	• Wears with Heavy Use	25+ Years	12	$25 ($330,000)
Composite Wood	• Durable • Many Color Options	• May Be Slippery • Unnatural Appearance • Relatively Heavy	25+ Years	20	$35 ($462,000)

Material	Advantages	Disadvantages	Life Expectancy	Unit Weight (PSF)	Cost per Square Foot (Total)
FRP	• Low Maintenance • Design Flexibility • Lightweight • Corrosion-free	• Costly	75 Years (25-50 Years of Maintenance—Wearing Surface)	10	$52 ($686,000)
Aluminum	• Lightweight • No Maintenance • Corrosion Resistant	• Appearance • Increased Noise • Potential For Galvanic Corrosion between aluminum deck and steel bridge	75 Years (No Maintenance)	8	$30 ($398,000)

Exhibit A—Alternative Materials for Bridge Deck

Staff recommends fiber reinforced polymer (FRP) to replace the existing timber decking material on the bridge. FRP is very durable, has the appearance of concrete, but weighs far less due to it being made of interlocking fiberglass panels with nonslip wearing surface. The material is lightweight, requires minimal maintenance, and is corrosion-free. Its anticipated life is 75 years, and the wearing surface is the only maintenance item. Recoating is generally considered cosmetic with an interval of 25 to 50 years between coatings. Although it is the most expensive alternative (twice as much as timber), its life expectancy is three times longer with minimal maintenance required.

Bridge Alignment

The Study also evaluated modifications to the existing bridge landings to enhance safety and provide a more direct route for bicyclists by eliminating the 180-degree turn switchbacks. One alternative was developed for the south approach due to constraints and three alternatives were developed for the north approach. All bridge approach alternatives have a vertical downgrade of 4.5 percent, which meets the requirements of the Americans with Disabilities Act (ADA) and bridge approach width matching the existing bridge width of 10′.

Right-of-way needs, order of magnitude costs, and environmental and permitting requirements were evaluated for the alternatives. Below are summaries of the Study findings:

Property/Ownership

Stevens Creek is within the Santa Clara Valley Water District (SCVWD) property located on the west side of the approaches. State Route 85 is located within the California Department of Transportation (Caltrans) property on the east side of Stevens Creek Trail. All proposed alternatives are within City property and do not require acquisition of property from the SCVWD or Caltrans.

The improvements at each approach encroach into the existing PG&E easement for the overhead electric transmission tower lines on the east and west sides of Stevens Creek. The improvements may require approval from the California Public Utilities Commission since the PG&E easement has structure and building restrictions.

Environmental

The removal of trees and vegetation within the Stevens Creek riparian corridor and the effects of construction adjacent to the riparian habitat are environmental concerns of the project. Most of the corridor in the project area contains riparian habitat, including numerous trees. The improvements would likely require a permit from the California Department of Fish and Wildlife (CDFW), which also requires mitigation in the form of creation of replacement habitat or through the purchase of credits at an approved mitigation bank.

The trees that would be impacted by the improvements not within the riparian corridor would be subject to the requirements of the City's Tree Preservation Ordinance. During the design phase, a tree survey would need to be conducted to determine tree impacts and mitigation requirements.

South Approach Improvement

For the south approach (Exhibit B), a 112' bridge approach that connects to the existing switchback landing area south of the trail is proposed. Due to the limited spacing between the Stevens Creek top of bank boundary to the west and drainage ditch to the east, only one alignment is feasible.

This improvement would require removal of approximately six trees (red **X** in Exhibit) along the alignment, and the estimated construction cost is $685,000.

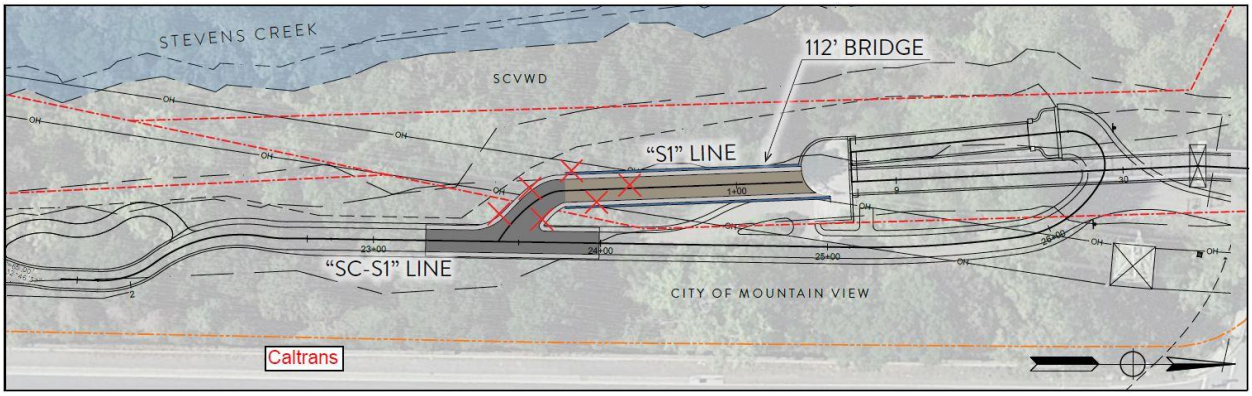

Exhibit B—South Approach Improvement Plan View

North Approach – Alternative 1

The north approach Alternative 1 (Exhibit C) proposes a 128′ bridge approach that spans over the existing trail which connects the existing switchback landing area to the east side of the trail. The profile of the existing trail under the new approach is lowered to meet a 10′ minimum vertical clearance for trail users, including maintenance vehicles. The new approach lands on the east side of the trail adjacent to the existing sound wall. A retaining wall is needed to account for the elevation difference between the new trail approach and the existing embankment. The proposed landing area connects at a "T" intersection at the trail.

This improvement would require removal of approximately 17 trees along the new alignment and the estimated construction cost is $1,059,000.

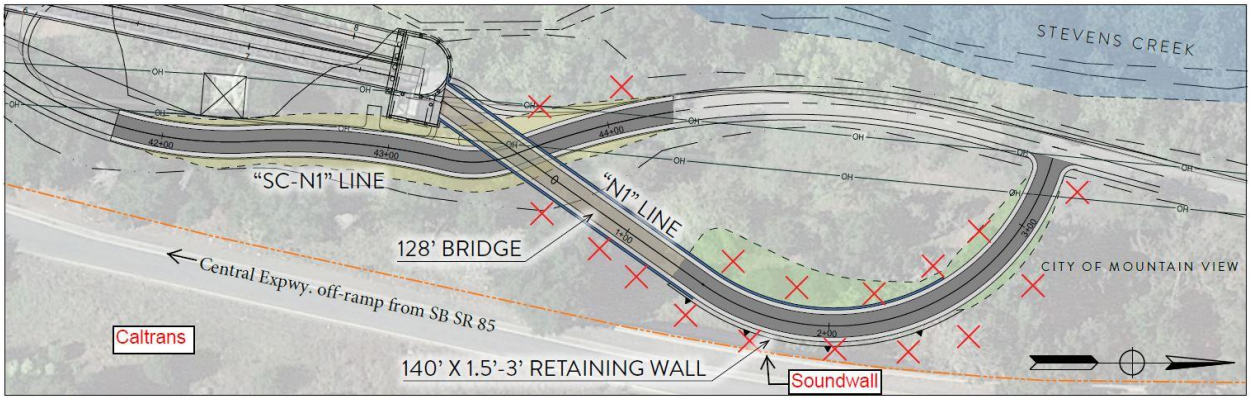

Exhibit C—North Approach Alternative 1 Plan View

North Approach – Alternative 2

The north approach Alternative 2 (Exhibit D) proposes a 225' bridge approach that connects to the existing switchback landing area north of the trail. The Alternative 2 approach extends approximately 450' north of the existing landing area because the existing trail is on a downgrade. In order to meet ADA requirements, a longer approach is needed. The existing at-grade trail segment adjacent to the new bridge and embankment needs to be relocated slightly east to accommodate the fill slope.

This alternative would require removal of approximately 24 trees, and the estimated construction cost is $1,514,000.

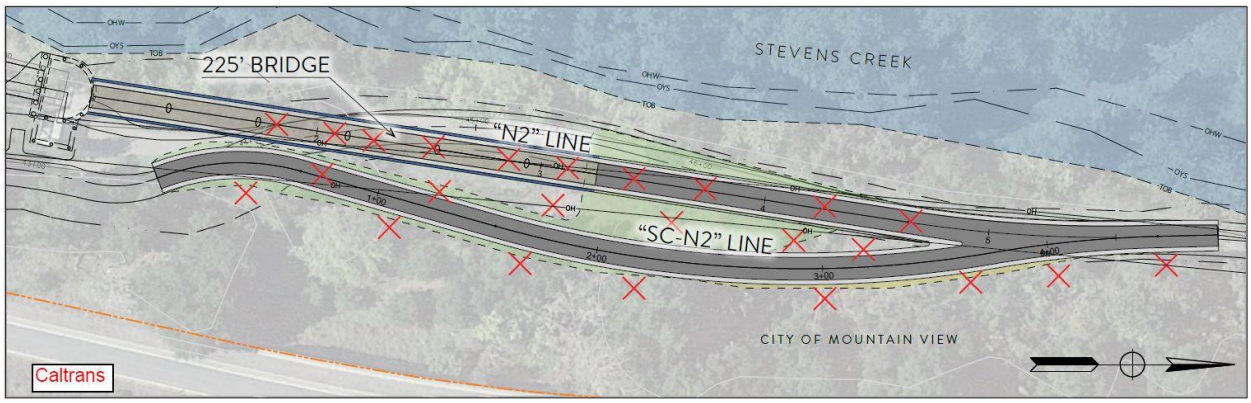

Exhibit D – North Approach Alternative 2 Plan View

North Approach – Alternative 3

The north approach Alternative 3 (Exhibit E) proposes a 225' bridge approach that connects to the existing switchback landing area to the existing Stevens Creek Trail to the north. The Alternative 3 approach extends approximately 450' north of the existing landing area because the existing trail is on a downgrade. In order to meet ADA requirements, a longer approach is needed. The at-grade trail adjacent to the new bridge and embankment alignment abuts the retaining wall to limit the impact to adjacent trees.

This alternative would require removal of approximately 20 trees, and the estimated construction cost is $1,569,000.

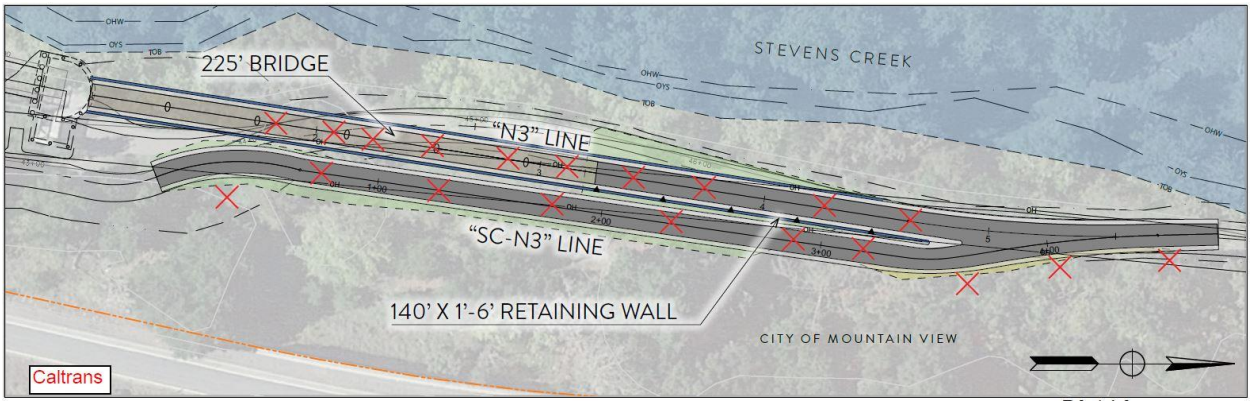

Exhibit E—North Approach Alternative 3 Plan View

Due to constraints, only one alignment alternative is provided for the south approach. Given the three alternatives for the north approach, staff recommends the North Approach Alternative 3 to move forward to the design phase when funding becomes available for the next phase of the project. Although North Approach Alternative 3 is the highest in cost, it is also the most direct alignment between the existing bridge and the existing trail. Alternative 3 also proposes a retaining wall (Exhibit F) between the new bridge and the at-grade trail to reduce conflict points from trail users who may be tempted to take shortcuts if the retaining wall is not in place (Alternative 2—Exhibit G).

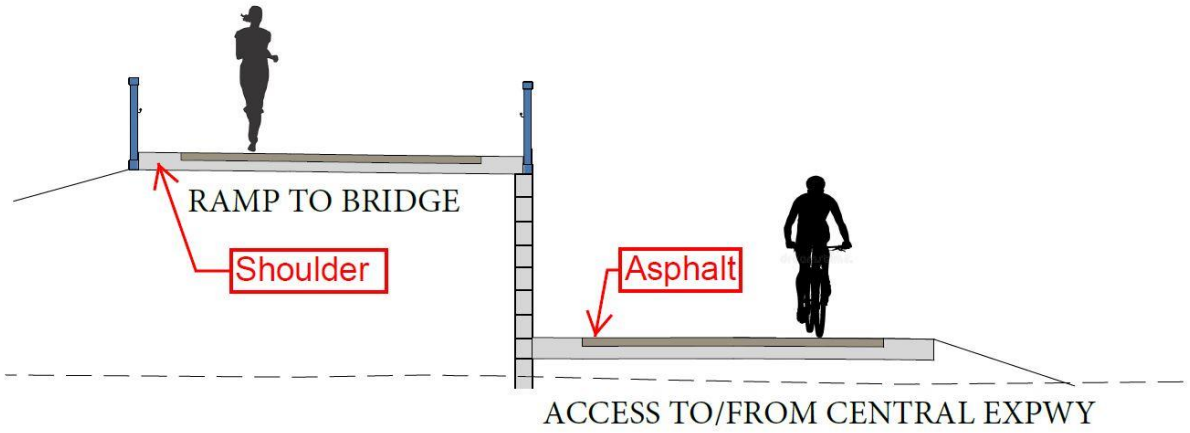

Exhibit F—North Approach Alternative 3 Cross Section

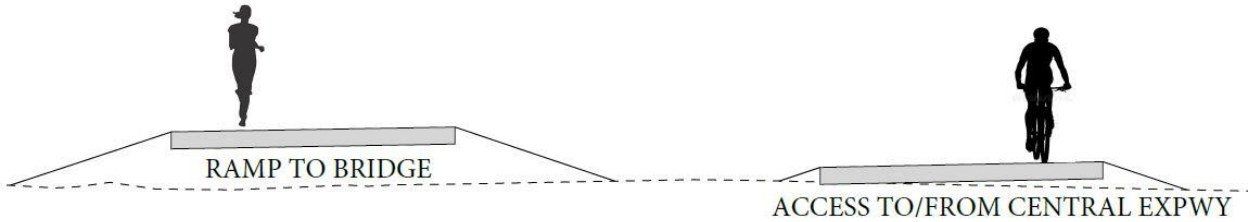

Exhibit G—North Approach Alternative 2 Cross Section

CONCLUSION

The Feasibility Study is in draft version and staff will direct Mark Thomas to finalize the report with the staff-recommended alternatives. Staff recommends replacing the existing timber decking on the Stevens Creek Trail Bridge over Evelyn Avenue, Caltrain tracks, VTA tracks, and Central Expressway with FRP due to its 75-year life expectancy and minimal maintenance requirement. The final feasibility study report recommends the South Approach Improvement and North Approach Alternative 3.

JH-JAS-MAF/AF/2/CSD
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cc: CSD, PWD, APWD—Solomon, POSM, PCE—Au, AE—Houghton, F/c (17-42)