City of Dublin Iron Horse Trail Feasibility Study

March 2017

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WC14-3178

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East Bay Regional Park District

BART

Wheels

contents

Iron Horse Regional Trail Feasibility Study | FINAL REPORT

LIST OF TABLES

introduction

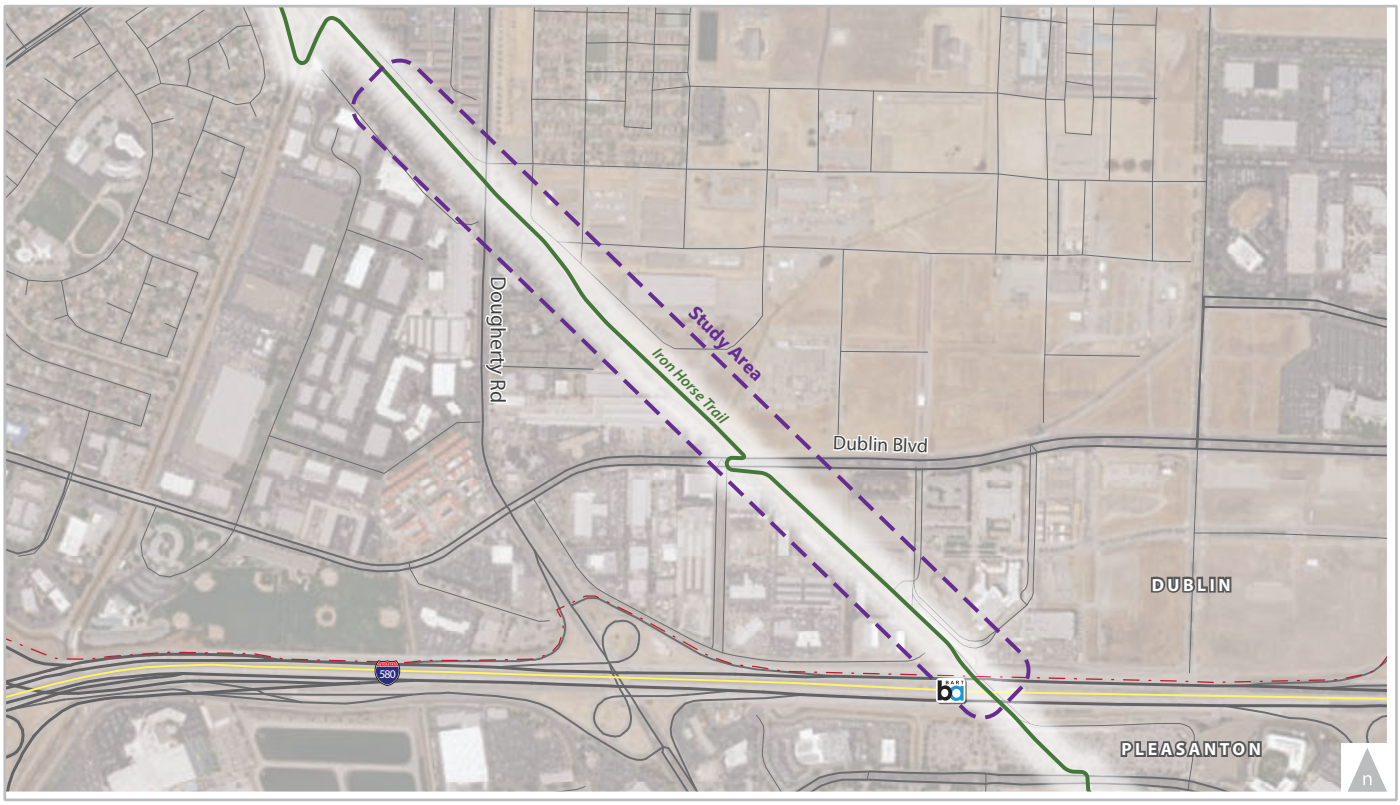
Iron Horse Trail Feasibility Study Goal:
The goal of this study is to identify potential improvements to enhance the Iron Horse Trail within the City of Dublin by establishing the trail as a "front door" to the City and the rest of the regional trail. Through enhancements informed by community and stakeholder input, the Iron Horse Trail presents a key opportunity to increase the amount of bicycling and walking within the City and reduce automobile trips.

The Iron Horse Regional Trail is a multi-use pathway that runs north-south through Contra Costa and Alameda Counties, connecting the Cities of Concord, Walnut Creek, San Ramon, Dublin, Pleasanton, Livermore, and the Town of Danville; and is managed by the East Bay Regional Parks District. Originally, this 40-mile span of right-of-way was used by the Southern Pacific Railroad but was abandoned in 1977. The Iron Horse Trail has since become an active transportation corridor for inland Contra Costa and Alameda counties providing many connections to residential neighborhoods, parks, schools, two BART stations, and commercial/retail uses. The Alameda County Transportation Commission, which oversees transportation funding within Alameda County, provided a $358,000 grant to explore a funding program along the trail within the City of Dublin.

After an extensive public outreach process and multi-modal assessment, a range of proposed improvements was compiled to allow the public and City officials to begin selecting project elements to improve safety, comfort, and efficiency for those travelling on the Iron Horse Trail. The identified near-term and long-term improvements were intended to enhance trail access for users of all ages and abilities and to connect more commuters to the East Dublin/Pleasanton Bay Area Rapid Transit (BART) station.

This study synthesizes the findings of multiple technical memoranda produced by the project team over the past year. The information was consolidated into an overview of the public involvement, existing conditions, alternatives analysis, and implementation strategy for the trail within the study area. **Figure 1** highlights the Iron Horse Trail Feasibility study area, which extends from just north of Dougherty Road to the East Dublin/Pleasanton BART station. This area was selected to focus on the trail access near BART and to address trail crossings at Dougherty Road and Dublin Boulevard.

Figure 1: Iron Horse Trail Feasibility Study Area



glossary

The visual glossary on the following page is meant to act as an easy to use reference for the active transportation terms used throughout this report. The intent of the visual glossary is to provide readers with an overview of commonly used terms by professionals in the bicycle and pedestrian planning fields.

Advanced Stop Bars
Striped markings before a crosswalk to advise motorists where to stop before arriving at an intersection or crosswalk.

Class I Shared-use Path
A completely separated right-of-way for the exclusive use of bicycles and pedestrian with minimized interruptions.

Class IV Separated Bikeway (Cycletrack)
A physically separated path along a street dedicated to bicycles.

Class II Standard Bicycle Lane
A striped lane for dedicated one-way bike travel on a roadway.

Class II Buffered Bicycle Lane
A modified on-street bicycle lane with a striped buffer to provide clear delineation from the vehicle travel lanes.

Curb Extensions / Bulb-outs
An extension of the sidewalk into the street to create a shorter pedestrian crossing distance and make pedestrians more visible to vehicles.

Decomposed Granite (DG)
Pavement building material composed of weathered granite typically used for heavy-use paths in parks or shoulders along trails.

Desire lines
The preferred path of travel for bicyclists and pedestrians that forms when users must go out of their way to reach a destination.

Ladder Crosswalk Striping
This type of striping enables the crosswalk to be better defined to automobiles.

Leading Pedestrian Interval (LPI)
A signal timing strategy that allows people walking to proceed during an all-red phase in order to give them a head start during the signal cycle.

Long-term Bicycle Parking
Bike lockers or shelters used to house bicycles for extended periods and can include smart-card technologies such as BikeLink.

Passive Signal Detection
Signal actuators that can automatically sense the presence of a bicycle or pedestrian in a crosswalk.

Pedestrian-scale Lighting
Lighting specifically oriented toward pedestrians that is often lower in height and spaced closer together than traditional roadway lighting.

Short-term Bicycle Parking
Bike racks that are not usually secured or sheltered and are generally found near highly visible areas or entrances to buildings.

Signal Cycle
The amount of time a traffic signal will allow all movements to occur. Long signal cycles can create delay and frustration.

Slip Lanes
A dedicated lane for right-turning vehicles with the expectation that they will not have to stop.

Speed Feedback Sign
A commonly used device that utilizes radar to measure and display the speed of passing vehicles.

Triple-Four Crosswalk
Crosswalk striping with piano key markings and a gap between them to direct pedestrian and bicycle traffic, can include bicycle stencils.

Wayfinding Signage
A network of signs that highlight nearby amenities and services that are accessible from a given location.

community engagement

Multiple public outreach strategies were employed to get feedback from various trail users.
The workshops and events focused on providing the public with general information and an opportunity to provide input on what the trail can look like in the future.

An extensive public outreach process was undertaken to understand the types of improvements the public would like to see incorporated into the Iron Horse Trail. The outreach included a variety of approaches to reach different types of Dublin residents and included the following methods to gain public and stakeholder opinions:

- Stakeholder interviews
- A walking/biking audit on the trail
- Three community workshops
- Outreach at the Dublin Farmers Market
- Advisory committee meetings
- Online Alternatives Survey

The workshops and events focused on providing the public with general information about the project and soliciting important feedback to learn about what types of improvements would directly benefit residents and encourage them to use the trail more often. This process allowed for frequent trail users, occasional users, and even some individuals who never used the trail before to identify key concerns regarding the Iron Horse Trail.

Feedback received during these outreach efforts focused on issues that make the trail feel disconnected from the overall transportation network. Attributes that contributed to this sentiment include: poor pavement quality, isolated segments, and lack of connectivity with adjacent land uses

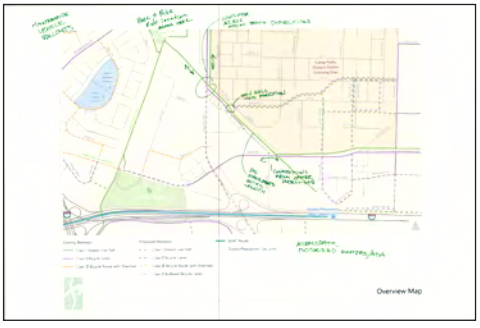
such as schools or other points of interest. Comments frequently centered on the trail's ability to serve as a viable commuter option due to the long distances between uses and safety concerns at intersections when there are heavy volumes of vehicular traffic. Other participants in the outreach efforts focused on the trail's role as a place for weekend recreation and to provide a separate facility that families can use with their children. Historical information and civic identity for the community could be enhanced through better use of educational signage and amenities. In terms of safety, some residents identified that the current trail width creates conflicts between cyclists and pedestrians, especially on the weekends, since both pedestrians and cyclists enjoy the opportunity to walk or bike next to a partner. This creates situations in which cyclists must maneuver around pedestrians or pedestrians must step off of the pathway to avoid cyclists. Additionally, some BART and transit commuters highlighted the lack of lighting along the trail during the evening as a deterrent to being able to utilize the trail safely since the trail is open between the hours of 5:00 AM to 10:00 PM. The following sections summarize the public outreach efforts that were held specifically for this project.

Workshop 1: Visioning & Trail Audit - January 24, 2015

The first workshop was held at Core Performance, a fitness gym in Dublin near the Iron Horse Trail study segment. It focused on communicating the overall intent of the project to the public and discussed the existing conditions of the trail. Participants provided ideas for improving the trail user experience. The workshop began with a presentation by the consultant team and City of Dublin staff, followed by a visioning exercise to allow participants to imagine what their ideal version of the Iron Horse Trail would look like. The visioning exercise provided an alternative method to understanding what future improvements could be included in this plan to meet the needs of participants.

After the initial presentations, attendees had the option to participate in a bicycle or walking audit of the trail study area. This exercise provided an opportunity for the consultant team to discuss issues with participants at the exact problem locations to point out specific issues or areas of concern. Feedback from participants included the need for landscape improvements, more efficient connections to BART, the lack of public art and wayfinding, safety concerns at intersection crossings, and a lack of trail-oriented lighting. After the audits, the walking and biking groups regrouped to discuss the problems they noticed in the field and to pinpoint the issues they would

The comments and feedback received provide insight into the following areas:
Functionality and connectivity to BART, active transportation and recreation along the trail, trail crossing safety concerns, and wayfinding needs.



like addressed on blown up maps of the study area. The results from each groups' discussion were then shared back to the entire group. The comments were consolidated into two maps which identified the major reoccurring themes presented by each group.

The comments and feedback received during the audit and visioning exercise are summarized into the high-level categories below:

Functionality and Connectivity: Participants stressed the need for a utilitarian trail with connections to BART and other destinations, with less emphasis on aesthetics. The trail should be planned as a component of a larger, more connected Dublin and regional bicycle network.

Active Transportation: Many discussions and comments from participants were centered on the trail's role to reduce car trips and a way to encourage non-auto trips in the region.

Trail Crossings: Several comments revolved around the challenging at-grade intersections at Dublin Boulevard and Dougherty Road. Heavy traffic volumes created wide intersections with long pedestrian crossing times. These crossings were cited as areas that discourage walking and biking on the trail. Pedestrian over- or under-crossings were frequently mentioned as possible solutions.

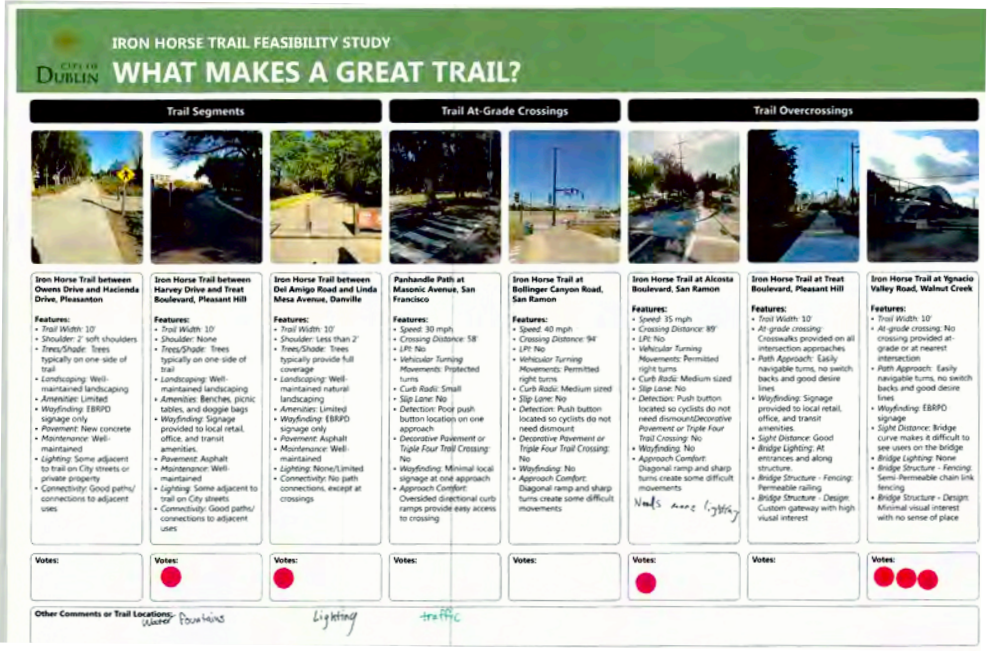
Wayfinding and Signage: Many participants felt that the locations of nearby destinations, such as the East Dublin/Pleasanton BART Station, were not obvious while on the trail and were difficult to find if one was unfamiliar with the area. Trail-oriented wayfinding signage was suggested to help people find local destinations.

Dublin Farmers' Market May 21, 2015

To present and document feedback on existing conditions the consultant team and City staff hosted an interactive, informational exhibit at the Dublin Farmer's Market on Bike to Market day. This event allowed Farmers' Market-goers to vote for a preferred look and setting of the Iron Horse Trail using other segments as precedents. The precedent areas allowed market-goers to better understand how the trail varies throughout the region and to show ways the trail could be enhanced in Dublin. This event used existing conditions information and gained feedback from a diverse cross-section of Dublin residents. Approximately 30 people provided comments and voted on their preferred local examples of trail segments, at- grade crossings, and overcrossings.

Community members were first asked to highlight perceived problems with the section of the Iron Horse Trail under study, as well as potential solutions, using poster-sized maps to facilitate ideas. The majority of the comments received on the study area maps targeted four major improvement areas: Dougherty Road crossing, Dublin Boulevard crossing, on-trail experience, and the trail-to-BART transition. The desire for overcrossings at both Dougherty Road and Dublin Boulevard were mentioned the most. Other concerns were the lack of adequate signage and wayfinding for nearby destinations. Commenters also characterized the on-trail experience as "desolate" and "unfriendly" landscaping as causes of discomfort. Respondents also suggested non-transportation functions for the trail, such as community programming or facilities, like a playground and events for residents. Many commenters mentioned that the BART connection is difficult, and the study would be very successful to the degree it can facilitate an easier path to the station.

An interactive poster labeled "What Makes a Great Trail?" invited market-goers to vote with stickers on their preferred example of existing trail segments, at-grade crossings, and trail overcrossings. Trail segments in Pleasant Hill and San Ramon, trail at-grade crossings in San Ramon, and trail overcrossings in Walnut Creek (Ygnacio Valley Road), all garnered the most votes.



Farmers Market attendees were provided the opportunity to highlight components of what makes a great trail. Existing Iron Horse Trail segments from around the region were used to provide precent examples that attendees could vote on for inclusion in Dublin.

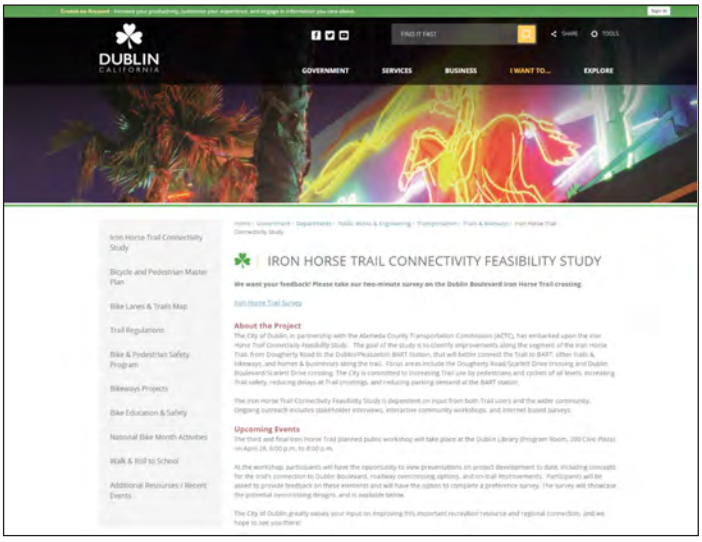
Workshop 2: Preliminary Improvements - October 7, 2015

The second workshop was held in the Regional Meeting Room at the Dublin City Hall. The intention of the workshop was to solicit community input on potential near-term and long-term trail improvements. These improvements included updates to roadway crossings, enhanced connectivity to transit, and on-trail amenities such as wayfinding and lighting. Input and results at this workshop would drive the creation of alternatives for both trail segments and trail crossings, alongside technical and engineering considerations.

Community members were encouraged to utilize this meeting as a dialogue and clarifications could be made as the presenters discussed the proposed improvements. Many participants wanted to know more about future adjacent developments and the extension of Scarlett Drive. With multiple projects in the planning stages surrounding the trail, this project was being used to ensure coordination between them, to enhance access to the Dublin/Pleasanton BART station, and to connection the trail to the south into Pleasanton. Some concerns were raised about the cost of grade-separated crossings but participants liked that the City already has some matching funds provided by adjacent developments to help pay for the structure at Dublin Boulevard.

Intersection improvements at Dougherty Road and Dublin Boulevard were requested in the short-term to help with the existing difficulties in making these long crossings. The City indicated that improvements would be included with the Dougherty Road Widening and Scarlett Drive Extension projects where possible to help implement improvements in the near-term. The improvements included enhanced signage to warn vehicles to the presence of the trail crossing, high-visibility crossing striping, and aligning the trail with the crossings. At-grade crossings would be retained should a potential overcrossing be installed.

Feedback regarding trail segment cross-sections included a strong desire to have separated facilities for bicycles and pedestrians where possible or to have a wider trail with a centerline to clearly delineate where the two-way travel should be occurring. Shade structures and trees were specifically requested on both sides of the trail but the project team explained that the Kinder Morgan pipeline will run between the trail and Scarlett Drive. Therefore, trees can only be planted to the east of the trail. Many participants recognized that incorporating enhancements to the trail through the BART station to connect with Pleasanton would help to promote the trail as a safe, comfortable place for more people to ride or walk to BART. Cyclists were in favor of a separate bikeway (Class IV) facility through the station to remove bicycle and pedestrian conflicts near the BART station fare gates.



City of Dublin project website provided an easy place to store project materials and access the online alternatives community survey.

Online Alternatives Community Survey: Available from April 11, 2016 – May 19, 2016

Workshop 2 feedback was utilized to create Alternatives for both trail segments and trail crossings. The alternatives were then incorporated into a publicly available online survey hosted on the City's website. The survey was advertised through a variety of means, including newspapers, the City's website, social media outlets, and through verbal announcements at community meetings, including the third Iron Horse Trail Connectivity Workshop held on April 28, 2016. The survey had over 80 respondents, and provides insight into community preferences for the project.

Survey respondents were asked a series of questions, and then had the option to write in comments and questions. Feedback from the survey indicated that respondents were strongly in favor of a new overcrossing at Dublin Boulevard (80 percent of participants in favor) as opposed to leaving the crossing as strictly at-grade. Comments included concerns about overall cost-effectiveness, timely implementation, and safety. Bridge color and design were lower priorities to survey respondents. Bridge costs were not provided while viewing the alternatives designs to understand the preferred design before refining the bridge options. While the most expensive option for a cable stayed bridge with a tower had the highest approval rating (3.14 out of 5), it only ranked slightly above the next highest approval option for a steel truss bridge (3.09 out of 5). Therefore, Option 1B, a steel truss bridge, was selected as the preferred alternative from the survey due to the overwhelming sentiment that cost should be the most important factor since the estimated cost is significantly less.

For the trail cross-section, survey respondents were presented with two alternatives. From the alternatives, respondents indicated a strong preference toward Alternative Two which separates bicycle and pedestrian travel. The trail can then better accommodate slower moving pedestrians from faster moving cyclists through providing each type of user with a dedicated area. Additional safety measures requested by respondents included pedestrian-scale lighting, bike speed limit signs, minimization of bollard use, shade structures or trees, and benches. Other comments showed support of the unique opportunity to create a corridor for active transportation modes with many concerned about the way in which the improvements would be financed. However, an overcrossing would not be financed by the City, but by regional, state, and Federal funding sources such as grant programs.

Dublin Boulevard Overcrossing Bridge Alternatives from Community Survey:

1. Steel Truss Arch (Two Options)
2. Basket Handle Arch (Two Options)
3. Cable-Stayed Tower

Steel Truss Arch - Option 1A
Iron Horse Trail Dublin Boulevard Overcrossing

Steel Truss Arch - Option 1B
Iron Horse Trail Dublin Boulevard Overcrossing

Basket Handle Arch - Option 2A
Iron Horse Trail Dublin Boulevard Overcrossing

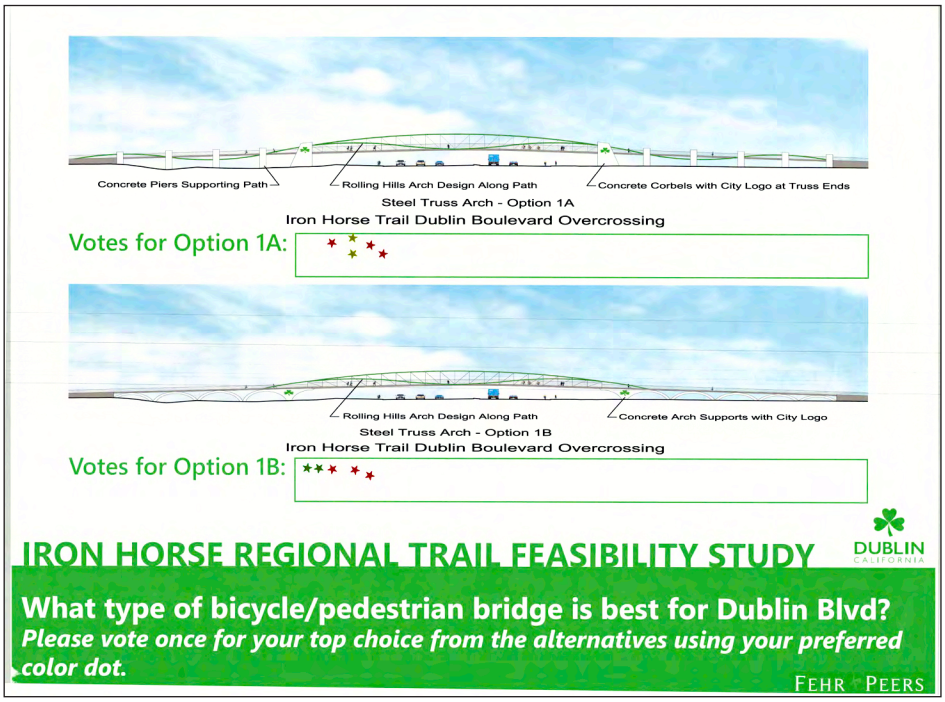
Basket Handle Arch - Option 2B
Iron Horse Trail Dublin Boulevard Overcrossing

Cable Stayed Crossing - Option 3
Iron Horse Trail Dublin Boulevard Overcrossing

Workshop 3: Alternatives Analysis & Preferred Improvements - April 28, 2016

The third workshop presented the project alternatives for both trail segments and grade separate crossings. Building upon feedback from Workshop 2 and meetings with the Advisory Committee, the project team presented two trail segment options and multiple over-crossing alternatives for the trail crossing at Dublin Boulevard. Participants were invited to vote on their preferred overcrossing and trail segment design after a presentation by the project team. The trail cross-section with separate areas for bicycle and pedestrians was voted much higher than the two-way mixed-flow option. This is generally attributed to the future context of trail along Scarlett Drive which will allow the separated pedestrian area to function more similarly to a sidewalk by providing a lower speed option than when combined with cyclists.

Discussions with attendees indicated that most were primarily concerned with selecting the most cost effective bridge type. While many participants indicated that they like the Cable Stayed bridge design, when costs were considered they gravitated toward the other design options. Initial cost estimates were discussed with attendees to give them a sense of the costs and benefits per bridge design. Descriptions of bridge costs can be found in Section 6 of this study. Participants indicated that they preferred the Steel Truss Arch bridge options (1A and 1B) equally much more than the other options.



Example of bridge alternatives voting board from Workshop 3. Trail cross-section alternatives were also presented at this workshop.

Stakeholder Interviews

Representatives from local agencies or citizen groups that play a direct role in the governance or use of the Iron Horse Trail and nearby areas were contacted to be interviewed as key stakeholders and provide insight to the use of the trail or related issues. The interviews took place between February 6 and February 10, 2015. Key takeaways from the stakeholder interviews are summarized below by type of respondent:

Trail Users

This group of stakeholders will be most impacted by any physical changes to the Iron Horse Trail. Members of this group represented organizations such as Trail Trekkers, and Bike East Bay. These representatives provided insights as advocacy groups that support active transportation, provided key insights into near-term improvements they would like to see to improve the functionality of the trail and provided strategies to help create modal shift in Dublin by addressing trail crossings and segments.

They described the trail's user mix as being split between recreational and commuter users. Conflicts sometimes arise between the two groups when different types of users may not understand what the other considers proper trail etiquette. The Dublin Boulevard and Dougherty Road crossings were mentioned as problematic with all stakeholders identifying the need for a true "trail crossing" rather than a standard crosswalk. A more seamless and easy connection to BART, better pavement quality, and enhanced "place-making" or trail identity for the trail were highlighted as areas that should be addressed by the study.

City of Dublin Staff

Dublin City staff offered valuable insight into the relationship between various ongoing City efforts and the potential for the Iron Horse Trail to have effective connectivity improvements. This group shared realistic insight about potential funding sources and strategies often utilized by the City. Representatives from Community Development, Facilities Development, Parks & Community Services, Public Works, and Dublin Police Services participated in the interview process.

The interviews largely focused on the role of the Iron Horse Trail as a nature park, the need for coordination between City departments, and the community desire for crossing improvements at Dublin Boulevard. Adequate lighting was also suggested as a method to improve perceptions of safety, especially during the early evenings.

Other Public Agencies

This stakeholder group has the broadest perspective on the management of the Iron Horse Trail. Representatives from the East Bay Regional Park District (Park District), City of Pleasanton, City of San Ramon, Alameda County Transportation Commission (ACTC), and the Livermore Amador Valley Transit Authority (LAVTA) were questioned about "off-trail" impacts and possible interagency coordination issues or potential political roadblocks that may arise during the various stages of the planning and implementation of improvements.

Each representative stressed the importance of inter-agency coordination for any successful project delivery. Key concerns revolved around the various utility lines that share the trail's right-of-way. Zone 7 waterways and Kinder Morgan, an energy company with pipelines in the area, would need to be consulted during the engineering phase to resolve conflicts with their infrastructure.

Local Schools

The priority of these stakeholders is the ongoing safety of students and enhancing active transportation access to the schools. Stakeholders included representatives from Dublin Unified School District, Safe Routes to School advocates, and Tri-Valley One Stop. Students were identified as the biggest trail users, often coming from north of Amador Valley Boulevard or from the Alamo Creek Trail. Staff did not use the trail as much because many do not live locally within Dublin or close enough to the schools. Safety was identified as a key concern by parents of children that walk to schools.

The overall community is seen as safe; however, parents of students have a poor perception of the trail. The future Dublin Crossing development will feed into Dublin High School and new students would benefit to improvements in trail comfort and safety. A new elementary school in Dublin Crossing would also have a strong opportunity to connect with the trail.

Advisory Committee Meetings

An Advisory Committee was established for this project consisting of local agency stakeholders from City of Dublin staff, Bay Area Rapid Transit District (BART), East Bay Regional Park District, Livermore-Amador Valley Transit Authority (LAVTA), and Alameda County Transportation Authority (Alameda CTC).

City Staff Coordination Meetings

The project team met with City staff multiple times during the project to discuss alternatives and to coordinate with other ongoing planning efforts in the City. These meetings were held at Dublin City Hall and included staff from Transportation, Public Works, and Parks & Community Services. Trail concepts and feasibility were discussed for project alternatives along with discussing how the trail would interact with the Dublin Crossing Park, Dougherty Road Widening, and Scarlett Drive Extension projects.

Transit Zone Field Meeting with Project Partner Agency Staff

The project team met near the Dublin/Pleasanton BART station on February 25, 2016 with representatives from BART and LAVTA who operates the Wheels bus system. Alternative designs and alignments for trail improvements were discussed with both partner agencies to ensure that transit zone recommendations would be feasible and not disrupt service for either agency. The final concept designs were then sent to each agency for review and comment.

Alameda CTC BPAC Presentation

The project team presented the Preliminary Improvement Plan and key project recommendations to the Alameda CTC Bicycle Pedestrian Advisory Committee (BPAC) with City staff on October 8, 2015. The BPAC was supportive of the recommended changes and offered further suggestions for crossing treatments, separating trail users with dedicated bicycle and pedestrian zones, and improvements near the Dublin/Pleasant BART station. The comments provided by the BPAC have been incorporated into the final recommendations where possible.

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relevant plans & policies

The planning and policy landscape of the Iron Horse Trail Feasibility Study can be illustrated with adopted plans and environmental documents of projects that are within or immediately proximate to the study area.

Improving the connectivity of the Iron Horse Trail to the East Dublin/ Pleasanton BART station is generally consistent with, and supported by, existing plans and policies. A number of policies related to land use, circulation, alternative transportation, and civic identity address improved cyclist and pedestrian safety and access to transit. Additionally, trail-related improvements are often prioritized for funding because it is identified as a regional asset by the City of Dublin and other agencies. Environmental documents from nearby major projects also suggested potential mitigations that a future project may need to address. The full-length memorandum with specifics of each plan, policy, or environmental document can be found in **Appendix A**.

City of Dublin Guiding Documents

The City of Dublin General Plan is supportive of improvements to the Iron Horse Trail. One particular consideration is that the trail is labeled as a "route of regional significance" in the General Plan. As a result, all physical improvements will be subject to a design review. Other sections of the General Plan that are supportive of Iron Horse Trail improvements are those pertaining to open space, regional identity, pedestrian routes and bikeways.

Other planning documents with ramifications for the future of the Iron Horse Trail are the Eastern Dublin Specific Plan 2014 Update and the Dublin Crossing Specific Plan. Both documents are a policy foundation for future mixed-use, high-density transit villages featuring interfaces with the trail. Expected growth from these developments combined with planned access to the Iron Horse Trail and transit may stimulate future growth of trail users. Similarly, to the above, the City of Dublin Bicycle and Pedestrian Master Plan contains a series of proposed bicycle networks that will feed into the Iron Horse Trail and as a result may increase traffic on the Trail.

Other Agencies

Plans produced by agencies proximate to the Iron Horse Trail include Alameda County, BART, the City of Pleasanton, and the City of San Ramon. Most significantly, the Alameda Countywide Bicycle and Pedestrian plans both identify the Iron Horse Trail as a priority in the Countywide Transportation Expenditure Plan. This significantly improves the financial feasibility of trail improvements. Although the study area for this project falls outside of its jurisdiction, BART is generally supportive of projects that improve bicycle and pedestrian access to their stations, as specified in the BART Bicycle Plan.

Finally, the City of Pleasanton conducted their own Iron Horse Trail Feasibility Study and Master Plan. Given that Pleasanton's jurisdiction is the portion of the trial immediately south of the East Dublin/Pleasanton BART station, opportunities and constraints identified there may be immediately relevant. Notably from the report, the Iron Horse Trail right-of-way also serves as a utility corridor for high-pressure gas lines, high-voltage transmission towers, fiber optics cables, and a water main. Environmental challenges include the potential for ground liquefaction in an earthquake and flooding.

The City of San Ramon conducted a similar Iron Horse Trail Feasibility Study to analyze potential improvements at the trail crossings at Bollinger Canyon Road and Crow Canyon Road. Ultimately, the City of San Ramon chose overcrossings as the preferred improvements for both arterial crossings.

Environmental Reviews

A series of major projects in the City of Dublin were recently subject to environmental review under the California Environmental Quality Act (CEQA). The study areas of these projects intersect or are sufficiently proximate to the current study area that environmental impacts affecting them may also affect the feasibility of Iron Horse Trail improvements.

Generally, five types of environmental constraints were discussed in the environmental review documents that may have implications for the Iron Horse Trail feasibility study.

Of primary concern were air quality impacts related to construction and operation of nearby projects, which could have an adverse effect on trail users. Given the proximity of fault lines, existing geological and seismicity-related constraints as well as flood hazard areas had to be addressed. Mitigations were also necessary for nearby populations of protected wildlife. While not of specific relevance to this project, these types of considerations may need to be accounted for given the size and scope of the adopted improvement plan.

Increased traffic as a result of future development was estimated to result in additional impacts to peak hour Level of Service (LOS) along Dublin Boulevard and Dougherty Road. The EIRs examined grade-separated trail crossings on these corridors as potential mitigation measures. Traffic impacts resulting from trail crossing improvements will need to be considered in the mitigations of other developments.

existing conditions

Walking and biking on the Iron Horse Trail today, many trail users have different experiences that can vary due to the changes in adjacent land uses, access or barriers to transit, access to other regional amenities, or other factors from the built environment. See **Appendix B** for the complete detailed analysis.

User Experience Along the Trail

The two main trail segments within the study area extend from Dougherty Road to Dublin Boulevard and from Dublin Boulevard to the East Dublin/Pleasanton BART station. These segments experience similar issues and poorly connect with adjacent land uses. Pavement conditions range from good quality, recently paved pathway segments to poor quality areas with significant cracking. The trail is generally about 10 feet wide throughout the study area and rarely has well-defined shoulders. If shoulders are present, they are mostly overgrown with vegetation or sometimes thorny weeds.

The adjacent landscaping is maintained intermittently by the East Bay Regional Park District or completely absent in some locations. Immature trees are dispersed along the segment just north of the East Dublin/Pleasanton BART station and are not close enough to the trail to provide shade during any time of day.

Limited place-making features identify the Iron Horse Trail as a key destination and transportation facility within Dublin. Limited signs or gateway amenities indicate its presence to residents or people passing by. East Bay Regional Parks District provides limited signage along the trail and a trail map is installed at the northern end of the BART station. However, the trail is not identified on the BART station transportation wayfinding signs located in multiple locations near the BART

fare gates. Additionally, pedestrian-scale lighting is only available near the BART station fare gates and bus bays. Minimal lighting from adjacent uses reaches the trail and is primarily directed toward roadways.

While retail, local services, multi-family residential developments, and other bicycle paths are located near the Iron Horse Trail, there are few direct connections to reach these locations from the trail. For example, the Dougherty Road bicycle path instructs southbound bicyclists to cross six lanes of traffic to connect with the southbound approach from the Iron Horse Trail on the north side of the intersection. Similarly, the multi-family developments near the BART station are only accessible by travelling all the way to the BART station or by deviating from the trail onto Dublin Boulevard, since no midway access points exist.

Trail users indicated that plants leave sharp stickers on the path, which cause flat tires as shown in the images below along the trail segment between Dublin Boulevard and Dougherty Road.

User Experience at Trail Crossings

Trail crossings within the study area occur at wide, signalized intersections with long crossing distances and no pedestrian refuge islands. Heavy vehicle volumes along Dublin Boulevard and Dougherty Road result in long signal times which extend delays for trail users. The crosswalks do not signify the presence of the Iron Horse Trail and are marked as standard crossings with two lines. Permitted right and left turn movements are allowed across the trail right-of-way at Dublin Boulevard and Dougherty Road when trail users may be crossing. Vehicle speeds were observed to be higher than the posted speed limits along Dublin Boulevard and Dougherty Road which can lead to high-speed turns. This creates potential conflicts with vehicles at the trail crossing since high volumes of bicyclists and pedestrians use these crossings and may not be seen by drivers.

Many of the existing intersections provide wider corner radii which increases pedestrian crossing distances and may cause increases in vehicle turning speeds. Wide corner radii also reduce the opportunity to to install directional curb ramps. The existing curb ramps are standard diagonal curb ramps.

Standard pedestrian actuated push buttons are installed at intersections but are sometimes placed in positions that encourage cyclists to dismount. Specific issues at each intersection are described below.

Dublin Boulevard/Iron Horse Trail Intersection at Scarlett Drive

The Iron Horse Trail crosses Dublin Boulevard at the signalized intersection with Scarlett Drive. The intersection has a crossing distance of 115 feet. The signal cycle length is greater than 120 seconds which causes delays for trail users. Large corner curb radii and the higher posted speed limit along Dublin Boulevard create a suburban environment for trail users. The crosswalk itself is striped with standard double white lines without any special trail markings or indicatations to roadway users that higher than average levels of bicycles and pedestrians may be crossing at that location. The median on Dublin Boulevard does not have a refuge-type amenity.

Crosswalks at the intersection are offset from the trail's desire line and there is a lack of signage to direct trail users on how to continue along the trail. As bicyclists approach the crossing area, they need to make 90-degree turns to use the pedestrian actuated push button to call the pedestrian signal.

The Dublin Boulevard trail crossing requires many sharp turns.
These maneuvers make it difficult for bicyclists to navigate the intersection and access the push buttons. Trail users often had trouble finding their way back to the trail due to a lack of directional signage.

Iron Horse Trail Crossing: Dublin Boulevard at Scarlett Drive

Houston Place/Scarlett Drive Intersection

The trail runs parallel to Scarlett Drive adjacent to the Houston Place/Scarlett Drive intersection. It is possible to travel northbound or southbound along the trail without entering the intersection. Scarlett Drive dead ends at Houston Place; however, Houston Place is side-street stop controlled for the eastbound approach. The trail can be accessed via an uncontrolled crosswalk across Scarlett Drive. Trail users here can access a nearby residential neighborhood as well as businesses along Houston Place. Directional wayfinding signage is not provided and the pathway connection itself between the Iron Horse Trail and the intersection itself is narrow. Standard double-white line striping is provided for the crosswalk.

Iron Horse Trail Connection:
Houston Place/Scarlett Drive Intersection

The Dougherty Road crossing has a long crossing distance and a pork chop island with narrow pass throughs. With a slip lane and an access road to the north of the intersection, trail users face potential conflicts with vehicles.

Dougherty Road/Iron Horse Trail Intersection at Scarlett Drive

Similar to the Dublin Boulevard/Scarlett Drive intersection, the intersection with Dougherty Road is 130 feet long with a signal cycle length of greater than 120 seconds. The posted speed limit on Dougherty Road is 40 mph. The crosswalk itself is a standard double white line and there is no median refuge. Large corner curb radii do not feature curb extensions. While the crosswalks align with the trail's desire lines, the curb ramps need to be upgraded to further align with the the crosswalks (see Figure 5b).

The northbound and southbound right-turn slip lanes may encourage higher turning speeds. The slip lanes create channelized pedestrian waiting islands (called "pork chops"). These pork chops have narrow pathways which make two-way travel difficult for people biking and walking together in the same space.

Approaches to the crossing share similar issues to the intersection at Dublin Boulevard; namely, that push button actuators are inconveniently located for cyclists. However, unlike Dublin Boulevard, the approach to the push buttons is more direct and does not require cyclists to make 90-degree turns. The push button on the southern side of the crossing is located on a side of the path which requires that cyclists dismount. The placement also on the left side of the trail against oncoming trail users and may require dismounting if other users are present. Permitted northbound right-turns, westbound right-turns, and southbound left-turns are allowed to made through the trail crossing. Westbound left-turns are protected and do not conflict with trail crossings.

Limited features highlight the presence of the Iron Horse Trail nearby, and there is no wayfinding signage to identify nearby amenities or destinations.

User Experience Near the BART Station

The East Dublin/Pleasanton BART station is located between the eastbound and westbound lanes of Interstate 580 (I-580) and can be accessed from either the Dublin or Pleasanton sides via the BART Access Road that crosses under I-580. **Figure 2** (on page 24) on the following page shows the alignment of the Trail through the East Dublin/Pleasanton BART Station "Transit Zone." The Transit Zone, for the purpose of this study, is generally defined as the greater BART station area, inclusive of the bus boarding areas on the north and south sides of I-580. The Transit Zone is generally the area south of Dublin Boulevard and north of Owens Drive. Through this Zone, the trail transitions from a typical Class I path south of Dublin Boulevard to a roadway-grade side path separated with a raised curb on the west side of the BART Access Road. The trail then shares an alignment with the BART sidewalk underneath I-580 and through the Pleasanton-side parking lots. The sidewalk is designated as a "Bicycle dismount zone" and provides access to the BART fare gates. Sidewalk widths range from about 20' to 25' throughout the undercrossing. However, some sidewalk areas are reduced to less than 10' where long-term bicycle parking is placed. To the south (on the Pleasanton side), the Trail is aligned with a wide sidewalk on the west side of the BART Access Road and extends through the Pleasanton-side parking lot to the intersection of the Iron Horse Trail/Owens Drive.

Extending between DeMarcus Boulevard in Dublin and the Pleasanton-side parking lot, the BART Access Road is designated for buses only and has travel lanes that are typically 20.5' wide under the I-580 overcrossing. The BART Access Road has bus pull outs under the I-580 overcrossing to allow for passenger drop-offs near the BART fare gates. There are also bus pull-outs on the east and west sides of the Dublin-side bus shelter area north of I-580 and bus pull-outs on the south side of the roadway on the Pleasanton-side bus shelter area where buses pick up passengers. Underneath I-580, there is one marked crosswalk which connects the Dublin-side bus area and multi-family residential uses to the BART station. This crosswalk is aligned with the BART fare gates and serves passengers coming from the Dublin parking lots, local businesses, residences, and bus stops.

BART and Bus Connections

The East Dublin/Pleasanton BART Station is a key multi-modal hub for both Dublin and Pleasanton residents and employees and can be accessed from both jurisdictions. Parking lots/garages are highly utilized and located on each side of I-580. Bus stops are also located on both the Dublin and Pleasanton sides. **Figure 2** details these features and indicates the bus routes that access the BART station. Some pedestrian wayfinding exists but is primarily oriented toward bus and BART riders making a BART/bus transfer or coming from one of the parking lots/garage. There is minimal trail-oriented wayfinding signage within the Transit Zone or within the station area directly near the BART fare gates.

The BART fare gates can be accessed under the Interstate I-580 overcrossing.
This image (below) from the south side of the BART area shows the lack of dedicated bicycle facilities to directly access the BART fare gates.

The north side bus bays provide the primary bus operations to the Transit Zone.
Looking northbound from the north side of the I-580 overcrossing it is evident that bicyclists and pedestrian facilities are inadequate and are in need of repair.

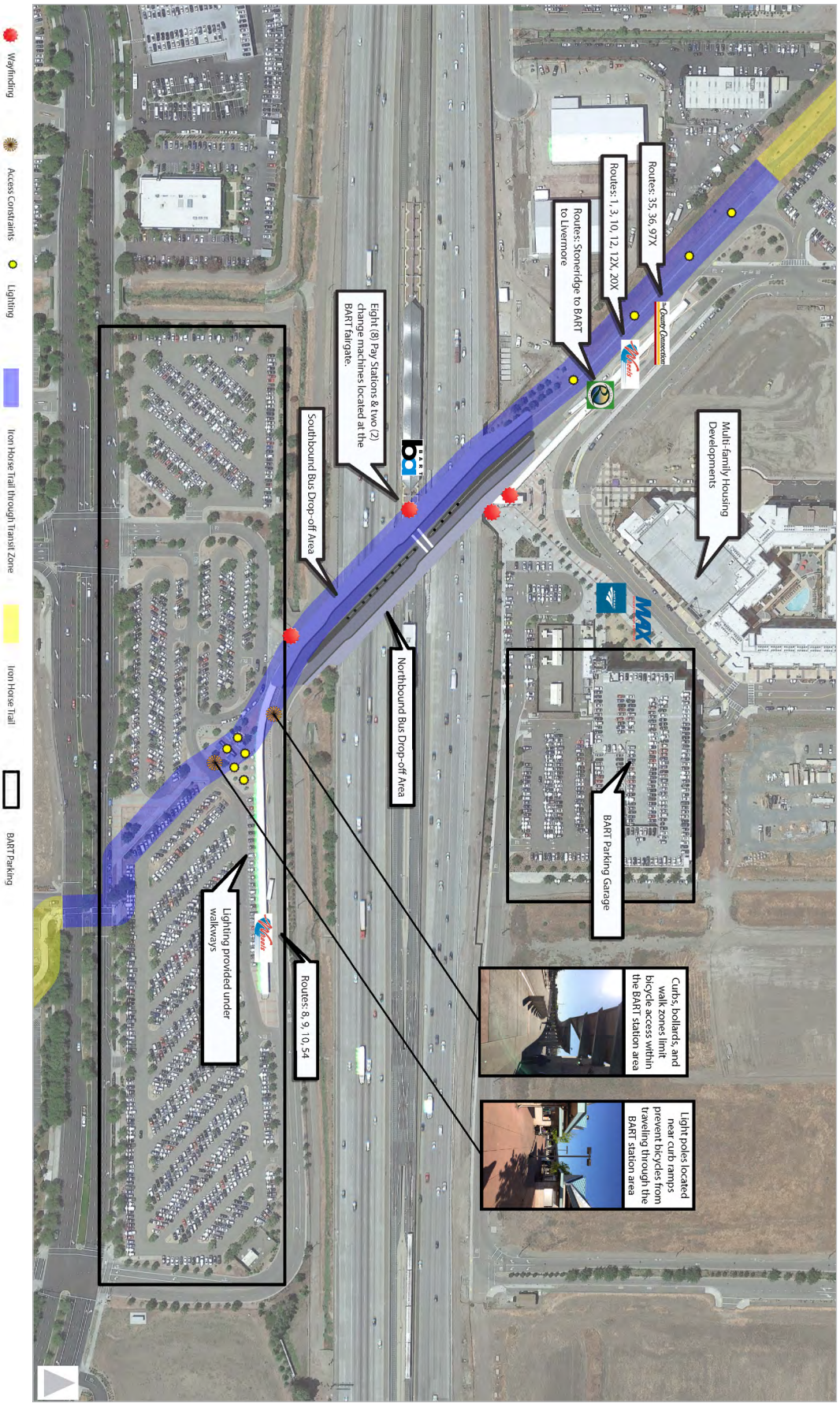


Figure 2: Transit Resources and Amenities near the Dublin/Pleasanton BART Station

The BART Access Road carries little traffic despite being the primary bus route through the area. During the PM peak hour there are typically up to 12 northbound and 9 southbound bus trips on the BART Access Roadway. Similarly, the BART Access Roadway typically experiences up to 10 northbound and 11 southbound bus trips during the AM peak hour.

The BART station is served by four main bus operators. The Central Contra Costa Transit Authority (CCCTA) operates County Connection routes 35, 36, and 97X. The Livermore Amador Valley Transit Authority operates the Wheels routes 1,3, 10, 12, 12X, and 20X. The Tri-Valley Rapid also accesses the station and is operated by Wheels as a high-frequency bus line that operates between East Livermore and West Pleasanton. Amtrak also operates a bus stop at the BART station that connects to Stockton for train services.

The Modesto Area Express (MAX) operates an express route between the Modesto Downtown Transportation Center and the East Dublin/Pleasanton BART station. The BART access roadway, parallels the Trail connection north of the BART station and runs under the I-580 overcrossing to allow certain bus routes access to either the north or south bus stops. Additionally, BART Police vehicles and various maintenance vehicles utilize the BART Access Road.

Bicycle Access to BART and Buses

Bicyclists can access the Transit Zone using the trail from Dublin or Pleasanton. Signage near the freeway undercrossing indicates that bicyclists are required to dismount and walk their bikes through the BART station area. **Figure 3** on the next page highlights the dismount area and bicycle parking locations within the Transit Zone. On the Dublin-side, the ten-foot-wide trail approach to the BART Access Road is at roadway grade and has lower quality pavement. This portion of the trail is adjacent to a chain link fencing ("hard barrier") on one side and an asphalt curb on the other. As a result of the poor pavement quality and dismount zone, more confident riders typically ride in the roadway and share the lane with buses.

Bicycle parking at the BART station consists of long-term lockers and short-term racks both inside and outside of the fare gates. In total there are approximately 102 short-term spaces and 36 long-term spaces on both the Dublin and Pleasanton sides of the station. During weekday field observations, the short-term spaces were almost fully occupied by 7:30 AM near the BART fare gates under the freeway. As a result, bicycles were locked to the pedestrian barricade in the median under I-580, indicating spillover in short-term parking in the area directly in front of the fare gates. However, no bicycles were observed at the northernmost or southernmost short-term spaces, which are approximately 600 feet away from the BART fare gates. This is likely due to their placement away from the BART fare gates and outside of direct lines of sight of BART patrons and BART Police where people may feel their bikes would be in jeopardy of being stolen.

The East Dublin/Pleasanton BART station area map does not show the Iron Horse Trail through the station (above). Bicyclists are instructed to walk their bikes through the station area but is often ignored by cyclists (below).

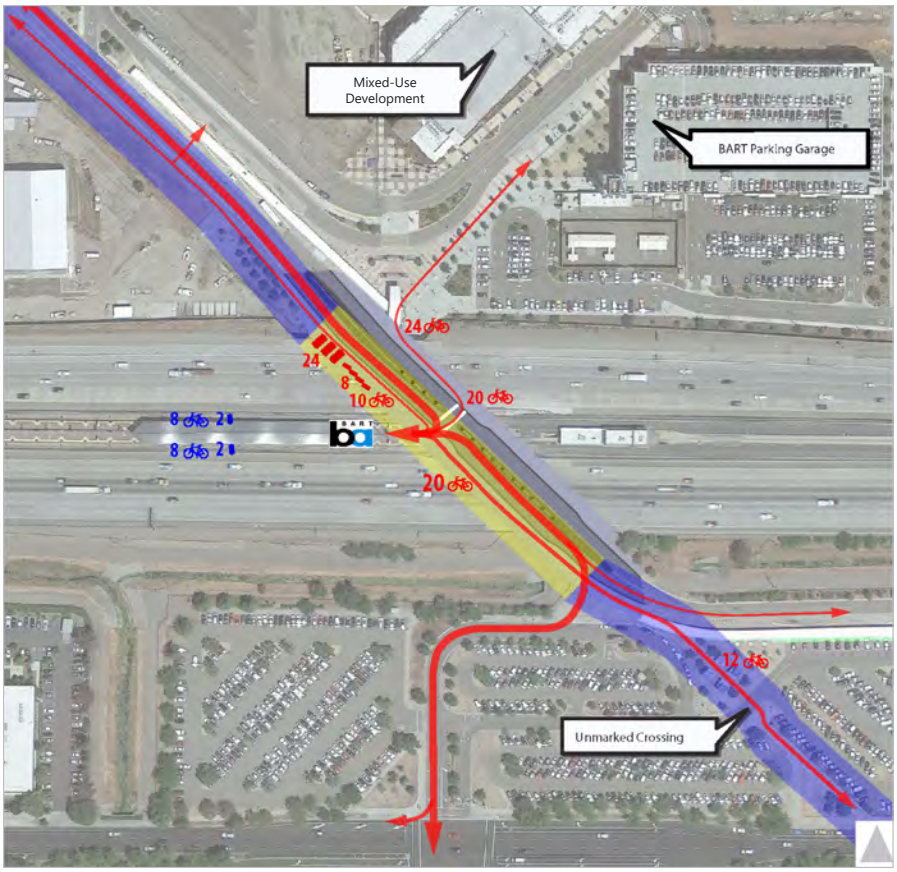


Figure 3: Bicycle Amenities and Access to Transit

LEGEND

- # Short-term Bicyle Parking (Outside BART station)
- # Short-term Bicyle Parking (Inside BART station)
- # Long-term Bicyle Parking (Outside BART station)
- # Long-term Bicyle Parking (Inside BART station)
- Primary and Secondary Bicycle Paths of Travel
  *Note: Thicker lines represent higher observed bicycle volumes.
- Iron Horse Trail Dismount Zone
- Iron Horse Trail through Transit Zone

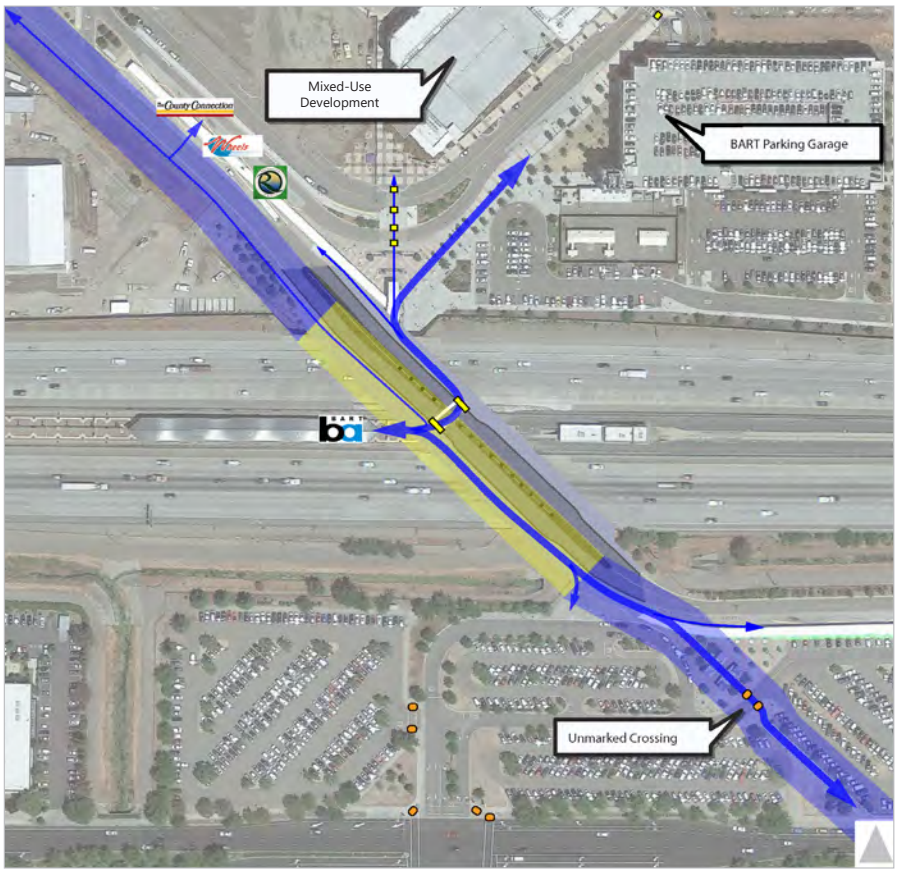


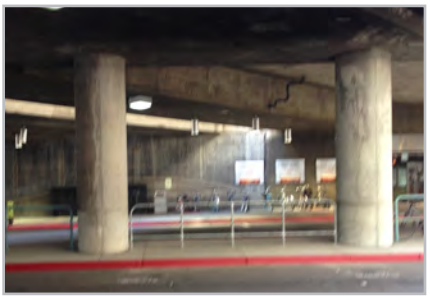
Figure 4: Pedestrian Amenities and Access to Transit

LEGEND

- Wide, Directional Curb Ramps
- Directional Curb Ramps
- Primary and Secondary Pedestrian Paths of Travel
  *Note: Thicker lines represent higher observed pedestrian volumes.
- Diagonal Curb Ramps
- Iron Horse Trail Dismount Zone
- Iron Horse Trail through Transit Zone

Figure 3 also shows the primary and secondary bicycle paths of travel observed during a typical weekday morning commute. A few bicyclists were observed riding on the sidewalks within the dismount zone to access bicycle parking. Many cyclists ride on the sidewalk and do not dismount or ride on the BART access road. A number of bicyclists were observed wrong-way riding northbound in the southbound bus lane against bus traffic. A fairly high volume of cyclists were observed exiting the BART station and then using the bus lanes which require them to cross a vertical curb near the southern drop-off area to access the Owens Drive & Willow Road intersection. No access ramp is provided at that location to facilitate that bicycle desire line.

The "Bicyclists Must Dismount" signs are posted in the shared sidewalk space on either side of the fare gates and at the southern and northern sides of the I-580 overcrossing. However, during multiple site visits, few bicyclists were observed dismounting their bikes when approaching the BART station from either the northbound or southbound approaches. This area is viewed as a large gap in the continuity of the trail to most users and adequate signage is not provided to properly direct the various trail users through the station.



The I-580 overcrossing features lighting aimed toward bicyclists and pedestrians. However, once outside of the BART station area limited pedestrian-scale lighting is available with most lighting aimed toward the streets.

Pedestrian Access to BART and Buses

Pedestrians who access the BART fare gate area were observed to primarily come from the Dublin-side BART parking garage located to the north of the station. Many of those exiting the BART station utilized the trail crossing on the Pleasanton side to access office uses. The bus stations and mixed-use/ multi-family residential developments on the Dublin-side were observed to provide about a quarter of the amount of pedestrian traffic as compared to the pedestrian volumes from the parking garage. Pedestrian activity from the Dublin portion of the trail was relatively small (not from adjacent land uses), as the nearest existing residential uses adjacent to the trail are over half a mile north of the BART station which are generally more accessible by bicycle. **Figure 4** highlights the pedestrian amenities and most used paths of travel within the

Iron Horse Trail Connection:
North of the BART Access Road at DeMarcus Boulevard.

transit area.

A median barricade channelizes pedestrians to cross at the marked crosswalk opposite the fare gates; however, some pedestrians crossed near the bus bays on the Dublin-side, and followed the trail on the west side of the roadway. Some pedestrians walking from the BART parking garage were observed walking in the northbound bus lane under I-580 to enter the crosswalk and avoid large groups of people exiting the BART fare gates.

Lighting

Pedestrian-scale lighting is not provided north of the BART Access Road along the Iron Horse Trail connection to Dublin Boulevard. The Iron Horse Trail may be used between the hours of 5:00 AM to 10:00 PM, unless otherwise posted or permitted according the East Bay Regional Park District. However, there are four street lights that provide minimal lighting to the trail alongside the BART Access Road across from the Dublin-side bus bays. Lighting is also installed under the I-580 overcrossing and along the walkways/bus bays with a small cluster of lights at the southern end of the Transit Zone. On the Pleasanton-side, some lighting is provided through the kiosk areas.

User Experience Connecting to the Trail

Bicycle Comfort Connecting to the Trail

Access to the trail for bicyclists traveling on the existing street network can often be uncomfortable or stressful for riders who are not as confident riding next to high volume or higher speed roadways. The level of stress or comfort perceived by a cyclist is heavily influenced by many factors. While some streets experience low traffic speeds and volumes that create an enjoyable bicycling experience for most users, other roadways may contain high traffic speeds and volumes with no separation from the travel lanes that cause the rider to feel less safe. Depending on the level of stress, some cyclists may be dissuaded from bicycling to the Iron Horse Trail because of the perception of danger, despite the presence of existing bicycle facilities. Improvements can be made to reduce the stress felt by these riders to encourage riders of all ages and abilities to comfortably access the trail.

To establish whether existing roadways and bicycle facilities feel stressful to the average rider, a Level of Traffic Stress (LTS) analysis was conducted to evaluate user perception of those facilities. This methodology measures how much stress is experienced by bicyclists due to various characteristics of roads and bicycle facilities. The Level of Traffic Stress (LTS) methodology was developed by the Mineta Transportation Institute in ***Low Stress Bicycling and Network Connectivity***[1], and is based on an application of Dutch bicycling standards and existing research in bicycle transportation. LTS rankings range from 1 (very low stress; tolerable by all) to 4 (very high stress; tolerable to only a few). The LTS analysis for Iron Horse Trail access was conducted in a manner consistent with the methodology developed by Merkuria, Furth, and Nixon (2012) which builds upon the Mineta Transportation Institute's methodology by setting the LTS score based on the weakest link of each bicycle or roadway facility approach.

LTS is closely related to the Four Types of Cyclists theory developed by Roger Geller at the Portland Office of Transportation. This theory highlights the varying percentages of the population's willingness to ride a bicycle and where they feel comfortable riding. LTS measures the quality of a person's experience while bicycling and can help identify facilities where less confident riders feel comfortable and safe. Low stress bikeways (LTS 1 and 2) are generally tolerated by the largest percentage of the population known as the "Interested but Concerned" group of cyclists (60 percent of the population). In contrast, high stress bikeways are tolerated by the smallest percentage of the population known as "Strong and Fearless" cyclists (less than one percent of the population). The development of low-stress connections and the elimination of high-stress barriers is critical to attracting new riders from the largest groups of potential cyclists ("Enthused and Confident" and "Interested but Concerned") to feel comfortable on facilities adjacent to the trail.

[1] Mekuria, Maaza, Peter Furth, and Hilary Nixon. Low-Stress Bicycling and Network Connectivity. Mineta Transportation Institute, San Jose State University, 2012. Print.

LTS Analysis Results

The LTS methodology was applied to existing and proposed bicycle facilities from the City of Dublin Bicycle and Pedestrian Plan network for bicycle facilities and major roadways within one mile of the Iron Horse Trail. Small neighborhood streets where excluded from the analysis because they typically score as LTS 1 due to low vehicle volumes and speed. The results of the LTS analysis are shown in **Figure 5** on the next page which also highlights opportunity areas to increase bicycle connectivity.

The on-street Class II Bicycle Lanes along Amador Valley Boulevard have an LTS Score of 3 – suggesting that only confident and experienced cyclists would be comfortable using the bicycle facility. This score is due to the relatively high speed limit and width of the bicycle operating way (bicycle lane plus parking lane when applicable). Although some segments of Amador Valley Boulevard would at times rate LTS 2, the methodology calls for the worst score to be applied to an entire segment because of the mental barrier provided by stressful situations throughout a corridor.

Dougherty Road ranks as LTS 4 primarily because of its high traffic volume, varying presence of bicycle lanes, width of available bicycle lanes, and posted speed limit. The Dougherty Road Widening project will add consistent Class II bicycle lanes (non-buffered) from Sierra Lane to the City limits.

Dublin Boulevard maintains an LTS 3 rating due to the Class II bicycles lanes located directly next to high speed and volume travel lanes. However, a Class I Multi-use path is located along the northern side of Dublin Boulevard as an extension of the Tassajara Creek Trail. Proposed low-stress bikeways in the area around the BART station should present a number of viable alternatives for cyclists of all abilities. Intersection treatments recommended in the City of Dublin Bicycle and Pedestrian Master Plan Design Guidelines should continue to be implemented to reduce stress at intersections. Ensuring bicycle treatments carry through the intersection and provide clear direction to cyclists about where they should be will help to increase the perception of safety to the general cyclist.

Improving LTS and the presence of bicycle facilities along major roadways that bisect the Iron Horse Trail can enhance the user experience and provide easier access to the trail. Other local destinations will also be easier to access from the trail itself and can highlighted with destination wayfinding.

Pedestrian Connectivity Barriers and Opportunities

In Dublin, access for pedestrians to the Iron Horse Trail is primarily provided by connecting adjacent or intersecting streets such as at the intersections with Dougherty Road and Dublin Boulevard. While there are a number of planned and existing residential uses that surround the trail in Dublin, most potential trail users would need to travel around the path to one of these two intersections in order to use the path. An access point at Houston Place and Scarlett Drive is provided between Dougherty Road and Dublin Boulevard. There is also one access point between Dublin Boulevard and the BART fare gates at DeMarcus Boulevard but is made indirectly by crossing over bus travel lanes.

With varying types of land-uses fronting the Iron Horse Trail, pedestrian barriers include fencing around development with minimal access points. Increasing permeability to land uses will help to make the trail feel more like a front door to these developments instead of the closed off back door feeling which currently exists. Many of these fences can be retrofitted for public or private use by installing gates to private developments or removing gates altogether. For example, an apartment building may provide access to the trail for their tenants by installing multiple controlled access points.

Future developments should also plan for trail access by providing access points at potential dead-end streets. The future Dublin Crossing Park will also provide connections to the trail. **Figure 6** shows the locations of existing barriers and opportunity areas for improved trail access. Additional connectivity improvements to the Alamo Creek Trail are also highlight near where both trails intersect. Many of these connectivity improvements will involve discussions with local property owners in order to implement or finance enhancements.

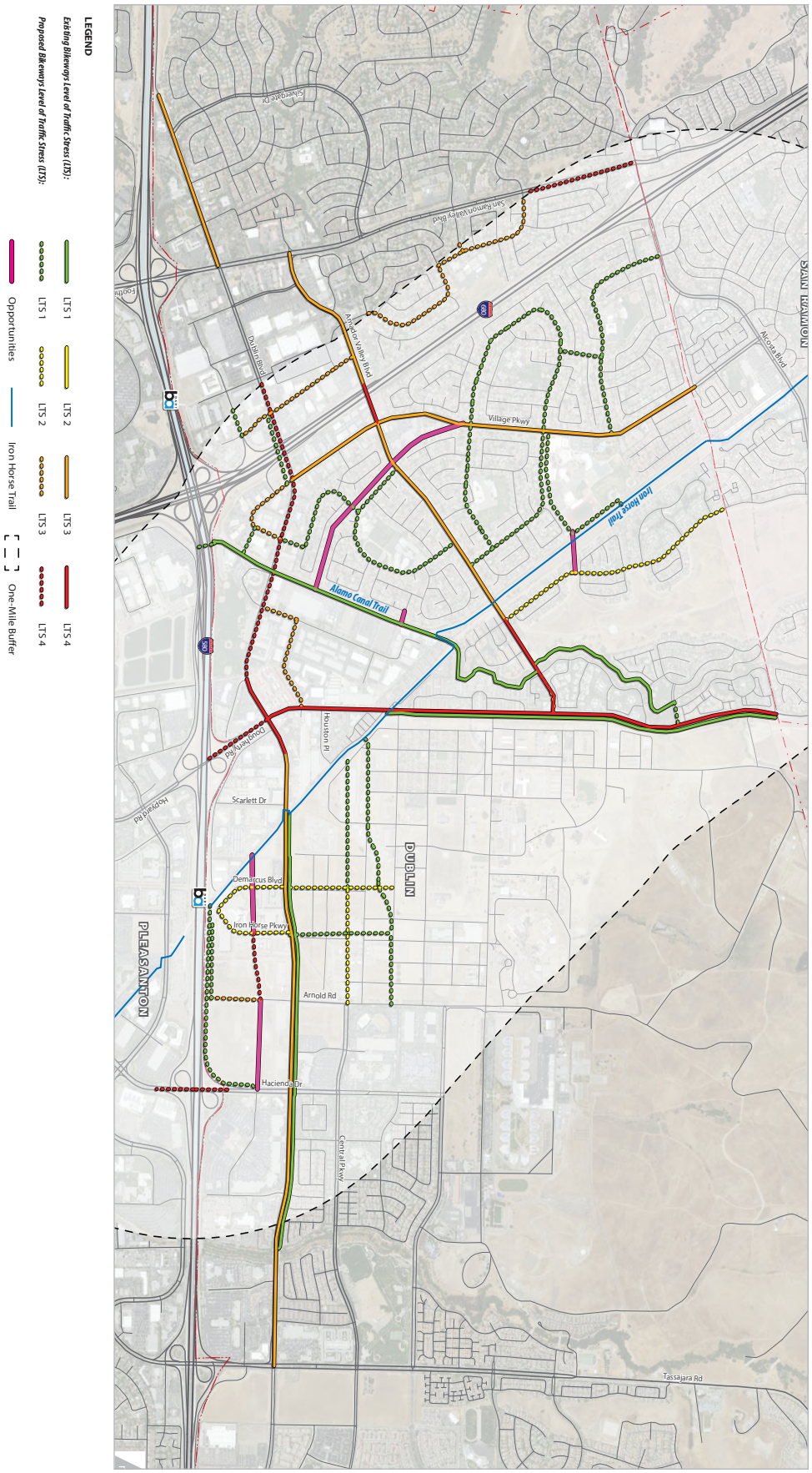


Figure 5: Existing and Proposed Bicycle Facilities Level of Traffic Stress and Opportunity Connections

Figure 6: Proposed Connectivity Improvements From Adjacent Neighborhoods & Trails

LEGEND

Iron Horse Trail | Class 1 Bike Path | Potential Low-Stress Connection | Existing Trail Acess Point | Opportunity Trail Acess Point

Evaluating Trail User Comfort

Methodology Overview

Trail users along separated pathways are generally less exposed to drivers than bicyclists and pedestrians using other types of facilities. The LTS methodology does not evaluate the difference between trails or measure the quality of the experience. Class I Multi-use trail default to a rating of LTS 1. Additionally, at trail crossings these users can encounter situations where vehicles may not be expecting bicycles or pedestrians. The LTS methodology also does not evaluate trail crossings.

As a result, people of varying ages and abilities may not feel comfortable using certain parts of these types of facilities. Many design elements of the trail make for more comfortable user experiences along trails such as trail amenities, maintained landscaping with visual interest, usable shoulders, and more. To evaluate user comfort and to understand the key design elements that benefit user comfort, a Built Environment Factors (BEF) rating methodology was used to measure how the existing trail segments and trail crossings are experienced by trail users. The BEF methodology scores the presence, absence, and quality of specific infrastructure elements that are important to bicyclists' and pedestrians' perception of trail comfort. This customized methodology allows for the identification of specific design elements to be included in the proposed project and may help understand why portions of the trail in other communities are particularly successful and enjoyed by users. This particular set of scoring criteria and weighting was developed using input from the public at Workshop #1 and from City staff. Additional detail on the methodology can be found in Appendix B.

Because the needs of trail users are distinct as they travel along the path compared to roadway crossings, three BEF methodologies were developed to analyze the following criteria for existing conditions and potential future conditions:

- **Trail Segments** - trail width, shoulders, shade, landscaping, amenities, wayfinding, pavement quality, connectivity, maintenance, and lighting.
- **At-Grade Crossings** - crossing distance, user comfort, leading pedestrian/bicycle intervals, vehicular turning movements, curb radii, detection, path approach comfort, gateway/wayfinding features, decorative paving or triple four trail striping, cycle length, vehicular speeds, and presence of slip lanes.
- **Grade-Separated Crossing** - trail width, at-grade crosswalks, path approach comfort to/from adjacent networks, gateway/wayfinding features, bridge lighting, bridge structure fencing/siding, bridge structure design, and sight distances/visibility along the path.

Precedent Evaluation

As a regional trail that serves the needs of many different Alameda and Contra Costa County communities, understanding the Iron Horse Trail study area within Dublin as compared to the trail as whole is important. Selected portions of the trail were used to provide a diverse understanding of the trail's varying characteristics within nearby jurisdictions and to identify the design elements that influence trail user comfort in that area. One at-grade crossing in San Francisco was identified for inclusion in this analysis due to its design characteristics for comparison purposes. Limited examples signalized crossings at intersections with conflicts removed through phasing currently exist along the Iron Horse Trail. Using the proposed BEF methodology, facilities can receive a rating of poor, good, or excellent. The BEF methodology rates the different facility types using the ranges presented in **Table 1** below and **Figure 7** summarizes precedent characteristics.

Table 1: BEF Rating Methodology Ranges

Facility Type	Minimum Possible Rating	Maximum Possible Rating	Poor Rating Range	Good Rating Range	Excellent Rating Range
Trail Segment	-11 points	22 points	>0 points	1-9 points	10+ Points
At-Grade Trail Crossing	-12 points	21 points			
Grade Separated Trail Crossing	-9 points	16 points			

Source: Fehr & Peers, 2015.

Figure 7a: Precedent BEF Ratings

Precedent Segments

Iron Horse Trail between Owens Drive and Hacienda Drive, Pleasanton

Features:

- *Trail Width:* 10'
- *Shoulder:* 2' soft shoulders
- *Trees/Shade:* Trees typically on one-side of trail
- *Landscaping:* Well-maintained landscaping
- *Amenities*: Limited
- *Wayfinding*: EBRPD signage only
- *Pavement*: New concrete
- *Maintenance*: Well-maintained
- *Lighting*: Some adjacent to trail on City streets or private property
- *Connectivity*: Good paths/ connections to adjacent uses

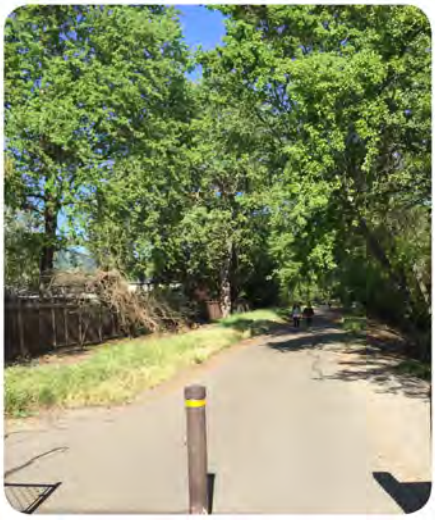
BEF RATING | **EXCELLENT**

Iron Horse Trail between Harvey Drive and Treat Boulevard, Pleasant Hill

Features:

- *Trail Width:* 10'
- *Shoulder:* None
- *Trees/Shade:* Trees typically on one-side of trail
- *Landscaping:* Well-maintained landscaping
- *Amenities*: Benches, picnic tables, and doggie bags
- *Wayfinding*: Signage provided to local retail, office, and transit amenities.
- *Pavement*: Asphalt
- *Maintenance*: Well-maintained
- *Lighting*: Some adjacent to trail on City streets
- *Connectivity*: Good paths/ connections to adjacent uses

BEF RATING | **EXCELLENT**



Iron Horse Trail between Del Amigo Road and Linda Mesa Avenue, Danville

Features:

- *Trail Width:* 10'
- *Shoulder:* Less than 2'
- *Trees/Shade:* Trees typically provide full coverage
- *Landscaping:* Well-maintained natural landscaping
- *Amenities*: Limited
- *Wayfinding*: EBRPD signage only
- *Pavement*: Asphalt
- *Maintenance*: Well-maintained
- *Lighting*: None/Limited
- *Connectivity*: No path connections, except at crossings

BEF RATING | **GOOD**

Figure 7b: Precedent BEF Ratings

Precedent At-Grade Crossings

Panhandle Path at Masonic Avenue, San Francisco

Features:
- *Speed:* 30 mph
- *Crossing Distance:* 58'
- *LPI:* No
- *Vehicular Turning Movements:* Protected turns
- *Curb Radii*: Small
- *Slip Lane:* No
- *Detection:* Poor push button location on one approach
- *Decorative Pavement or Triple Four Trail Crossing:* No
- *Wayfinding*: Minimal local signage at one approach
- *Approach Comfort*: Oversized directional curb ramps provide easy access to crossing

BEF RATING | **GOOD**

Iron Horse Trail at Bollinger Canyon Road, San Ramon

Features:
- *Speed:* 40 mph
- *Crossing Distance:* 94'
- *LPI:* No
- *Vehicular Turning Movements:* Permitted right turns
- *Curb Radii*: Medium sized
- *Slip Lane:* No
- *Detection:* Push button located so cyclists do not need dismount
- *Decorative Pavement or Triple Four Trail Crossing:* No
- *Wayfinding*: No
- *Approach Comfort*: Diagonal ramp and sharp turns create some difficult movements

BEF RATING | **POOR**

Iron Horse Trail at Alcosta Boulevard, San Ramon

Features:
- *Speed:* 35 mph
- *Crossing Distance:* 89'
- *LPI:* No
- *Vehicular Turning Movements:* Permitted right turns
- *Curb Radii*: Medium sized
- *Slip Lane:* No
- *Detection:* Push button located so cyclists do not need dismount*Decorative Pavement or Triple Four Trail Crossing:* No
- *Wayfinding*: No
- *Approach Comfort*: Diagonal ramp and sharp turns create some difficult movements

BEF RATING | **POOR**

Figure 7c: Precedent BEF Ratings

Precedent Overcrossings

Iron Horse Trail at Treat Boulevard, Pleasant Hill

Features:

- *Trail Width:* 10'
- *At-grade crossing:* Crosswalks provided on all intersection approaches
- *Path Approach:* Easily navigable turns, no switch backs and good desire lines
- *Wayfinding:* Signage provided to local retail, office, and transit amenities.
- *Sight Distance*: Good
- *Bridge Lighting*: At entrances and along structure.
- *Bridge Structure - Fencing*: Permeable railing
- *Bridge Structure - Design*: Custom gateway with high viusal interest

BEF RATING	EXCELLENT

Iron Horse Trail at Ygnacio Valley Road, Walnut Creek

Features:

- *Trail Width:* 10'
- *At-grade crossing:* No crossing provided at-grade or at nearest intersection
- *Path Approach:* Easily navigable turns, no switch backs and good desire lines
- *Wayfinding:* EBRPD signage
- *Sight Distance*: Bridge curve makes it difficult to see users on the bridge
- *Bridge Lighting*: None
- *Bridge Structure - Fencing*: Semi-Permeable chain link fencing
- *Bridge Structure - Design*: Minimal visual interest with no sense of place

BEF RATING	GOOD

Based on the detailed BEF rating methodology presented in Appendix B, the precedent locations were evaluated and then used to recalibrate the BEF rating system to provide regionally balanced outcomes that are mostly Iron Horse Trail-specific. The results are also presented with details on **Figure 7**. The outcomes of the precedent evaluation are also used to identify design elements to promote visual consistency throughout the corridor, as well as to better understand how these issues are dealt with in adjacent jurisdictions. Detailed information can be found in Appendix B.

Dublin Iron Horse Trail Evaluation Results

Once the BEF methodology was recalibrated using the precedent locations from other areas along the Iron Horse Trail, the BEF ratings were established for the Dublin Iron Horse Trail segments and crossings using their existing conditions. **Table 2** below details the BEF ratings for the segments and crossings within the study area.

Many of the trail segment BEF ratings in other locations received higher ratings than those within the study area. This is attributable to the inclusion of more trail amenities, presence of shoulders, and better visual appeal. Generally, the trail segments in the study area scored low for comfort, missing shoulders and shade features, and poor pavement quality. At-grade crossings within the study area rated similarly to other at-grade signalized crossings along the trail. Design elements that contributed to the study area crossings low ratings included long crossing distances, higher vehicular speeds, uncomfortable maneuvers for bicycles and pedestrians, and the presence of a slip lane in one location.

Table 2: Dublin Iron Horse Trail Existing Conditions Built Environment Factors Evaluation

Dublin Iron Horse Trail Study Area Location	BEF Rating
Trail Segments	
Iron Horse Trail Segment along the BART Access Road (North of the I-580 overcrossing) to DeMarcus Boulevard Intersection	Poor
Iron Horse Trail Segment between BART Access Roadway/DeMarcus Boulevard Intersection and Dublin Boulevard	Poor
Iron Horse Trail Segment between Dublin Boulevard and Dougherty Road	Poor
At-Grade Crossings	
Dublin Boulevard/Iron Horse Trail Intersection at Scarlett Drive (Signalized)	Poor
Dougherty Road/Iron Horse Trail Intersection at Scarlett Drive (Signalized)	Poor

Source: Fehr & Peers, 2015..

Land Use & Forecasts

Existing & Future Land Use

The Iron Horse Trail study area is surrounded by varying types of land uses. Immediately west of the trail are commercial and residential uses. To the east, the land is largely undeveloped due to the U.S. Army-owned Camp Parks training center. The Camp Parks area is approved to be developed as Dublin Crossing, a large subdivision with approximately 1,995 housing units and up to 200,000 square feet of commercial space. The Dublin Crossing development will directly interface with the Iron Horse Trail in the northern part of the study area and is expected to rebuild the portion of the trail between Dougherty Road and Dublin Boulevard.

North of the Dougherty Road/Scarlett Drive intersection lies large amounts of residential uses including affordable units at Emerald Vista with a mix of single-family homes and multi-family developments. At the East Dublin/Pleasanton BART Station, a large portion of the Transit Village Center is constructed or under construction, this area is planned to have approximately 1,800 housing units and up to two million square feet of campus office space. **Figure 8** shows future land use developments in relation to the Iron Horse Trail study area.

Figure 8: Future Land Use Trends Near the Iron Horse Trail

City of Dublin, 2013, *Dublin Crossing Specific Plan*
City of Dublin, 2014, *Updated Eastern Dublin Specific Plan*
City of Dublin, 2015, *Annual Progress Report on the Dublin General Plan and Housing Element*

Existing Bicycle and Pedestrian Demand and Future Forecasts

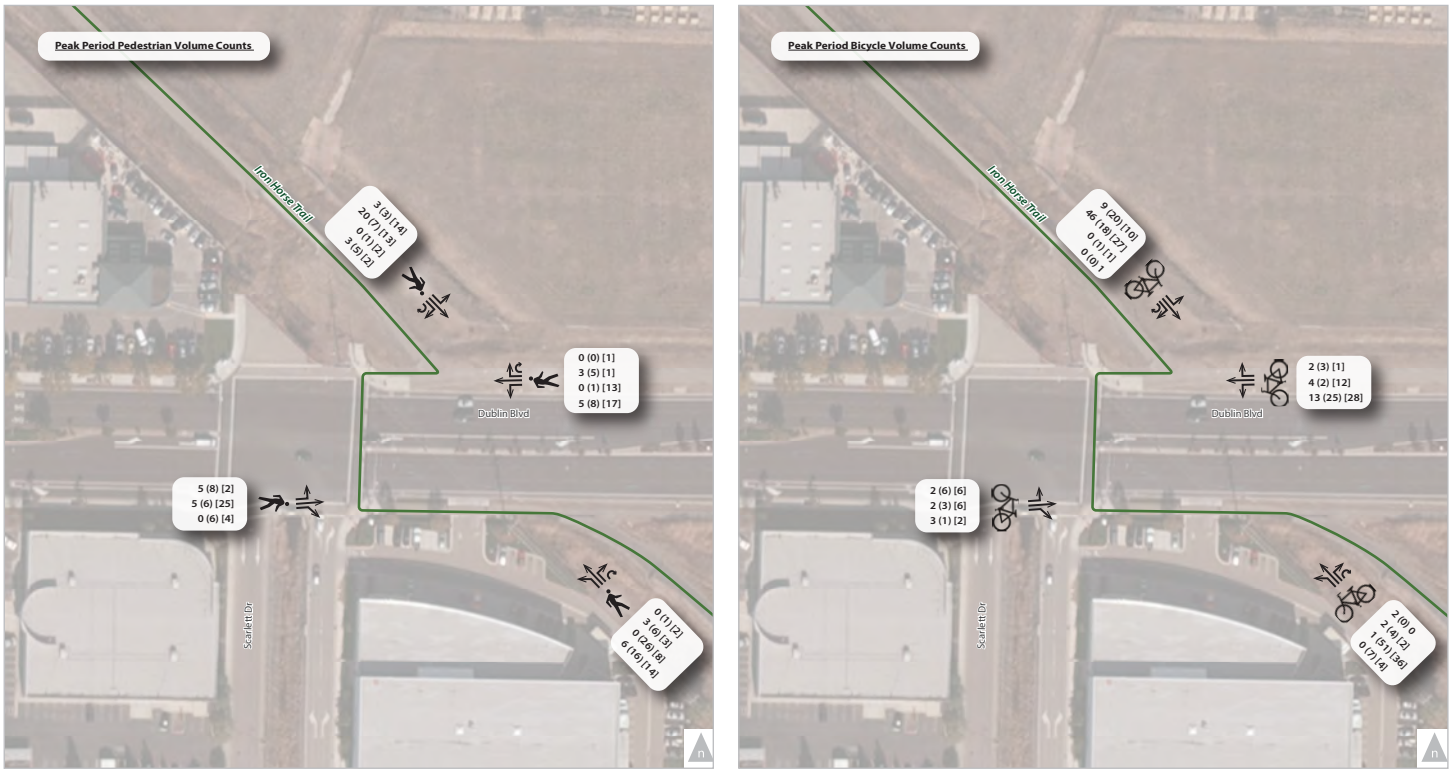
Existing peak commuting period trail user counts were taken in June 2015 at the Dublin Boulevard and Iron Horse Trail intersection crossing at Scarlett Drive. The counts took place on a weekday in the morning between 7:00 AM to 9:00 AM and in the afternoon between 4:00 PM and 7:00 PM. Additionally, Saturday counts were conducted between 7:00 AM to 11:00 AM to analyze the difference between commuters and recreational trail users.

During the weekday morning commute period, there were approximately 140 bicyclists and pedestrians that used Dublin Boulevard and Iron Horse Trail intersection at Scarlett Drive. Of those 140 users, approximately 50 percent of the observed trail users traveled from the northern part of the Iron Horse Trail through the intersection and then continued southbound on the Iron Horse Trail toward BART. During the evening commute period, there were approximately 260 total bicyclists and pedestrians utilizing the intersection. Roughly 40 percent of those users came from the Transit Zone area to the south of the intersection using the trail. However, almost 50 percent of evening those accessing the intersection headed northbound on the Iron Horse Trail from the intersection.

During the Saturday morning peak recreation period there was a total of 284 bicyclists and pedestrians utilizing the trail. While the majority of users had origins and destinations from the trail, the number of users connecting from the east leg of Dublin Boulevard was much higher than during the weekday commute periods. Additionally, there were 67 trail users who utilized this intersection crossing to help them continue traveling along the Iron Horse Trail during the Saturday recreation period. **Figure 9** highlights the existing trail user volume movements at the Dublin Boulevard and Iron Horse Trail crossing at Scarlett Drive.

Existing daily trail users were projected using the peak hour counts and data provided by East Bay Regional Parks District

Figure 9: Peak Period Trail User Volumes at the Iron Horse Trail Crossing with Dublin Boulevard and Scarlett Drive



LEGEND

Iron Horse Trail

XX (YY) [ZZ] - Morning Peak Period (Evening Peak Period) [Saturday Peak Period]

(Park District). The counts provided by the Park District did not provide data consistent with the peak hour count numbers. However, the trail forecasting tool in the following section assists with calculating daily users and provided a more reasonable daily user total. Based on that tool and the local population, a total of approximately 680 daily bicyclists and pedestrians utilize the Iron Horse Trail. **Figure 10** shows the population totals near the Iron Horse Trail from the 2010 US Census used to forecast future trail demand (Note that the population bands displayed are not inclusive of the other bands shown).

Figure 10: Existing Population Totals near the Iron Horse Trail

Forecasted Trail User Demand

Understanding the potential for increased walking and biking trips on the Trail, it is important to plan and design for future users as well as those already using the trail today. The National Cooperative Highway Research Program (NCHRP) Report 552: Guidelines for Analysis of Investments in Bicycle Facilities was used to estimate the potential for walking and biking. This methodology builds off the assumption that a project will increase ridership proportional to residents' distance from the improved facility and is correlated with population density and regional mode share. However, that methodology does not take into account the large amount of new residential development planned within Dublin Crossing. As a result, a forecast with and without Dublin Crossing was developed, as shown in **Table 3**. With Dublin Crossing, 1,319 trail users are expected in 2040, and 1,188 without Dublin Crossing in 2040.

Table 3: Forecasted Trail User Demand without and with Dublin Crossing

	Future Conditions (2040) without Dublin Crossing	Future Conditions (2040) with Dublin Crossing
Existing Bike/Ped Users (Daily)	686	686
New Bike/Ped User (Daily)	503	634
Total Future Bike/Ped Users (Daily)	1,188	1,319
Percent Increase in Bike/Ped Users (Daily)	73%	92%

Source: Based on the NCHRP Report 552, Fehr & Peers, 2015.

Existing Auto Demand and Future Forecasts

The Iron Horse Regional Trail is bisected by two large arterial roadways within the study area. The arterials - Dublin Boulevard and Dougherty Road - create barriers to access and comfort for trail users. To assess the effect of these roadways on the trail experience under current conditions and potential future scenarios, existing auto volumes and future auto demand forecasts were examined.

Weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak period intersection turning movement counts were collected at the study intersections shown on Figure 8 in January and February 2015 for the Dublin Kaiser Transportation Impact Report (Prepared by Fehr & Peers, 2015).

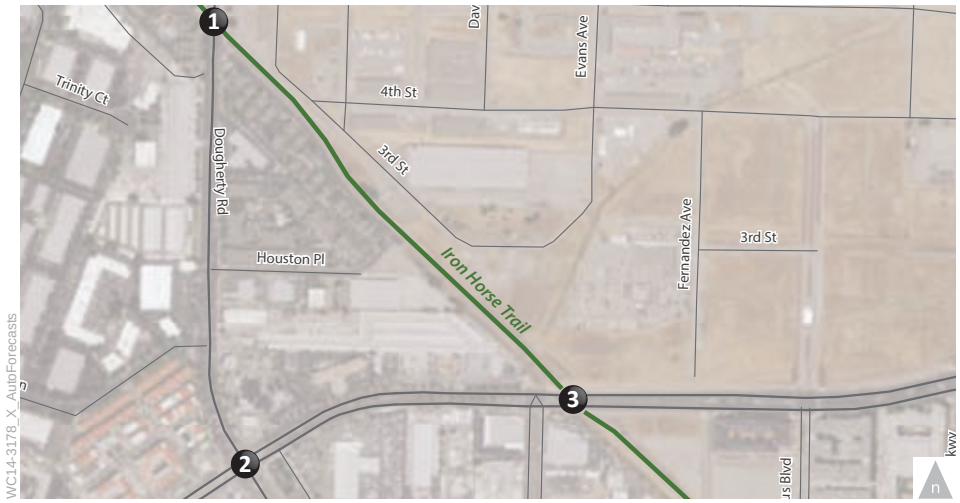
For the study intersections, the single hour with the highest traffic volumes during the count periods was identified. The AM peak hour in the study area is generally from 7:30 to 8:30 AM and the PM peak hour is generally from 4:45 to 5:45 PM. The peak hour volumes are presented on **Figure 11** along with the existing lane configuration and traffic control.

Future Auto Forecasts

Future auto demand was derived using the City of Dublin Travel Demand Model to produce intersection turning movement volumes for Existing, Near-Term (2025), and Future (2040) conditions. The derived auto volumes were approved for use in the Dublin Kaiser Transportation Impact Report (prepared by Fehr & Peers, 2015) and take into account future shifts in auto travel within Dublin. The Scarlett Drive extension, Dougherty Road widening, and other planned infrastructure improvements contribute to these shifts near the Iron Horse Trail crossings.

Both Dougherty Road and Dublin Boulevard will experience substantial increases in automobile trips through 2040 due to the buildout of large land development projects near the Iron Horse Trail. Increased automobile volumes along these roadways may negatively affect trail user experiences when attempting to cross at these locations. Additionally, the increase in automobile traffic highlights the need to prioritize intersection upgrades to accommodate efficient and safe bicycle and pedestrian travel. **Figure 11** details the peak hour automobile forecasts at the arterial intersections with the Iron Horse Trail at Scarlett Drive/ Dougherty Road, Scarlett Drive/Dublin Boulevard, and Dougherty Road/Dublin Boulevard.

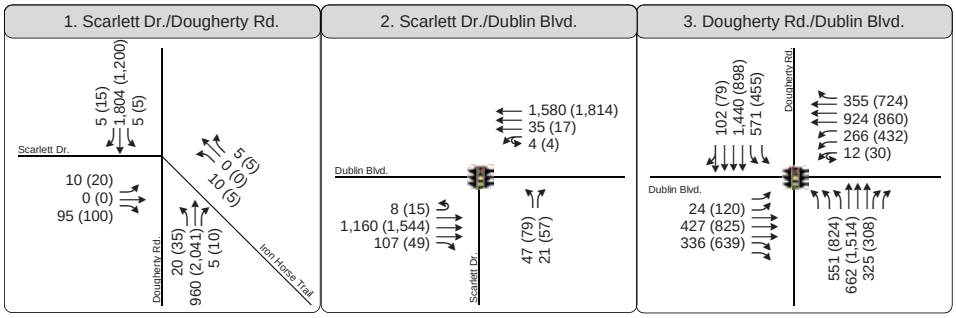
Figure 11: Existing, Near-term (2025), and Future (2040) Auto Volumes



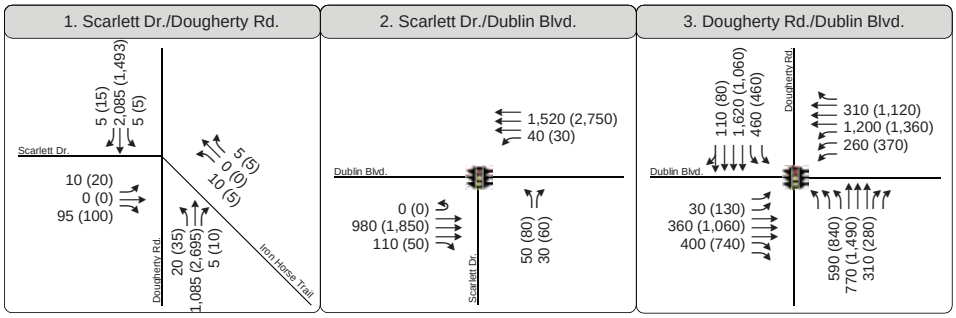
LEGEND

- XX (YY) — AM (PM) Peak Hour Traffic Volumes
- Signalized Intersection
- Stop Sign
- # — Study Intersection

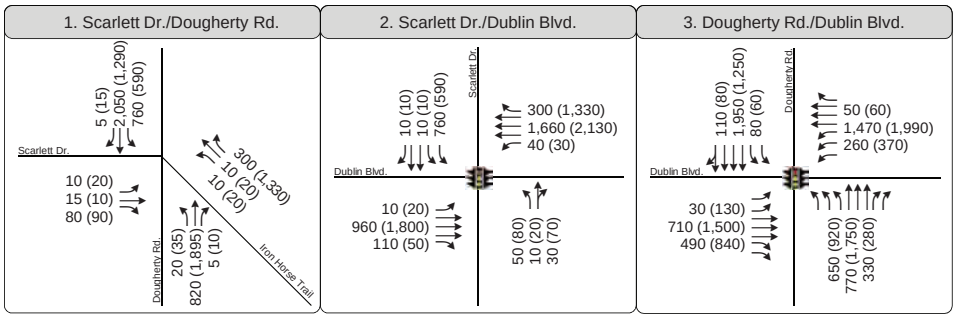
Existing Conditions



Near-Term Conditions (2025)



Future Conditions (2040)



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alternative analysis & preferred improvements

A comprehensive public outreach process, review of relevant policies, documentation of existing built environment, and a Preliminary Improvement Plan were used to create potential alternatives for trail segments and crossings. Improvements to individual segments, crossings, and the Transit Zone are recommended to improve the Built Environment Factors (BEF) described in the previous section.

City of Dublin staff, project partners, Alameda CTC BPAC, and Dublin residents had the opportunity to review and make recommendations on the alternative designs for trail segment cross-sections and trail crossings. Their input was used to identify the final preferred improvements. The preferred trail cross-section provides dedicated spaces for bicyclists and pedestrians. At Dublin Boulevard, the preferred alternative includes the installation of a grade-separated crossing to better align the trail and create a more comfortable user experience. At Dougherty Road, at-grade crossing enhancements are preferred due to potential land-use conflicts and feasibility concerns with relocating utilities.

The preferred alternatives were ultimately selected based on feedback from an online survey, technical feasibility, cost, and BEF evaluation. A detailed list of proposed improvements can be found in the following Implementation chapter with cost estimates and potential funding sources.

Trail Segment Alternatives

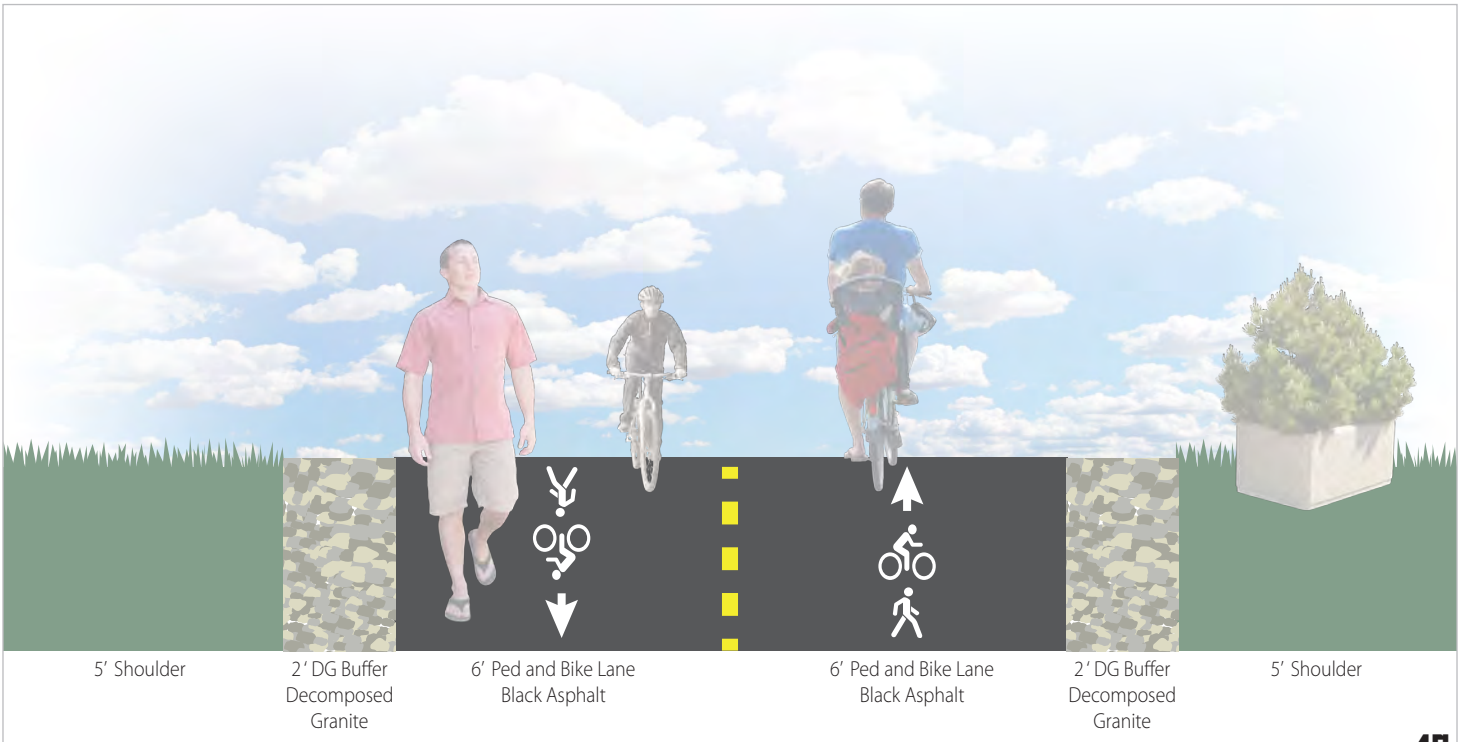
Two primary trail segment alternatives were studied based on input received during the first two public workshops. Both alternatives would feature trail improvements to trail amenities, pavement quality, pedestrian-scale lighting, wayfinding, the width of the trail (currently 10 feet wide), and landscaping. The alternatives differ in how trail users are meant to share the trail facility:

- Alternative One: Single Shared-Use Path - Provides one lane in each direction for pedestrians and cyclists to share.
- Alternative Two: Separated Users - Provides dedicated spaces for cyclists and pedestrians.

Alternative One: Mixed-Flow Multi--Use Trail

The first trail segment alternative is a 12-foot wide asphalt path with two-foot decomposed granite shoulders on both sides of the trail. This provides trail users with a total usable width of 16 feet. The path itself would be separated by a dashed centerline to separate trail users by direction. This option provides a wider space for users to travel in each direction and allows cyclists to ride next to each other. However, because people who walk and bike share the path, conflicts may occur between bicyclists and pedestrians due to the speed differential between them or cyclists having to circumvent pedestrians in the mixed-flow areas. The two-foot decomposed granite shoulders offer a safe place for pedestrians to avoid potential conflicts with cyclists and for joggers to utilize as a lower impact surface than the asphalt portion. **Figure 12** shows the cross-section for shared-use path that could be accommodated in the available trail right-of-way.

Figure 12: Mixed-Flow Trail Segment Cross-section



Alternative Two: Multi-Use Trail with Separated Users

The second trail segment alternative provides separate areas for pedestrians and cyclists. The trail consists of two parallel paths: a nine foot two-way bicycle path and a six-foot two-way pedestrian path. In separating users, this design minimizes conflicts between faster moving bicyclists and slower pedestrians. However, it also makes it more difficult for groups of pedestrians or cyclists to walk or ride side-by-side due to the more constrained spaces. While there are no shoulders in this configuration, a two-foot clear zone should be maintained adjacent to the bicycle zone near the landscaping to ensure bicycle handlebars do not clip any adjacent amenities. **Figure 13** shows the cross-section for a multi-use trail with separate areas for bicyclists and pedestrians that could be accommodated in the available trail right-of-way. The separation between the bicycle and pedestrian paths is differentiated through materials: concrete sidewalk would be used to denote the pedestrian zone and asphalt would be used to denote the bicycle path.

Figure 13: Multi-Use Trail Segment with Separated Users Cross-section

Built Environment Factor Comparison

Both trail segment alternatives have very high levels of comfort for trail users. They both received a score of Excellent, with a neglible difference in total score based on the overall usable width of the trail. Therefore, Alternative One scored marginally higher than Alternative Two even though both trail segment alternatives received "Excellent" BEF ratings. **Table 4** summarizes the trail segment BEF ratings.

Table 4: Trail Segment Alternatives BEF Comparison

	BEF Ratings		
Trail Segments	**Existing**	**Alternative One**	**Alternative Two**
Demarcus Boulevard/Bus Frontage Road to Dublin Boulevard	Poor (-2)	Excellent (19)	Excellent (18)
Dublin Boulevard to Dougherty Road	Poor (1)		

Preferred Alternative

Alternative Two was identified as the preferred alternative. Alternative Two was selected based on input from the online survey, feedback at local community workshops and input from City staff and the Alameda CTC BPAC. Because the proposed trail alignment is directly adjacent to Scarlett Drive and the path takes the place of a typical sidewalk, many community comments focused on the Alternative Two sidewalk and bicycle path configuration seeming more appropriate as an urban trail configuration. Additionally, with the potential for an increase in the number of trail users many survey respondents felt the separate dedicated spaces would make the trail more inviting to more types of pedestrians include children and seniors who may be moving at much slower pace than fast moving cyclists near the future park. This sentiment was also shared at the Alameda CTC BPAC meeting to provide a more dedicated transportation facility for cyclists who are commuting to BART.

The Park District, which currently maintains the trail, does not normally install centerline stripe or separate users on the Iron Horse Trail. However, the Park District has indicated that changes to the standard unmarked configuration should be coordinated and approved by the Park District. Upon consideration, a maintenance and operations agreement for the customized configuration would need to be formed between City of Dublin and the Park District.

Trail Crossing Alternatives

This section identifies site-specific trail improvements at intersections to better connect the trail along the corridor. Trail crossing improvements are recommended for both at-grade crossings and for the potential to install grade separated crossings at Dublin Boulevard and Dougherty Road. At-grade crossing improvements generally only produced one set of alternatives that should be implemented in the near-term to address some of the trail user concerns at the current crossings. Near-term improvements will still be required to be maintained even with grade-separated improvements. Longer-term investments will be needed to fund and construct alternatives for grade separated crossings, where recommended. Detailed guidance on crosswalk treatments and bicycle/pedestrian detection can be found in **Appendix C**.

Dublin Boulevard/Scarlett Drive Intersection with the Iron Horse Trail

At-grade Improvements

While not the preferred alternative, at-grade trail crossing improvements at Dublin Boulevard and Scarlett Drive are recommended as near-term improvements to. **Figure 14** highlights the recommended at-grade improvements at Dublin Boulevard. The existing intersection requires several modifications that should remain even if a grade separate crossing is installed at this location. Therefore, the proposed improvements could be installed in conjunction with the Scarlett Drive extension or through the use of alternative funding sources such as City funds or grants.

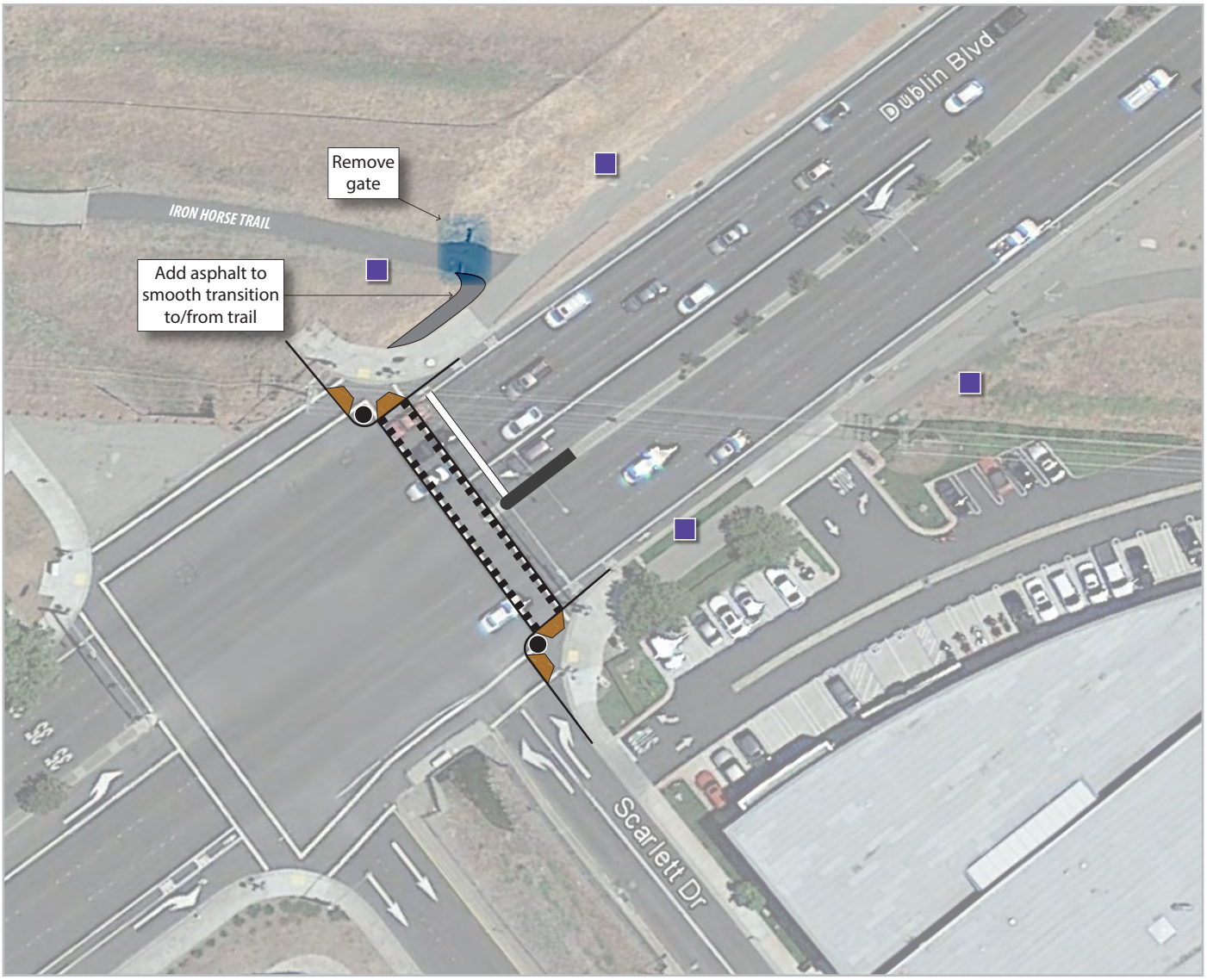
Bicyclists attempting to cross Dublin Boulevard often have to make sharp turns from where the trail meets Dublin Boulevard to the east of the intersection in order to maneuver to the signal. This movement should be improved by removing bollards and adding asphalt to make the path approach to the intersection easier for cyclists. At the intersection, user experience can be improved through relocating pedestrian-actuated push buttons to more convenient locations for cyclists and pedestrians. This will help to prevent cyclists from having to make unnecessarily sharp turns or dismount to be able to reach push buttons. Passive detection could also be installed in advance of the crossing to extend the crossing time for trail users to be able to make the crossings to reduce waiting time.

The crosswalk should be re-striped in a triple-four style trail crossing with bicycle and pedestrian stencils to distinguish the trail crossing from a typical crosswalk. Bicycle and pedestrian stencils within the center of the crosswalk enforce the trail crossing as a shared space where bicyclists can ride through the crossing but should yield the right-of-way to pedestrians. Consistent trail crossing treatments should be applied at all trail crossings throughout the City. The median nose extending into the trail crossing should be shortened as to not protrude into the crosswalk.

Curb radii on the northeast and southeast corners will be reduced and to slow vehicle turning speeds across the trail crossing. Large 8-foot wide directional curb ramps should be installed at the trail crossings. The additional sidewalk area will help to accommodate wider turns for bicyclists and provide better queueing space for bicyclists. Speed feedback signs or trail crossing signs should be located ahead of the trail crossing to control vehicle speeds and warn vehicles of the upcoming trail crossing.

Directional signage should be installed from both trail approaches to indicate the preferred path of travel for navigating the Dublin Boulevard crossing. Wayfinding signage at key decision points should be installed to guide users to local destinations in Dublin such as BART, Downtown, and other trails. Permanent art installations and gateway features that highlight the Iron Horse Trail could be installed to create a better sense of place and visual interest for trail users.

Figure 14: Dublin Boulevard Conceptual Design (Full Buildout with or without Grade-separated Crossing Alignment)



Grade Separated Alternatives

The Dublin Boulevard intersection with the Iron Horse Trail represents a major barrier in connectivity due to high vehicle volumes, high speeds, the out of direction travel required, and a long, potentially stressful at-grade crossing. While the at-grade crossing should be enhanced in the near-term, long-term investment alternatives for this crossing were analyzed to more efficiently and safely connect the natural desire lines of the Iron Horse Trail. This will allow for easy passage to the BART station as well as nearby land uses from the trail or adjacent approaches. Multiple grade separation alternatives were evaluated including a tunnel undercrossing and bridge overcrossing. Detailed cost estimates and bridge plans are provided in **Appendix D**.

Undercrossing Evaluation

A bicycle/pedestrian undercrossing for Dublin Boulevard was evaluated as a potential solution to bypass the intersection. However, tunneling under public right-of-way in this location is both complicated and expensive. The large number of utilities that are underground on the northern side of the intersection including the Kinder Morgan pipeline would have significant cost to relocate. In the case of tunnel construction, excavating and re-locating gas, sewer/storm drains, electrical power lines, and telecommunications infrastructure would be overly costly and time-consuming. Additionally, there is typically a larger logistical cost for removing the soil and debris associated with tunneling.

Bicycle and pedestrian underpasses also present community safety concerns, as there are fewer 'eyes on the street' in a tunnel which could create the feeling of an unsafe environment. The tunnel would need to be well lit but would need to stretch a great length on either side of the intersection extending the amount of time users would need to be underground. The future Dublin Crossing Park on the north side of the intersection is also renovating the creek habitat and the underground tunnel may conflict with parts of that project. Additionally, underpasses require additional maintenance and drainage systems to ensure that the tunnel is not blocked by debris or water. For these reasons, an undercrossing was eliminated as a feasible alternative.

Overcrossing Evaluation

Three alternative conceptual overcrossing bridge designs were evaluated as part of this planning process. Each option includes varying architectural styles that range in cost, color options, and maintenance. All bridge overcrossing alternatives include pedestrian scale lighting, path approaches that meet trail user desire lines, at-grade crosswalks, gateway design features, wayfinding at key decision points, permeable railings or fencing to maintain sight lines, and designs that provide visual interest. The alternatives described below were presented at the third community workshop and the online survey which allowed Dublin residents to vote on their preferred designs.

Additionally, the Scarlett Drive Extension project and the Dublin Crossings development will create heavy amounts of turning vehicles between Dublin Boulevard and Scarlett Drive (see Figure 11). Near-term at-grade improvements should be installed to enhance existing trail user comfort and accommodate future Dublin Crossing Park access, removing trail users from the Dublin Boulevard and Scarlett Drive intersection by installing a grade separated crossing will help to maintain adequate signal operations at the intersection and maintain a safer trail user environment. Additionally, should a grade-separated crossing not be installed, the Dublin Crossing Environmental Impact Report states that the eastern trail crosswalk at the intersection would need to be removed to maintain turning operations.

Alternative One: Main Span Truss Bridge

Alternative One is a Steel Truss Bridge designed with soft, rolling architectural features that are intended to reflect the surrounding rolling hills of the Tri-Valley area. Two aesthetic options for Alternative One were presented to highlight variations that can be included with this bridge design. Option 1A is designed with concrete piers that support the bridge on the approach and descent, and concrete corbels that feature the Dublin City logo. Option 1B has concrete arches, instead of piers and corbels that support the path. It also features the Dublin City logo. Both 1A and 1B can be painted with green, mustard, or gray accents.

Both Alternative One options are estimated to cost approximately $7.4 million include planning, design, and construction. **Figure 15** and **Figure 16** on the next page show the aesthetic variations for Alternative One.

Figure 15: Dublin Boulevard Overcrossing Alternative One Option 1A

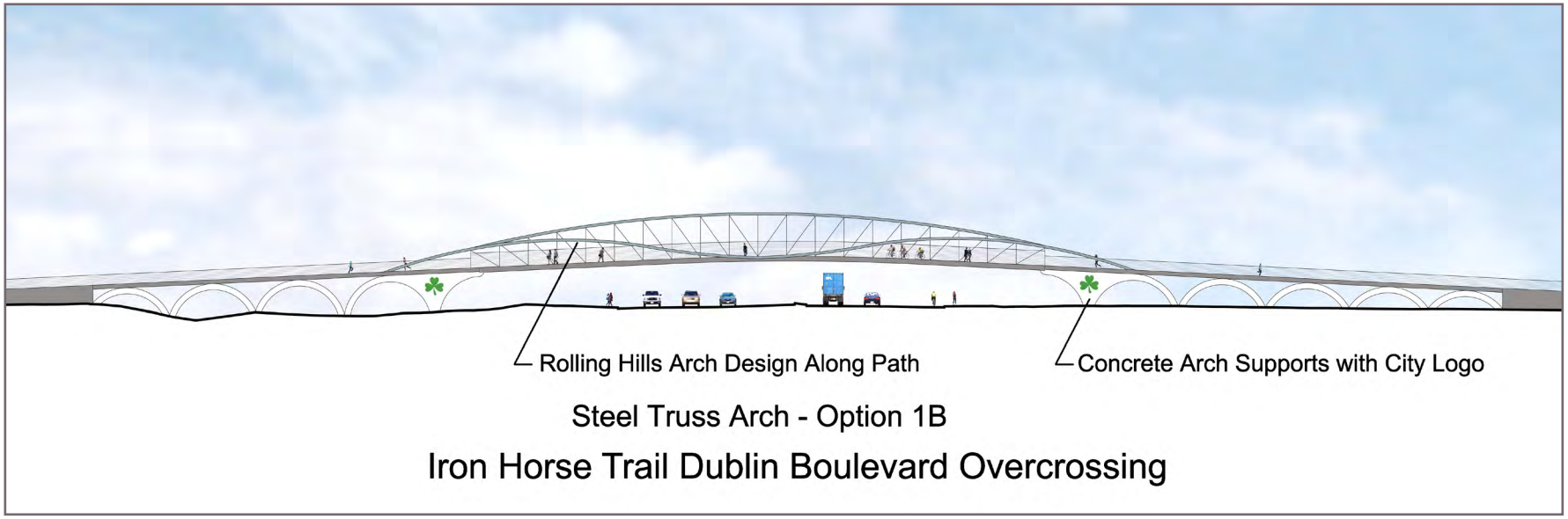
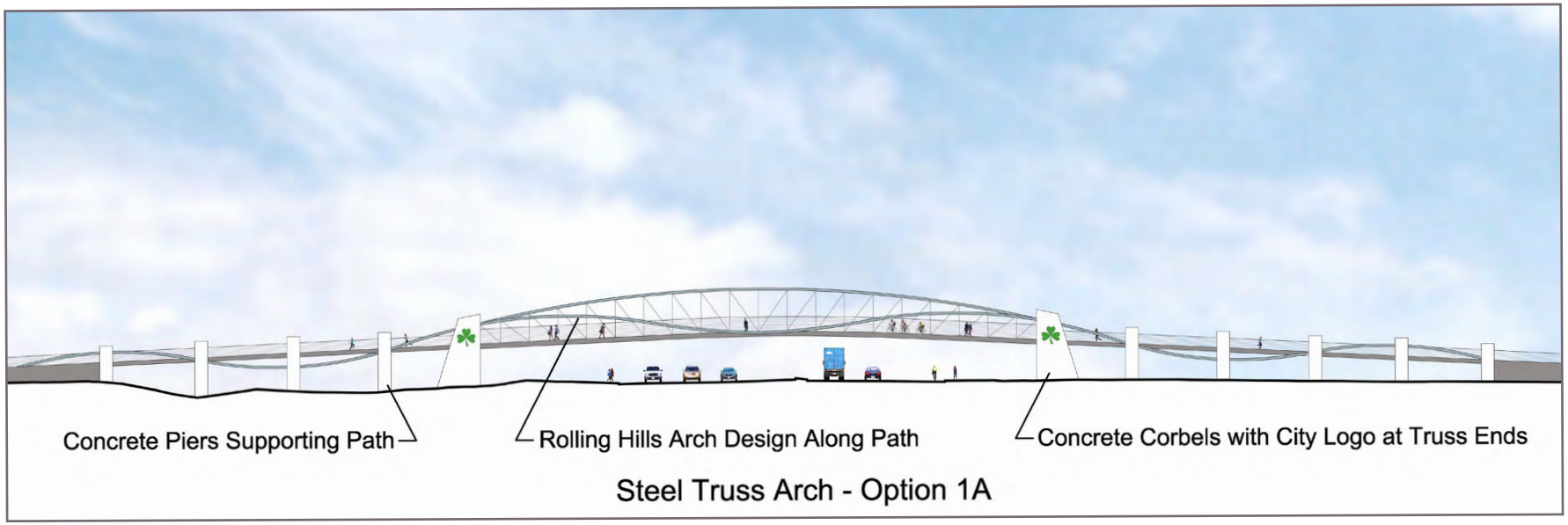


Figure 16: Dublin Boulevard Overcrossing Alternative One Option 1B



Alternative Two: Main Span Basket Handle Arch Bridge

Alternative Two is a Steel Basket Handled Tied Arch Bridge where the path is supported by steel arches. Two aesthetic options for Alternative Two were presented to highlight variations that can be included with this bridge design. Option 2A features concrete corbels on each end with the emblematic Dublin shamrock and hill design arch supports for the path approaches. Option 2B has concrete piers supporting the path on the approaches and pointed concrete corbels with the Dublin shamrock. Like the previous option, the bridge can include painted green, mustard, or gray accents.

Both Alternative Two options are presented in **Figure 17** and **Figure 18** and each has an estimated cost of approximately $10.9 million including planning, design, and construction.

Alternative Three: Main Span Cable Stayed Bridge

Alternative Three is a cable-stayed bridge that features a large central tower with cables that support the main span of the bridge over Dublin Boulevard. Concrete piers would support the path on the approaches. Like the previous option, this bridge can have green, orange, or gray accents with the Dublin shamrock embossed at the top of the tower. This design is intended to be a statement that could be visible from both BART and the freeway while providing a focal point at the future Dublin Crossings Park.

Alternative Three is the most expensive option and is presented in **Figure 19** with an estimated cost of $16.1 million.

Table 5 compares the ranges in estimated costs associated with the grade separation alternatives. With an estimated range between $7.4 million and $16.1 million, cost variations were weighed heavily when selecting a preferred alternative.

Table 5. Dublin Boulevard Grade Separation Cost Comparison

Crossing Alternative	Style	Cost
Undercrossing	Tunnel	N/A
Bridge Option 1	Main Span Truss Bridge	$7.4 Million
Bridge Option 2	Main Span Tiered Arch Bridge	$10.9 Million
Bridge Option 3	Main Span Cable Stay Bridge	$16.1 Million

Figure 17: Dublin Boulevard Overcrossing Alternative Two Option 2A

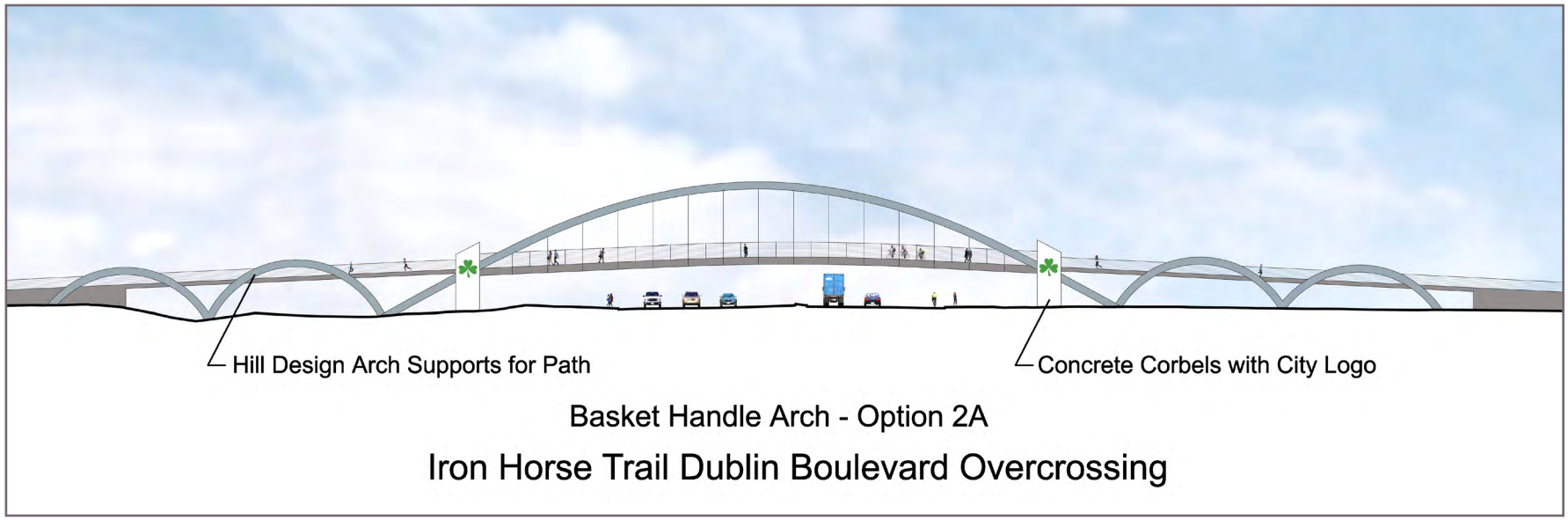


Figure 18: Dublin Boulevard Overcrossing Alternative Two Option 2B

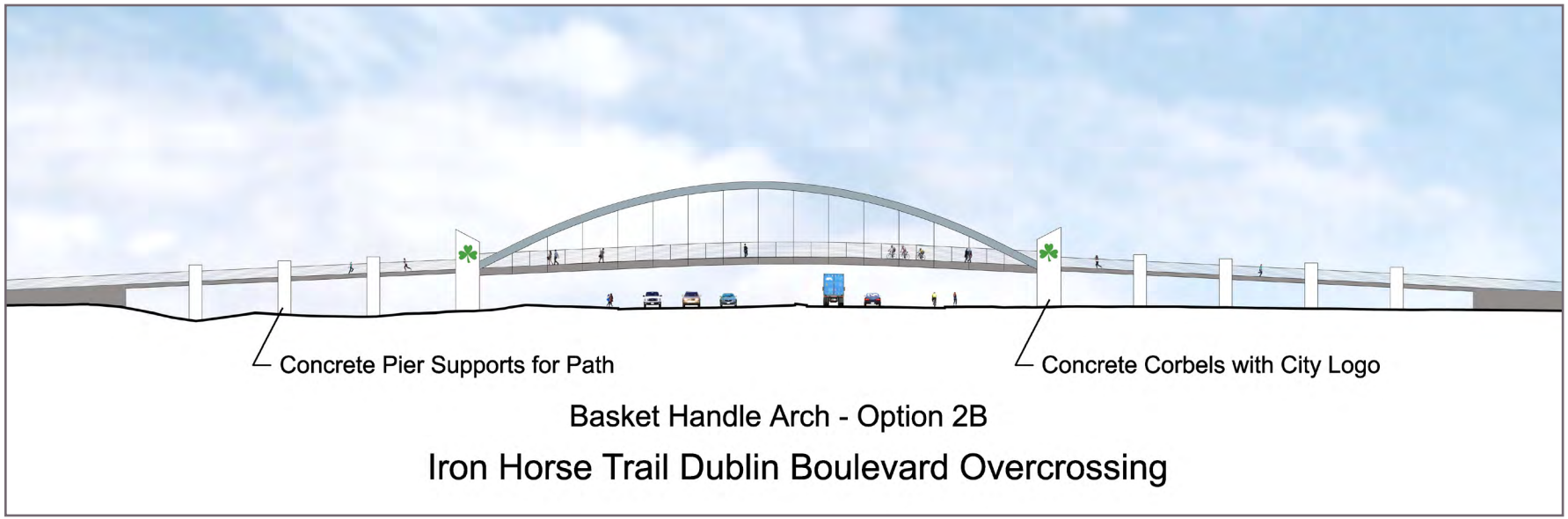
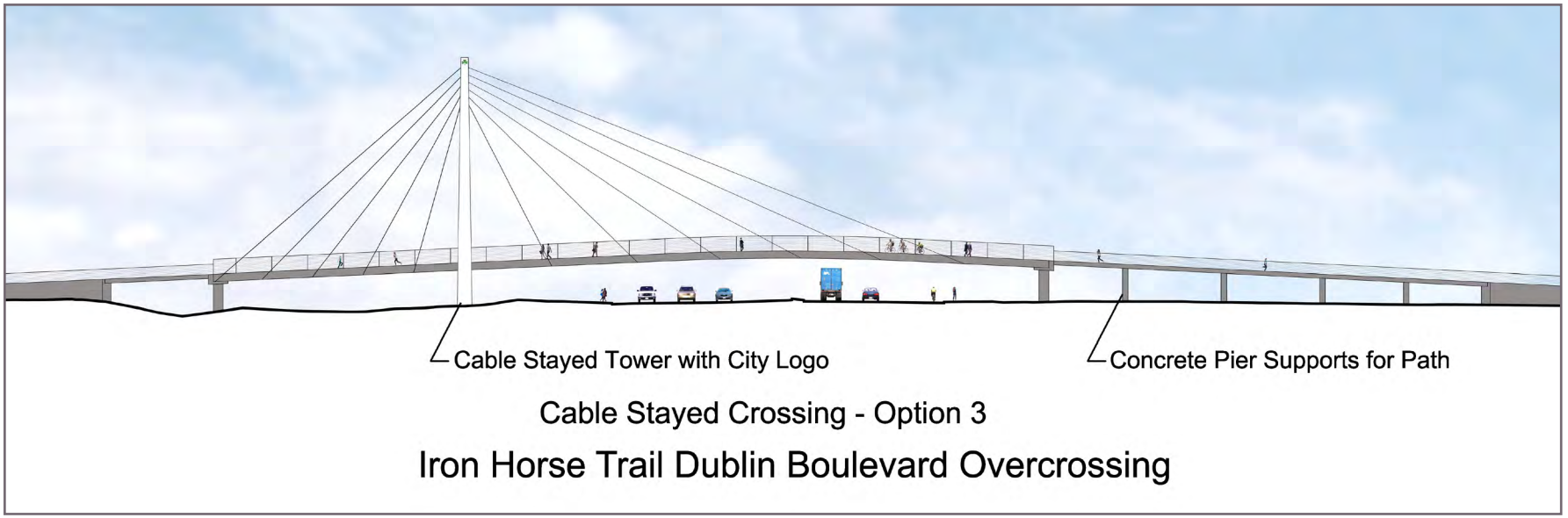


Figure 19: Dublin Boulevard Overcrossing Alternative Three



Built Environment Factors

Trail user comfort can be greatly increased at the at-grade crossing at Dublin Boulevard by enhancing approach comfort, reducing turning conflicts, installing active and passive pedestrian and bicycle detection, and creating easy to understand wayfinding signage. While the recommended at-grade improvements would increase the BEF rating to "Good," major barriers would still exist such as the long crossing distance, long traffic signal cycle lengths, and high volumes and speeds of automobiles on Dublin Boulevard. Installing a grade-separate crossing over Dublin Boulevard would greatly reduce bicycle and pedestrian conflicts at the intersection and alleviate issues that will ultimately remain at the intersection even with the near-term improvements. By installing a bridge using the recommended improvements, the crossing would receive a rating of "Excellent." **Table 6** compares BEF ratings for the proposed improvements at Dublin Boulevard.

Table 6. Dublin Boulevard Crossing BEF Ratings Comparison

Study Crossing	Existing	Proposed At-grade Improvements (Full Buildout)	Undercrossing	Overcrossing
Dublin Boulevard	-6	6 (Good)	Not Feasible	14 (Excellent)

Preferred Dublin Boulevard Crossing Alternative

The online community survey presented to the public indicated that Alternative Three design received the highest approval rating. While this design was generally liked by the public, concerns were raised in the survey and at public workshops about the cost of the structures. Costs were not included with the structures during the online survey to understand the preferred aesthetic desires of Dublin residents.

Alternative One (Option 1B) received the second highest approval rating of all of the bridge types and has an estimated cost of less than half of Alternative Three. Option 1B was only rated marginally behind Alternative Three. Therefore, based on the numerous comments received from Dublin residents about selecting a functional bridge alternative that also weighs the importance of reducing costs, Alternative One Option 1B is the preferred alternative for the Dublin Boulevard Iron Horse Trail overcrossing.

Preferred Dublin Boulevard Overcrossing Alternative One (Option 1B) looking East on Dublin Boulevard.

Preferred Dublin Boulevard Overcrossing **Alternative One (Option 1B) looking West on Dublin Boulevard.**

G Street/Scarlett Drive Intersection with the Iron Horse Trail

The future Dublin Crossing development will construct a large number of new housing units, changing the volume of vehicles on the adjacent roadway network. A new street structure within the development will connect with the existing street network. Scarlett Drive will be widened to accommodate the increase in vehicles and a new intersection will be created by extending a new roadway, G Street, from within the Dublin Crossing development to Scarlett Drive.

The new intersection with G Street will create another signalized intersection crossing for the Iron Horse Trail at this location. A Class I Multi-use trail will also be included on the north side of G Street which should be directly tied in with the Iron Horse Trail on the northeast corner of the intersection. This should be accomplished by providing a larger queuing area on the northeast corner where cyclists and pedestrians can wait for the signal or bypass the queuing area to continue on either trail.

The Iron Horse Trail crossing, on the east leg of the intersection across G Street, should feature a triple-four crosswalk with bicycle and pedestrian stencils in the crosswalk. This type of high visibility crossing is used to indicate that it is a space to be shared by both pedestrians and bicyclists who can ride through the intersection. On-street bicycle facilities will also be present along Scarlett Drive by extending the existing Class II bicycle lanes. At the G Street intersection, the conflict zone with cars turning right should be painted green skip striping to highlight the potential conflict area between bicycles and vehicles. The bicycle lanes and turning movements should also feature bicycle detection.

G Street (Future Roadway) and Scarlett Drive **crossing with the Iron Horse Trail should incorporate many of the same treatments as the two major signalized intersections at Dublin Boulevard and Dougherty Road.**

Dougherty Road/Scarlett Drive Intersection with the Iron Horse Trail

The existing at-grade trail crossing at Dougherty Road has a long crossing distance, extended signal cycle lengths, large curb radii which allow for high speed turns, and high speeds which create an uncomfortable atmosphere for trail users. Consequently, this intersection garners a low score on the BEF rating methodology due to these crossing barriers. The Dougherty Road widening project design plans were being approved during the formation of this study to widen the roadway from four to six lanes. Many of the recommendations provided in this section were incorporated in the design of the Dougherty Road widening.

At-grade Improvements

The at-grade intersection improvements provided one set of recommendations rather than multiple alternatives. The cost for these improvements are provided in Section 7. The recommended improvements are intended to help enable easier, more efficient crossings. Trail user desire lines and approaches are generally properly aligned for the existing crossing. The Dougherty Road Widening project and the Scarlett Drive extension project will shift the trail east which will reduce the crossing distance and match trail user desire lines.

The crossing should be enhanced by including a number of design features which are intended to provide a more welcoming and less stressful environment for trail users compared to the existing condition. These improvements include modifying the traffic signal to feature leading pedestrian intervals and overlapping the southbound left-turns from Dougherty Road to Scarlett Drive with the northbound right turns from Scarlett Drive to Dougherty Road. This will help to reduce conflicts between vehicles and trail users and increase visibility between trail users and right-turning vehicles if they are allowed to turn right during the trail crossing phase. Additionally, an extinguishable no right-turn sign and separate right-turn signal phasing can be introduced for the northbound right-turning movement direction that can be activated when trail users activate the crossing.

At the intersection, user experience can be improved through relocating pedestrian-actuated push buttons to more convenient locations for cyclists and pedestrians. This will help to prevent cyclists from having to make 90-degree turns or dismount to be able to reach push buttons. The push buttons should be located near the wide path ramps to place bicyclists and pedestrian on the correct side of the crossing to reduce conflicts in the crossing itself. Passive detection should also be installed in advance of the crossing to extend the crossing time for trail users to be able to make the crossings to reduce waiting time. Active pedestrian detection should remain at the signals to account for users coming from other approaches. Vehicle speeds would be more controlled with speed feedback signs, and advanced stop bars will help guide motorists for proper placement in front of the trail crossing itself.

The curb radius on the southeast corner should be reduced as much as possible to slow turning vehicles. Oversized path ramps and truncated dome should be installed on both sides of the crossing. The northwest porkchop island is difficult to navigate and does not provide adequate space for two cyclists to pass each other. Therefore, the porkchop island should be widened to provide better travel space and direct access to the crossing. This will help place users in the proper position to be able to enter the crosswalk and reduce conflicts within the island. The crosswalk should feature triple-four striping with bicycle and pedestrian stencils to establish consistency throughout the corridor. This crossing treatment also makes the crossing more visible to motorists to highlight the potential for heavier volumes bicyclists and pedestrians using this crossing.

Finally, wayfinding signs, gateway features, and public art installations will help to cultivate a sense of place while highlighting the trail as a desirable facility. Wayfinding will promote the trail as a viable connection to local destinations or nearby points of interest and direct users how to directly access the Dublin/Pleasanton BART station.

Grade Separated Alternatives

While at-grade improvements will help to make the Dougherty Road crossing a more comfortable crossing for trail users, grade separated improvements were evaluated to understand the feasibility, cost, and necessity of such an improvement. Detailed cost estimates can be found in **Appendix D**.

Undercrossing Evaluation

A bicycle/pedestrian undercrossing for Dougherty Road was evaluated to understand if such a facility would be cost effective and provide a more comfortable environment for trail users. While tunneling under public right-of-way is complicated and expensive, feedback from local residents during the public workshops indicated that many people often feel unsafe using trail underpasses as there are fewer "eyes on the street" in a tunnel. This presents a major concern because the tunnel would need to be underground for approximately 450 feet to clear both Dougherty Road and the western access road to the northern apartment complex.

Additionally, there are a large number of utilities that would need to be relocated. In the case of tunnel construction, excavating and re-locating gas, sewer/storm drains, electrical power lines, and telecommunications infrastructure would be overly costly.

The estimated cost for an underpass at Dougherty Road is $10.8 million dollars including planning, design, and construction.

Overcrossing Evaluation

An overcrossing was evaluated for feasibility, cost effectiveness, and need. A potential bridge would need to span approximately 700 feet to cross both Dougherty Road and the northern access road to the adjacent residential developments. Additionally, the structure would need to have a 'touch down' structure directly adjacent to apartments which front the trail, which may not be compatible due to privacy concerns. Power lines directly parallel the Iron Horse Trail in this section and would need to be undergrounded or relocated to accommodate the bridge. Based on discussion with PG&E, this may prove to be very expensive and may not be feasible due to other undergrounded utilities in the area.

The estimated cost for a main span truss bridge at Dougherty Road is $9.6 million. Due to privacy concerns, land-use incompatibility, and the potential difficulty of relocating existing power lines, an overcrossing is not recommended as a the preferred alternative at this location. The cost estimate did not evaluate the cost of relocating utilities and the feasibility of relocating utilities would require further study in coordination with the utilities providers. When considering the overcrossing as part of the entire study area with limited resources, the Dublin Boulevard overcrossing ranks as a higher priority. However, should additional funds become available the Park District and/or the City of Dublin could construct the overcrossing to separate trail users from the at-grade crossing.

Built Environment Factor Comparison

Upon buildout of the Dougherty Road Widening and Scarlett Drive Extension projects, the at-grade crossing improvements will re-align the crossing and implement safety features that will make the intersection much more comfortable for trail users. **Table 7** summarizes the BEF ratings for applicable alternatives.

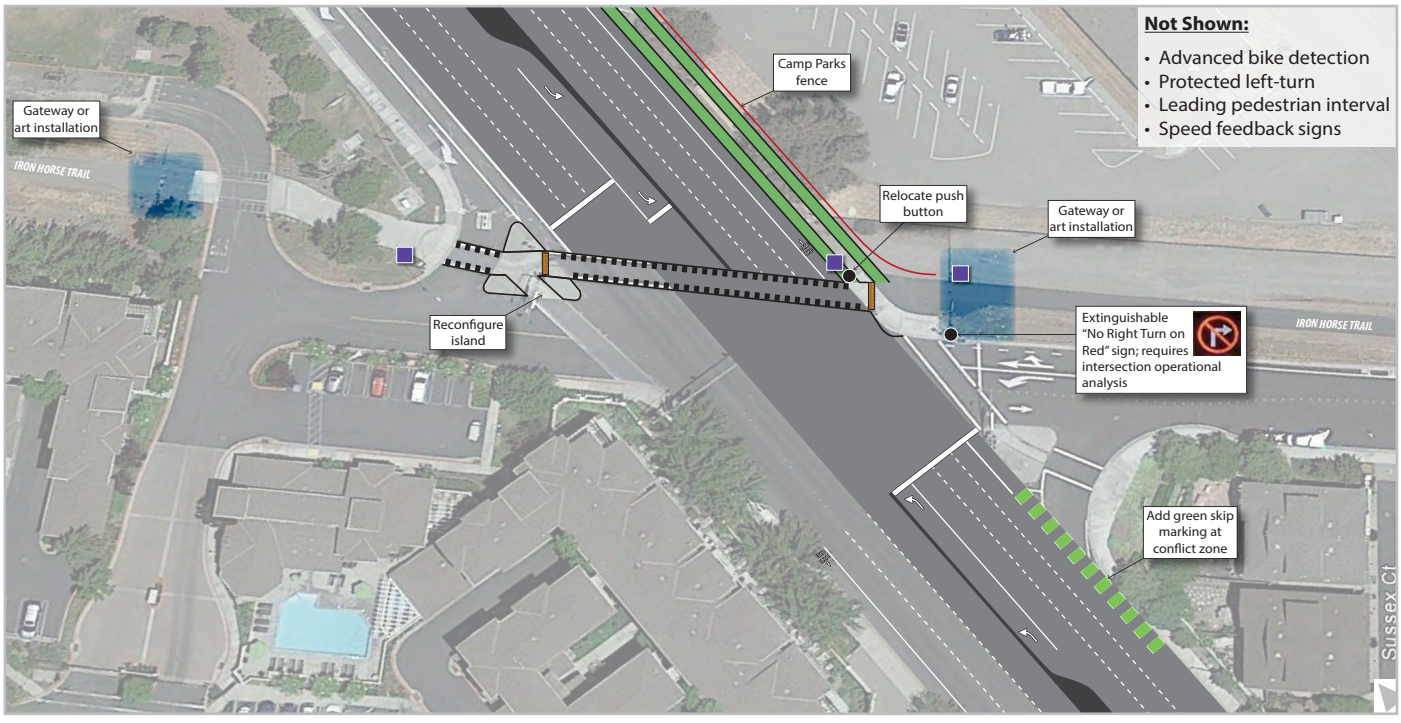
Table 7. Dougherty Road Crossing BEF Ratings Comparison

Study Crossing	Existing At-grade Crossing	Proposed At-grade Improvements (Full Buildout)	Undercrossing	Overcrossing
Dougherty Road	Poor (-8.5)	Good (6)	Not Feasible	Requires further utilities analysis

Preferred Dougherty Road Crossing Alternative

The preferred Dougherty Road alternative is to implement the recommended at-grade crossing improvements (shown in **Figure 20**). While both an overcrossing and undercrossing were evaluated at this location, trail alignment and desire lines were not highlighted as major issues during the public outreach phases of the project (unlike Dublin Boulevard). Improvements to the at-grade crossing can make the user experience much more pleasant and the added benefit of a grade separated crossing is much less than at Dublin Boulevard. Protected signal phases, active and passive trail user detection, and shortened crossing distance improvements allow the crossing to receive a "Good" BEF rating. While an overcrossing is technically feasible, it is not recommended due to the high cost, difficulty of utility relocation, span of crossings, and land use incompatibility with the span touching down directly next to existing residential uses.

Figure 20: Dougherty Road/Scarlett Drive intersection crossing with the Iron Horse Trail recommended improvements.



Transit Zone Recommendations

The Iron Horse Trail currently appears to terminate to the north of the Dublin/Pleasanton BART station near Demarcus Boulevard where an informational sign and a dedicated trail exist to the north. However, the trail technically is meant to continue through the BART station and connect with the extension of the trail to the south of Owens Drive in Pleasanton. Improvements are recommended throughout the Transit Zone to improve the user experience both accessing transit facilities and traveling through to the Pleasanton extension of the trail. **Figure 21** provides an overview of the preferred Iron Horse Trail alignment through the Transit Zone.

Transit Zone North (Area North of the Dublin/Pleasanton BART Station)

Where the trail currently appears to terminate in the north, there is a large amount of unused asphalt pavement. At its intersection with Demarcus Boulevard, a rough trail continues toward the BART fare gate area with street furniture inside the trail, such as light poles and chain link fencing, creating a narrow 8-foot wide trail segment. Wheels (LAVTA) buses operate two-way bus travel lanes adjacent to the trail area in this section of the transit zone. With buses constantly using the small access road, navigating it is a challenge for bicyclists but many choose to ride in the southbound bus lane to avoid pedestrians in this constrained segment. This creates an area of conflict and also creates a barrier for cyclists attempting to reach the BART fare gates or who wish to continue through the transit area.

A plaza with gateway features could be constructed at the northern end of the transit area where the large amounts of unused asphalt area currently exists. This small plaza could feature benches, a fixed bicycle repair station, landscaping, public art, and other amenities to create a gateway to the Iron Horse Trail.

The trail should be widened in the northern Transit Zone to accommodate better two-way bicycle and pedestrian travel. Due to the constrained amount of available right-of-way in this area, a two-way trail with a centerline should be provided where cyclists and pedestrian share spaces. The chain link fencing should be moved as far back away from the trail as the Zone 7 Water Agency will permit to be able to widen the trail to a minimum of 12 feet. A trail with dedicated bicycle and pedestrian facilities is not feasible through this area because the trail width necessary for this type of facility cannot be obtained while maintaining proper bus operations. A repaved two-way mixed-flow trail with a wider width that is free of obstacles will encourage bicyclists and pedestrians to use the trail instead of attempting to travel in the bus lanes.

The existing light poles should be moved out of the trail right-of-way and pedestrian-scale lighting should extend from the I-580 overpass to Dublin Boulevard. Wayfinding signs should be installed to properly direct cyclists and pedestrian to the BART fare gates and through the station.

Transit Zone South (Near the Dublin/Pleasanton BART Fare Gates to Pleasanton Iron Horse Trail)

As the trail approaches the Interstate 580 overpass, the existing trail currently continues on the sidewalk which is shared between trail users and BART/Wheels passengers entering and exiting the station area. Cyclists are meant to dismount and walk through the station area under the overpass. Many cyclists have indicated that this is often ignored and was confirmed with multiple rounds of field observations near the BART fare gates. For cyclists wishing to continue on the trail on the Pleasanton side of the BART station, there is no obvious way to accomplish this and no signage to indicate where to reconnect with the trail on the Pleasanton side of the station. High volumes of pedestrians are often present near the BART fare gates which makes it difficult for cyclists to navigate this area.

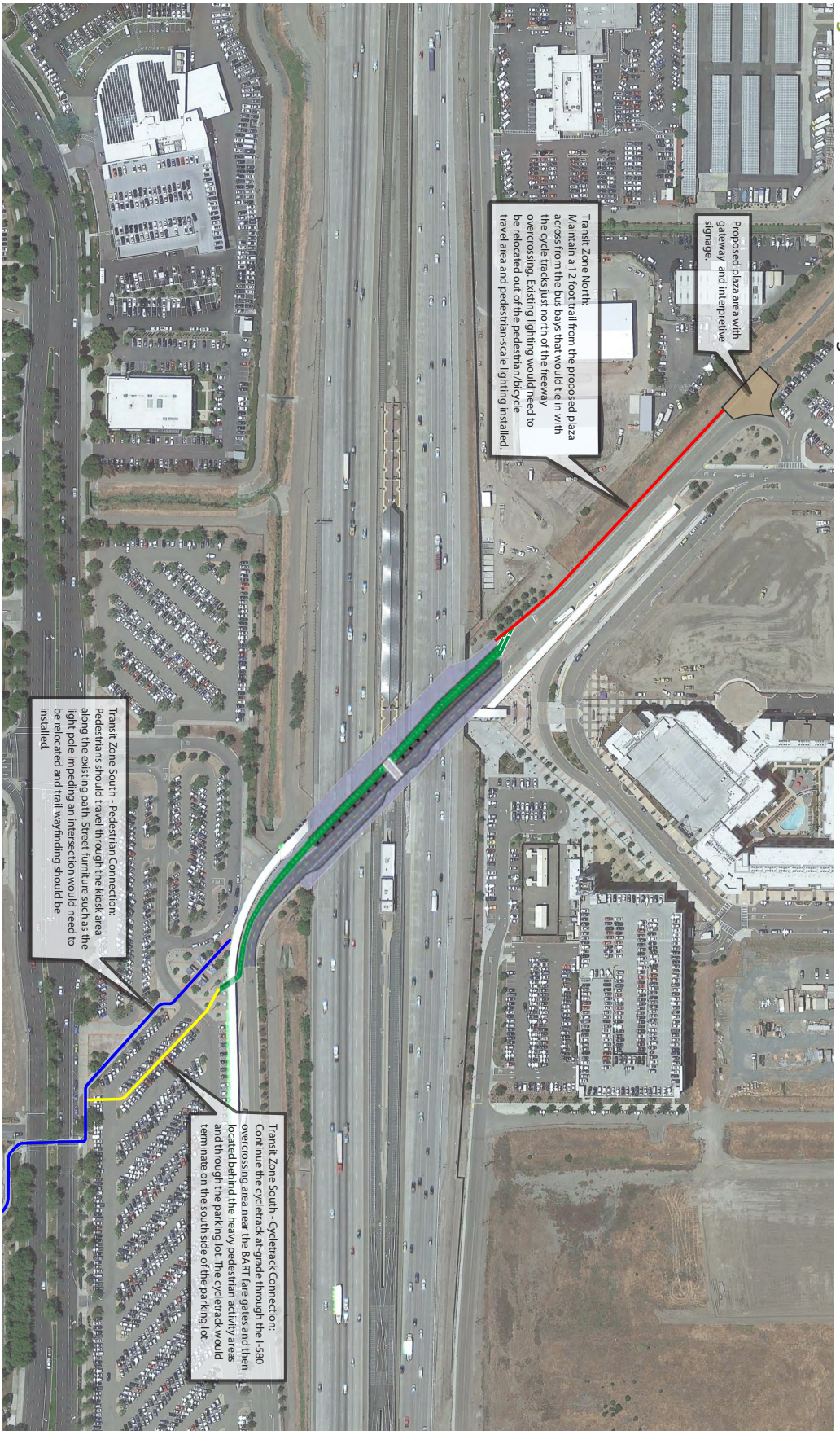
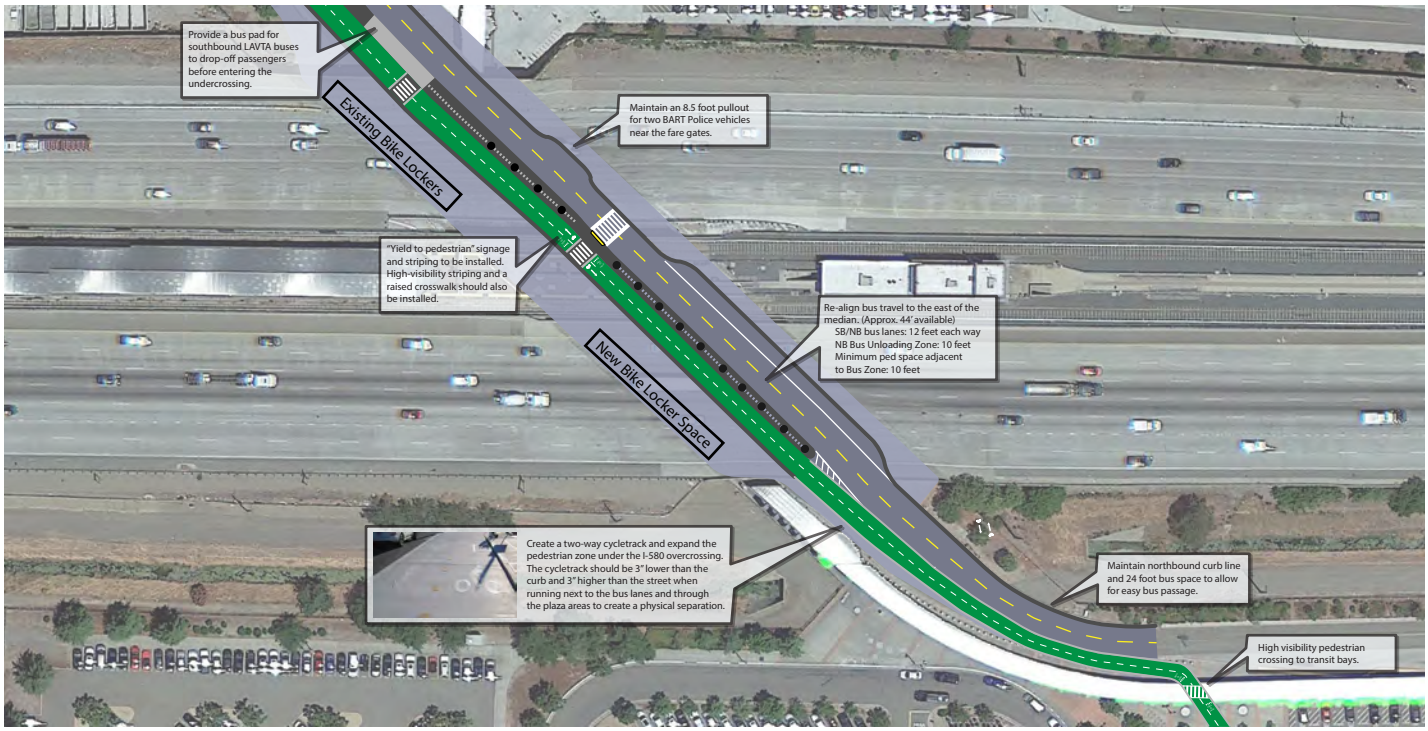


Figure 21: Transit Zone Preferred Alignments Overview

To reduce the amount of bicycle and pedestrian conflicts near the BART fare gates, Wheels bus operations should be shifted to the east side of the median under the Interstate 580 overpass. This can be accomplished by reducing some of the curb area near the median and along the eastern side of the roadway while maintaining a northbound bus drop-off area (approximately 165 feet in length) and dedicated BART Police parking as shown in **Figure 22**. Southbound bus drop-offs in the current location are much less frequent and LAVTA is considering plans to move all bus operations to the northern side of I-580 to improve connectivity between routes. Therefore, the southbound drop-off area may not be need in the future. In the interim, passengers could be dropped off to the south of Interstate 580 where passengers currently board those routes. However, should LAVTA's plans change, a southbound bus pad could be accomodate to the north of Interstate 580 by shifting the separate bikeway slightly to the west. Southbound buses would dropoff passengers from the travel lane and a pedestrian crossing could be striped across the cycletrack.

With bus operations shifted to the east, there would be sufficient area to the west of the median under the overpass to create a separated bikeway (cycletrack) at roadway level through the station area and widen the pedestrian sidewalk area. Additional long-term bicycle parking could be installed in the expanded areas or a future bike station could be built in coordination with BART. The separated bikeway should then continue through the parking lot on the south side of the BART station to connect with the signalized Iron Horse Trail crossing at Owens Drive. The remaining two-way parking aisle in the southern BART parking lot should be converted to one-way and the planted median should be widened to incorporate

Figure 22: Transit Zone Improvements Under the I-580 Overpass



the cycle and trees or landscaping, where possible. Raised crosswalks through the parking lot connecting the bikeway and additional signage will alert drivers to expect higher volumes of cyclists in these locations within the BART parking lot. This will close the existing gap between the Dublin and Pleasanton sides of the Iron Horse Trail (shown in Figure 21).

Near-term improvements to the transit zone include installing a trail-oriented wayfinding program to indicate how the trail continues through the transit zone into the City of Pleasanton. A customized transit zone wayfinding program could be created in coordination with BART and the City of Pleasanton, to create a consistent experience. Iron Horse Trail information should also be included in 511.org station area guides. Additionally, a partnership between BART and BikeLink can help add or convert existing standard lockers to e-lockers that facilitate rentals by the hour. Additionally, short-term bicycle parking such as bike racks are highly utilized when they are placed near the station entrance. However, auxiliary bicycle racks placed farther away from the entrance are not as well-used. The scarcity of bicycle parking at the station entrance leads some people to lock their bicycles to a fence located on the center median, presenting a potential conflict with busses and other vehicles on the road. Therefore, additional short-term bicycle parking should be installed near the fare gates where there are more eyes on the bicycles and BART Police are often seen patrolling the area. **Table 8** below summarizes the Transit Zone BEF ratings with the recommended improvements.

Table 8. Transit Zone BEF Ratings Comparison

Trail Segment	Existing Segments	Transit Zone North	Transit Zone South
Transit Zone	Poor (-3)	Good (9)	Excellent (14)

These recommendations improve regional connectivity to BART as well as the City of Pleasanton. Given that these recommended improvements are not with the City of Dublin's jurisdiction, they would need to be implemented by BART.

2. G Street name subject to change with changes to the Dublin Crossing development.

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phasing & implementation plan

The preferred alternatives selected in the previous chapter are the result of an extensive public engagement process and were discussed in great detail by the City of Dublin Iron Horse Trail Advisory Committee. The recommended improvements listed in Table 10 summarizes how the Built Environment Factors are specifically addressed by the selected preferred alternatives for both near-term and long-term recommendations.

Table 9 provides potential funding sources for trail improvements. **Table 10** summarizes when the proposed improvements for trail segments and crossings within the study area should be implemented and provide cost estimates for the near-term and long-term recommendations. Cost estimates include Planning Application and Environmental Design (PAED), Plans, Specifications, and Estimates (PS&E), and construction costs. Near-term improvements should be implemented within five years and be included with existing planned projects such as the Dougherty Road Widening, Scarlett Drive Extension, Dublin Crossing Park, or through coordination with the adjacent Dublin Crossing development. Funding for long-term improvements should be explored in the near-term. Design and environmental clearance for long-term projects could occur in the near-term if funding becomes available. This enables a project to become "shovel ready" and can make the project more competitive for grant funding.

Table 9: Possible Funding Sources for Proposed Iron Horse Trail Related Projects

Scope	Responsible Agency	Name	Possible Funding Sources Type	Funds Available (if known)	Frequency
County	Alameda County Transportation Commission (Alameda CTC)	Alameda CTC Measure B & BB	Allocation	$264 million earmarked for bike path gap closure county-wide (including IHT). Pleasanton is allocated approx $1.1 million annually.	Annual
County	Alameda County Transportation Commission (Alameda CTC)	Transportation Fund for Clean Air	Allocation	FY16-17 balance: $55,000	Annual
County	Alameda County Transportation Commission (Alameda CTC)	Alameda Transportation Improvement Plan	Allocation	Unknown	Unknown
Federal	US Department of Transportation (USDOT)	Safe Routes to Schools (now part of Surface Transportation Block Grant program under the 2016 FAST Act)	Competitive Grant	Approx $830 million annually until FY20	Annual
Federal	US Department of Transportation (USDOT)	Transportation Investment Generating Economic Recovery (TIGER) Grant	Competitive Grant	Approx $500 million	Annual
Regional	Metropolitan Transportation Commission (MTC)	Safe Routes 2 Transit (SF Bay Area Regional Measure 2)	Competitive Grant	Approx $4 Million per year from 2005-2014	Every 2 years (last cycle in 2014)
Regional	Metropolitan Transportation Commission (MTC)	One Bay Area Grant (OBAG) Program	Competitive Grant	Approx $300 million	Every 2-3 years
State	California Department of Transportation (Caltrans)	Safe Routes 2 Schools	Competitive Grant	$24.25 million annually	Annual
Federal	US Department of Transportation (USDOT)	Highway Safety Improvement Program (HSIP)	Competitive Grant	Approximately $2.5 billion	Annual
Federal	Federal Transit Administration (FTA)	Small Starts Program Capital Investments Grant	Competitive Grant	Approximately $3.5 billion	Annual

Table 10: Iron Horse Trail Feasibility Study Phasing and Implementation Plan

Area	Location	BEF Criteria	Issue/ Opportunity	Near-Term Preliminary Improvement	Near-Term Cost	Long-term Preliminary Improvement	Long-Term Cost	Agencies/Partners Involved	Total Cost
S1	Iron Horse Trail Segment north of Dougherty Road	Trail	Pavement in poor quality	**S1.NT 1.1**: Resurface existing asphalt.	$160,000	**LT 1.1**: Work with the Park District to maintain trail over time.	-	East Bay Regional Park District, City of Dublin, and Nearby Apartment Complexes	$160,000
			Opportunity for a speed table to elevate trail users at residential roadway and to make drivers more aware of the trail crossing.	**S1.NT 1.2**: Consider working with private property owners to install a raised crossing (speed table) across Park Sierra, which intersects the Iron Horse Trail to the north of the Dougherty Road.		-			
S2	Dougherty Road between Iron Horse Trail and 250' north of 5th Street	Trail/Gap Closure	Existing gap for bicyclists and pedestrian between Dougherty Road path and the Iron Horse Trail. Current guidance requires southbound bikes to cross six lanes of traffic to continue south. Limited guidance for pedestrians.	**S2.NT 2.1**: Connect both directions of the Dougherty Road Path to the Iron Horse Trail along the east side of Dougherty Road. Provide in-roadway two-way cycletrack and designated walkway through striping and low-cost materials.	N/A	**S2.LT 2.1**: Formalize the path connection to the Iron Horse Trail with the Dougherty Road widening project.	Part of Dougherty Road Improvement Project	City of Dublin	Part of Dougherty Road Improvement Project
			No signage is provided to indicate the Dougherty Road Path connection with the Iron Horse Trail.	**S2.NT 2.2**: Provide bicycle and pedestrian destination wayfinding on Dougherty Road Path to the Iron Horse Trail.		**S2.LT 2.2**: Maintain and update wayfinding signage over time, as needed.			
I3	Dougherty Road/Iron Horse Trail Intersection at Scarlett Drive	Crossing	The crossing distance is long (130') .	**I3.NT 3.1**: Install a curb extension on the southern side of the intersection to reduce the crossing distance.	$1,000,000	**I3.LT 3.1**: Periodic monitoring of trail users for safety and comfort at this location should occur. While not the preferred alternative in the context of this study, future conditions could support the installation of an overcrossing. Land-use conflicts, utility relocation, trail user volumes, and safety should be evaluated.	$750,000	City of Dublin and East Bay Regional Park District	$1,750,000
				I3.NT 3.2: Stripe a modified Triple-four trail crossing with bike stencils to distinguish the trail crossing from a typical crosswalk. Consistent designs should be applied at all trail crossings in Dublin. Consider color or decorate paving, if desired.					
				I3.NT 3.3: Modify the signal to include leading pedestrian interval for Trail crossing with extinguishable "No Right Turn" signs for southbound and eastbound traffic during the LPI.					
			The large intersection features a greater than 120 second cycle length which creates trail user delay.	**I3.NT 3.5**: Add advanced passive detection for trail users approaching intersection to reduce delay once arrived at intersection.					
			Permitted northbound right-turns, westbound right-turns, and southbound left-turns are frequently made when trail users are crossing. Westbound left-turns are protected and do not conflict with trail crossings.	**I3.NT 3.6**: Modify the signal to incorporate protected left-turns to eliminate the conflict with trail users.					
		Curb Ramps	The trail crossing aligns with the north-south desire line of Trail users, but the diagonal ramp needs to align better with the crosswalk.	**I3.NT 3.7**: Install an oversized ramp on the southern side of the trail crossing.					
		Pork Chop Island	The southbound approach allows trail user to navigate a pork chop island with space and turns that do not meet current guidelines.	**I3.NT 3.8**: Widen the pork chop paths at the northern side of the intersection to allow for easier bicycle navigation and two-way trail traffic.		**I3.LT 3.2**: Consider removing the pork chop island.			
				I3.NT 3.9: Stripe triple-four trail crossing across slip lane.					
		Curb Radii	Large curb radii limit the ability to provide directional curb ramps and have radii greater than 25 feet.	**I3.NT 3.10**: In conjunction with the curb extension on the south side of the intersection, reduce the curb radii to less than 25 feet if possible.		**I3.LT 3.3**: As redevelopment occurs, consider realigning the intersection to meet at 90 degrees.			
		Detection	The push button on the southern side of the crossing is located on the opposite side of path, requiring cyclists to dismount to access. The placement also puts cyclists and pedestrians on the opposite side of trail against oncoming trail users.	**I3.NT 3.11**: Relocate the push-button on the southern side of the intersection to the eastern side of the crossing in order to provide easier access for trail users or add passive detection for bicyclists.		-			
		Gateway/ Wayfinding	Gateway treatments are not provided at this intersection to identify the Iron Horse Trail.	**I3.NT 3.12**: Install art installations, banners, and other temporary features to highlight the trail presence.		**I3.LT 3.4**: Consider permanent art installations highlighting Dublin and the Iron Horse Trail. If grade separation is considered, utilize bridge design to highlight the Trail, the City of Dublin, and BART.			
			Trail-user destination wayfinding is not provided.	**I3.NT 3.13**: Install trail-user destination wayfinding in Dublin right-of-way to identify preferred routes to key destinations, such as BART, Downtown, and other trails.		-			
		Vehicular Speeds	Dougherty Road has a 40 mile per hour posted speed limit.	**I3.NT 3.14**: Consider speed feedback signs		-			
				I3.NT 3.15: Install advance stop bars.		-			

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Table 10: Iron Horse Trail Feasibility Study Phasing and Implementation Plan

Area	Location	BEF Criteria	Issue/ Opportunity	Near-Term Preliminary Improvement	Near-Term Cost	Long-term Preliminary Improvement	Long-Term Cost	Agencies/Partners Involved	Total Cost
S4	Iron Horse Trail Segment between Dougherty Road and Dublin Boulevard	Trail Width	The trail is 10 feet wide throughout the entire segment.	-	$1,075,000	**S4.LT 4.1**: When the Scarlett Drive extension to Dublin Boulevard occurs, widen path and include shoulders and a landscaped buffer between the roadway and the trail.	$1,123,000	East Bay Regional Park District, City of Dublin, and Zone 7 Water District	$2,198,000
				-		**S4.LT 4.2**: Identify consistent pavement materials and treatment through corridor.			
				-		**S4.LT 4.3**: Identify consistent pavement materials and treatment through corridor.			
			There are soft-shoulders in many places, but this frequently has overgrown vegetation, including thorny weeds in some seasons.	**S4.NT 4.1**: Create shoulders on each side with decomposed granite.		**S4.LT 4.4**: Maintain the pavement quality overtime and repair cracked pavement.			
			The asphalt was resurfaced along this segment but there are still some sections with poor quality and cracks.	-		**S4.LT 4.5**: Plant street trees and landscaping in buffer between Scarlett Drive travel way and the Trail, as redevelopment occurs.			
		Landscaping	No trees or shade structures are present in this segment.	**S4.NT 4.2**: Plant street trees near Scarlett Drive that would provide at shade.					
			Fence, vegetation, and drainage ditch do not provide welcoming environment	**S4.NT 4.3**: Plant drought-tolerant landscaping along both sides of the trail to provide visual interest and create a more welcoming environment.					
			Vegetation maintenance problem with burrs that often get imbed in bike tires and cause flat tires.	**S4.NT 4.4**: Replace vegetation with burrs.		-			
		Placemaking and Amenities	No amenities are present creating an opportunity to add resting places and new landscaping.	**S4.NT 4.5**: Add benches, rest area with shade structure, and interpretative signage along the trail.		-			
		Wayfinding	There is one sign that highlights how to access the Tassajara Creek Trail near Dublin Boulevard. No other wayfinding to local destinations and transit is present.	**S4.NT 4.4**: Install Park District wayfinding signs. Install trail-user destination wayfinding to identify preferred routes to key destinations, such as BART, Downtown, and other trails.		**S4.LT 4.6**: Maintain and update wayfinding signage over time, as needed.			
		Connectivity	There is mid-block connection at Houston Place, but a continuous fence otherwise prevents access to the Trail from side streets.	**S4.NT 4.7**: Consider formalizing another connection point at Kerry Court to improve connectivity along Scarlett Drive.		-			
			Opportunity to provide connections to the future Dublin Crossing development to the east of the trail.	-		**S4.LT 4.7**: Provide connections to Dublin Crossing and the future park near the Dublin Boulevard intersection with the trail. Minimize driveway/intersection frequency. Treat such conflicts as "trail crossings" to define priority for trail users.			
		Maintenance	Vegetation has not been maintained. Weeds were overgrowing the shoulder and parts of the trail.	**S4.NT 4.8**: Work with the Park District, BART, and property owners to memorialize landscaping maintenance.		**S4.LT 4.8**: Work with the Park District, BART, and property owners to maintain trail and adjacent land over time.			
		Lighting	No lighting is provided along this portion of the trail. Some indirect lighting is provided near the existing residential uses to the west of the trail but the lighting is directed at trail.	-		**S4.LT 4.9**: Provide pedestrian scale lighting along the trail to enhance the pedestrian experience and encourage people to commute by walking or bicycling.			

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Table 10: Iron Horse Trail Feasibility Study Phasing and Implementation Plan

Area	Location	BEF Criteria	Issue/ Opportunity	Near-Term Preliminary Improvement	Near-Term Cost	Long-term Preliminary Improvement	Long-Term Cost	Agencies/Partners Involved	Total Cost
I5	Future G Street/Scarlett Drive Intersection with the Iron Horse Trail	N/A	N/A - Incorporate recommendations when the new roadway is constructed.	**I5.NT 5.1**: Stripe a modified Triple-four trail crossing with bike stencils to distinguish the trail crossing from a typical crosswalk. Consistent designs should be applied at all trail crossings in Dublin. Consider color or decorate paving, if desired.	Part of Dublin Crossing Development	-	-	City of Dublin and Dublin Crossing Developer	-
				I5.NT 5.1: Modify the signal to include leading pedestrian interval for Trail crossing with extinguishable "No Right Turn" signs for southbound and eastbound traffic during the LPI.					
				I5.NT 5.1: Add advanced passive detection for trail users approaching intersection to reduce delay once arrived at intersection.					
				I5.NT 5.1: Install an oversized ramps on either side of the trail crossing.					
				I5.NT 5.1: Install trail-user destination wayfinding in Dublin right-of-way to identify preferred routes to key destinations, such as BART, Downtown, and other trails.					
I6	Houston Place/Scarlett Drive Intersection (Current Unsignalized Connection to IHT with future signalization)	Crossing	Standard two-line striping is provided to cross Scarlett Drive to access the trail.	**I6.NT 6.1**: Stripe a high visibility crosswalk across Scarlett Drive to highlight where higher volumes of pedestrians may access the trail.	$48,000	-	-	Dublin Crossing Developer	$48,000
		Trail	Path connection to the Trail from Houston Place/Scarlett Drive is narrow.	**I6.NT 6.2**: Widen path connection to allow two-way bicycle/ pedestrian traffic.		-			
		Gateway/ Wayfinding	Directional signage and wayfinding is not provided.	**I6.NT 6.3**: Trail-user destination wayfinding and trail identification signage should be installed to highlight access to the trail.		-			

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Table 10: Iron Horse Trail Feasibility Study Phasing and Implementation Plan

Area	Location	BEF Criteria	Issue/ Opportunity	Near-Term Preliminary Improvement	Near-Term Cost	Long-term Preliminary Improvement	Long-Term Cost	Agencies/Partners Involved	Total Cost
I7	Dublin Boulevard/Iron Horse Trail Intersection at Scarlett Drive (Signalized)	Crossing	The existing crossing distance is long (115'). Diagonal curb ramps do not meet new guidelines to orient the ramps with the crosswalk.	**I7.NT 7.1**: Reduce curb radii on the northeast and southeast corners to provide oversized directional ramps for two-way trail traffic and to reduce the crossing distance to the roadway width.	$741,000	**I7.LT 7.1**: Construct the preferred alternative grade-separated structure to meet trail user desire lines, reduce vehicular conflicts, and provide a comfortable crossing for all ages and abilities. Near-term improvements are assumed to have been installed in order to enhance the at-grade crossing and to should be integrated with the structure.	$7,400,000	City of Dublin, Pacific Gas & Electric, Zone 7 Water District, and Dublin Crossing Developer	$8,141,000
			Curb radii are large. This allows autos to make higher-speed right-turn movements, and makes providing directional curb ramps difficult.						
			The large intersection features a greater than 120 second cycle length which creates trail user delay.						
			Permitted right-turns (Northbound from Scarlett) are frequently made across the trail crossing.						
			Median protrudes into crosswalk and does not provide a pedestrian refuge amenity.	**I7.NT 7.2**: Remove median protruding into crosswalk or shift the crosswalk to the west upon construction of the reduced curb radii.					
			The crosswalk is striped using standard double lines that do not distinguish the Trail crossing from a typical crosswalk.	**I7.NT 7.3**: Stripe a modified Triple-four trail crossing with bike stencils to distinguish the trail crossing from a typical crosswalk. Consistent designs should be applied at all trail crossings in Dublin. Consider color or decorate paving, if desired.					
		Path Approach/ Detection	Bicyclists need to make turns to actuate push buttons on both trail approaches.	**I7.NT 7.4**: Adjust push button placement to reduce sharp-turns for bicyclists. Add passive detection for cyclists on trail.		-			
			Trail alignment does not meet current guidelines or user desire lines on both approaches.	**I7.NT 7.5**: Provide wider turns for bicyclists from the Iron Horse Trail to the sidewalk on the northern side of Dublin Boulevard and provide queueing space for bicyclists.		-			
			Some trail users use the adjacent driveways (and parking lot) to bypass the turn required of bicyclists at the south approach of the crosswalk	**I7.NT 7.6**: Install direction signage to detail the preferred method for crossing Dublin Boulevard.		-			
		Gateway/ Wayfinding	Gateway signage and treatments needed to highlight the Iron Horse Trail.	**I7.NT 7.7**: Install art installations, banners, and other temporary features to highlight the trail presence.		**I7.LT 7.2**: Consider permanent art installations highlighting Dublin and the Iron Horse Trail. If grade separation is considered, utilize bridge design to highlight the Trail, the City of Dublin, and BART.			
			Trail-user destination wayfinding needed to detail connections with local amenities and transit options.	**I7.NT 7.8**: Install trail-user destination wayfinding in Dublin right-of-way to identify preferred routes to key destinations, such as BART, Downtown, and other trails.		-			
		Vehicular Speeds	Dublin Boulevard has a 35 mile per hour speed posted speed limit west of Scarlett Drive and 45 mile per hour posted speed limit to the east of Scarlett Drive.	**I7.NT 7.9**: Consider installing speed feedback signs in the block ahead of the Trail crossing.		-			

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Table 10: Iron Horse Trail Feasibility Study Phasing and Implementation Plan

Area	Location	BEF Criteria	Issue/ Opportunity	Near-Term Preliminary Improvement	Near-Term Cost	Long-term Preliminary Improvement	Long-Term Cost	Agencies/Partners Involved	Total Cost
S8	Iron Horse Trail Segment between Dublin Boulevard and Demarcus Boulevard/ BART Access Road	Trail	The trail is 10 feet wide throughout the entire segment.	**S8.NT 8.1**: Widen trail opportunistically and as feasible.	$420,000	**S8.LT 8.1**: Widen trail and include shoulders.	$1,025,000	City of Dublin, East Bay Regional Park District, and Bay Area Rapid Transit (BART)	$1,445,000
			Most of the trail segment features a grassy shoulder which is generally unmaintained. Some portions of the trail feature sloped gravel shoulders	-					
			The pavement is average quality asphalt with a generally smooth riding/walking surface.	-		**S8.LT 8.2**: Identify consistent pavement materials and treatment through corridor. Work with the Park District and BART to maintain the trail over time.			
		Landscaping	Smaller, immature trees are located near the trail but do not provide shade/visual interest.	**S7.NT 8.2**: Plant trees alongside the trail to provide shade and visual interest.		**S8.LT 8.3**: Maintain trees and vegetation over time.			
			The vegetation near the trail is generally unmaintained and provides minimal visual interest. Burrs from the vegetation result in flat tires.	**S8.NT 8.3**: Consider adding drought-tolerant landscaping along both sides of the trail to provide visual interest and create a more welcoming environment. Keep vegetation away from paved portion of trail.					
		Placemaking and Amenities	There are no gateway features or amenities to identify the Iron Horse Trail.	**S8.NT 8.4**: Add benches and interpretative signage near gateways at Dublin Boulevard and DeMarcus Boulevard.		**S8.LT 8.4**: Add benches and interpretative signage near possible future connection to Campell Lane.			
		Wayfinding	Trailhead signage is located at the entrances to this segment but there is no Park District wayfinding signage or destination wayfinding to local amenities.	**S8.NT 8.5**: Install Park District wayfinding signs. Install trail-user destination wayfinding to identify preferred routes to key destinations, such as BART, Downtown, and other trails.		**S8.LT 8.5**: Maintain and update wayfinding signage over time, as needed.			
		Connectivity	No connections are provided but there is an opportunity to connect to the future development to the east in the Dublin Transit Village along Campbell Lane.	-		**S8.LT 8.6**: Incorporate a connection between Campell Lane and the Iron Horse Trail.			
		Maintenance	Vegetation is generally not well maintained and some of the trees are in need of maintenance.	**S8.NT 8.6**: Work with the Park District, BART, and property owners to formalize landscaping.		**S8.LT 8.7**: Work with the Park District, BART, and property owners to maintain trail and adjacent land over time.			
		Lighting	There is no lighting present along this segment of the trail.	**S8.NT 8.7**: Provide lighting at gateway locations to the trail segment near Dublin Boulevard and Demarcus Boulevard.		**S8.LT 8.8**: Provide pedestrian scale lighting along the trail to enhance the pedestrian experience and encourage people to commute by walking or bicycling.			

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Table 10: Iron Horse Trail Feasibility Study Phasing and Implementation Plan

Area	Location	BEF Criteria	Issue/ Opportunity	Near-Term Preliminary Improvement	Near-Term Cost	Long-term Preliminary Improvement	Long-Term Cost	Agencies/Partners Involved	Total Cost
S9	Iron Horse Trail Segment From Demarcus Boulevard Intersection along the BART Access Road (North of I-580)	Trail	The trail is generally 10 feet wide parallel to the BART Access Road but a small portion near the I-580 overcrossing expands to 13 feet.	**S9.NT 9.1**: Stripe a cycle track from the Demarcus Boulevard/Trail connection intersection along the BART Access Roadway connecting to the fare gates. Work with Pleasanton to continue this facility to the south. Direct bicyclists to use this facility instead of the Trail through this segment.	$475,000	**S9.LT 9.1**: Widen and redesign the trail to a minimum of 11 feet with 2 foot shoulders on both sides. This can be accomplished by reducing the bus travel lane widths in the BART Access roadway or by expanding to the east and removing the chainlink fence, which may require working with private property owners.	$1,183,000	Bay Area Rapid Transit (BART), Livermore-Amador Valley Transit Authority (Wheels), Central Contra Costa Transit Authority (County Connection), East Bay Regional Park District	$1,658,000
				-		**S9.LT 9.2**: Identify consistent pavement materials and treatment through corridor.			
			There are no shoulders provided along the portion of the trail and there is a chainlink fence directly along the trail on one-side and an asphalt curb on the other. The chainlink fence minimizes the effective width of the trail.	-		**S9.LT 9.3**: As the trail is widened, provided DG shoulders on each side of the trail.			
			The asphalt surface is in need of repair and creates a rougher ride through this segment on a bicycle.	**S9.NT 9.2**: Repave the asphalt surface to provide a smoother riding surface.		**S9.LT 9.6**: Work with the Park District and BART to maintain the trail over time.			
			Street lamp poles are located within the ten feet effective width of the pathway.	-		**S9.LT 9.5**: Relocate light poles into a landscaped buffer or out of the effective ten foot minimum walkway.			
		Landscaping	Some trees are provided near the I-580 overcrossing but are located behind the chain link fence and do not provide any shade for the trail.	-		-			
			This portion of the trail has minimal landscaping and the existing vegetation is located behind the chainlink fence on the eastern side of the trail. The landscaping appears minimally maintained and provides little to no visual interest for trail or transit users.	**S9.NT 9.3**: Consider adding landscaping along the trail.		-			
		Placemaking, Amenities	Long- and short-term bicycle parking options are located near the BART station.	**S9.NT 9.6**: Add places to rest along the trail and pair with shading elements and landscaping.		**S9.LT 9.6**: Construct a trail plaza in the existing cul-de-sac space just north of the Demarcus Boulevard/Bart Access Road intersection. Install benches, wayfinding, and interpretative signage to act as a gateway to the Iron Horse Trail in Dublin.			
		Wayfinding	Only East Bay Regional Parks District trailhead signage is located along the trail. Regional transit maps are provided near the BART station for transit users but are not located directly along trail.	**S9.NT 9.5**: Install Park District wayfinding signs. Install trail-user destination wayfinding to identify preferred routes to key destinations, such as BART, Downtown, and other trails.		**S9.LT 9.7**: Maintain and update wayfinding signage over time, as needed.			
		Connectivity	Transit amenities/services and adjacent multi-family residential developments are accessible but require trail users to travel through the BART Access Road at unmarked location.	**S9.NT 9.6**: Install a high visibility crosswalk to connect the trail to the bus depots to the west.		**S9.LT 9.8**: Improve connections between development along DeMarcus Boulevard the trail crossing, including through the bus plaza.			
		Maintenance	Some vegetation is located along the west side of the path; however, it is not well-maintained	**S9.NT 9.7**: Work with the Park District, BART, and property owners to formalize landscaping.		**S9.LT 9.9**: Work with the Park District, BART, and property owners to maintain trail and adjacent land over time.			
		Lighting	Minimal lighting is available from the BART Access Road lights along trail which face the street toward the transit facility.	**S9.NT 9.8:** Retrofit existing light poles to provide lighting toward the BART Access Road and the Trail.		**S9.LT 9.10**: Provide additional pedestrian scale lighting along the trail to enhance the pedestrian experience and encourage people to commute by walking or bicycling. Enhance lighting at trail crossings, as feasible.			

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Table 10: Iron Horse Trail Feasibility Study Phasing and Implementation Plan

Area	Location	BEF Criteria	Issue/ Opportunity	Near-Term Preliminary Improvement	Near-Term Cost	Long-term Preliminary Improvement	Long-Term Cost	Agencies/Partners Involved	Total Cost
S10	BART Fare Gates Area along the BART Access Roadway	Transit Zone	Signage requires bicyclists to dismount, which is inconvenient and a barrier to biking through the Transit Zone. However, they are not provided an alternative alignment through the BART station area.	**S10.NT 10.1**: Work with BART and City of Pleasanton to provide an attractive alternative for bicyclists that creates a continuous dedicated bikeway through the BART area, such as a cycle track. Remove dismount zone signs with the installation of the bikeway.	$960,000	-	-	Bay Area Rapid Transit (BART)	$960,000
		Wayfinding	Limited wayfinding or guidance on the Trail alignment though the Transit Zone.	**S10.NT 10.2**: Work with BART, City of Pleasanton, and the Park District to install destination wayfinding and Park District signs along the Trail through the BART area.	N/A (BART cost)	**S10.LT 10.1**: Maintain and update wayfinding signage over time, as needed.	N/A		
		Bike Parking	Not all lockers allow BikeLink cards.	**S10.NT 10.3**: Work with BART to convert all lockers to BikeLink technology.		-			
			Bike racks nearest to the station area are full on weekdays and the bike racks further from the BART gates are not utilized due to a lack of visibility from the BART fare gates.	**S10.NT 10.4**: Work with BART and City of Pleasanton to relocate underutilized bicycle racks to more convenient and secure locations.		**S10.LT 10.2:** Work with BART to encourage the installation of a Bike Station at the East/Dublin Pleasanton BART station.			
		Lighting	Lighting is provided underneath I-580 and under the bus bay shelters.	-		-			
		Crossings	Few pedestrians coming from bus station use the marked crosswalk.	**S10.NT 10.5**: Restripe and sign the new crosswalk across the BART Access Roadway, just north of I-580 to high-visibility ladder striping and remove stop bars. Add crosswalk signs and ensure the crosswalk is sufficiently lit by adjacent roadway lighting.		-			
TOTAL NEAR-TERM COST: $4,879,000							**TOTAL LONG-TERM COST: $16,360,000**		

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Preliminary Environmental Review

A preliminary, screening-level analysis of potential environmental issues related to the Iron Horse Trail Feasibility ("project") was conducted and provides a summary of recommendations that may avoid or reduce potential project-related impacts. The screening-level evaluation represents the first step in understanding whether the project is likely to result in environmental impacts under the California Environmental Quality Act (CEQA) or the National Environmental Policy Act (NEPA).

The 2016 CEQA Guidelines Environmental Checklist and applicable sections of the Code of Federal Regulations (CFR) were used to guide this screening analysis. **Appendix E** provides the complete table of environmental impacts with the results of the CEQA screening analysis in a matrix, organized by topic area. As significance determinations under NEPA differ from those of CEQA and are generally broader, a summary of the NEPA analysis is included separately in Appendix E. **Figure 23** provides a map of identified environmental issues that will need to be considered during CEQA and NEPA review for the project.

A series of prior CEQA documents completed for projects within or adjacent to the IHTC project area were screened. This screening provided an overview of existing environmental issues in and around the project area, and has served as a basis for evaluation of CEQA topic areas for the project.

Environmental Issues by Topic Area

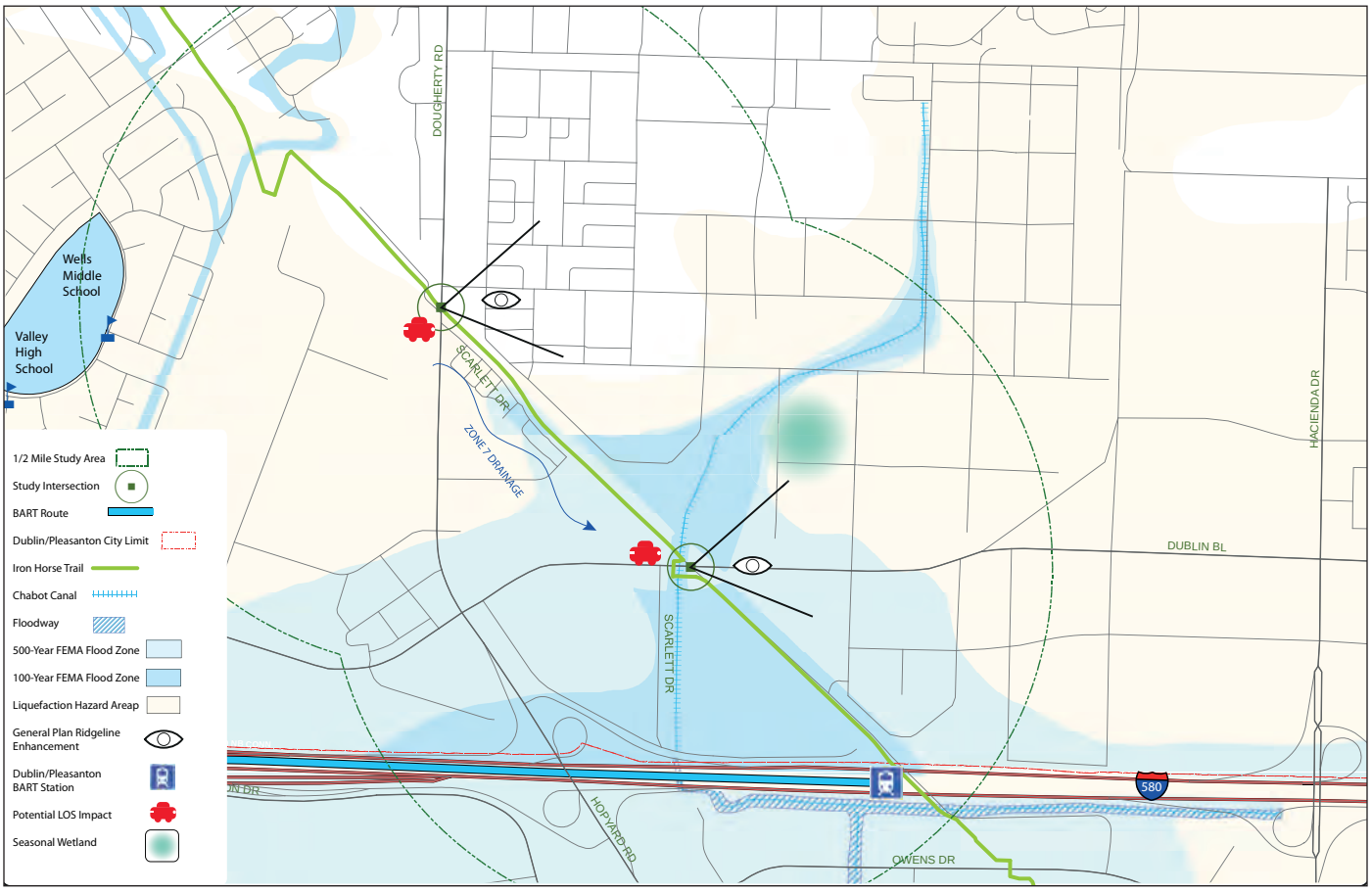
A series of major projects adjacent to the project have completed environmental review under CEQA over the last several years. In some cases, the project area(s) overlapped a portion of the project area for this study. The environmental conditions and project-related impacts identified by the prior EIRs reviewed provide a background for environmental issues that maybe encountered on the project. A summary of environmental issues identified by these analyses and their relationship to the project is included in Appendix E. In addition, a high-level evaluation was completed regarding topics that did not present major issues in prior EIRs, to evaluate whether the project is likely to result in significant impacts for these topics.

The preliminary environmental screening indicates the project is likely to have the following CEQA effects:

Less than significant (mitigation not likely needed)

- Agriculture and forest resources,
- Greenhouse gas emissions, hazards,
- Land use and planning,
- Mineral resources,
- Population and housing,
- Public services, or
- Utilities and services systems

Figure 23: Potential Environmental Issues



California Geologic Survey, Seismic Hazards Zoning Program, 2008
Alameda County Registrar of Voters, Mapping Section, ROV_Flood, 2011
Federal Emergency Management Agency, National Flood Hazard Layer, 2014
City of Dublin, 2014, *General Plan Amendment*
City of Dublin, 2013, *Dublin Crossing Specific Plan Draft Environmental Impact Report*

Significant impacts (likely reduced to less-than-significant level with mitigation measures)

- Air quality,
- Cultural resources,
- Geology and soils,
- Hydrology and Water quality, and
- Noise

Potentially significant impacts1:

- Aesthetics,
- Biological resources, and
- Transportation and traffic

These assumptions are based on analysis of the project against the criteria found in the 2016 CEQA Guidelines Environmental Checklist **(Attachment B)** and the review of prior EIRs.

Anticipated Level of CEQA Review

Based on the screening-level findings described above, an Initial Study with a Mitigated Negative Declaration (IS/MND) is likely to provide an adequate level of CEQA review. However, it is possible that the project CEQA analysis may determine the project would result in significant impacts that cannot be mitigated to a less-than-significant level. Possibly, air quality analysis and the exposure of cyclists and pedestrians to air quality that exceeds BAAQMD thresholds may result in significant and unavoidable impacts[2]. Once an initial study is complete a final determination can be made. If no significant and unavoidable impacts are found, no further analysis would be required. If significant impacts are found and cannot be mitigated to less-than-significant levels, an EIR would be prepared.

However, completing an EIR would reduce risk, as the standard of review if challenged in court would be "substantial evidence"[3], and preparation of an EIR could provide a more thorough environmental analysis. Given the size, public visibility, and potential funding sources of the project, it may be advisable and efficient to prepare an EIR without a prior initial study[5].

Anticipated Level of NEPA Review

It is anticipated that the project may have a federal nexus, and would therefore be required to complete NEPA review. Depending on the agency with federal delegation to complete this review, a set of significance thresholds may or may not be used4. Significant determinations under NEPA review differ from CEQA; under NEPA, significance is determined based on the impact of a project as a whole, rather than by topic areas individually. This, in addition to separate significance criteria, means impacts that are determined to be significant under CEQA may not be determined significant under NEPA. Based on a screening of the project, it is considered to be unlikely that the project as a whole would have a significant impact on the environment, and therefore an Environmental Impact Statement (EIS) is not likely to be required.

A review of NEPA categorical exclusions (23 CFR 771.117) found that the project may qualify as a categorical exclusion under criteria (c)(3), which covers construction of bicycle and pedestrian lanes, paths, and facilities. However, it is important to note that categorical exclusions may only be used if a project will not have a significant environmental impact or substantial controversy on environmental grounds.

Ultimately, the lead federal agency will determine the level of NEPA review required for the project; however, this screening-level review indicates that a categorical exclusion may be sufficient[6]. If further analysis determines that the project could potentially result in significant impacts under NEPA, an Environmental Assessment may be prepared to determine if an EIS is necessary.

3. The screening indicated further analysis and information will be required to assess the likelihood of project-related CEQA impacts to these topic areas. <?> The screening indicated further analysis and information will be required to assess the likelihood of project-related CEQA impacts to these topic areas.
4. Per CBIA v. BAAQMD (2015) 62 Cal. 4th 369, CEQA may require analysis and mitigation of existing environmental conditions on a project's future users if the project may "exacerbate" an existing environmental condition
5. Initial studies are held to the "fair argument" standard, which places a greater burden of proof on the project proponent. Conversely, the "substantial evidence" standard places the burden of proof largely on the plaintiff.
6. While NEPA delegates the responsibility of developing thresholds of significance to federal agencies, many have not formally adopted thresholds. In particular, Caltrans does not currently have adopted thresholds for NEPA review.

appendix

A. Relevant Plans & Policies (Urban Planning Partners)

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MEMORANDUM

DATE: May 19, 2015

TO:
Martha Aja
City of Dublin

FROM:
Greg Goodfellow
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E. ggoodfellow@up-partners.com

RE: Task 3, Policy and Environmental Constraints: *Iron Horse Trail Connectivity Feasibility Study*

This memo contains the results of a review of existing planning documents relevant to *the Iron Horse Trail Connectivity Feasibility Study*. Policies and conditions that may influence the Iron Horse Trail improvement process are summarized. Documents reviewed include City of Dublin policy planning documents, as well as relevant bicycle, pedestrian and transit-related policy documents prepared by outside agencies:

- *City of Dublin 2014 General Plan*
- *Dublin Crossing Specific Plan (2013)*
- *City of Dublin Eastern Dublin Specific Plan 2014 Update*
- *City of Dublin Bicycle and Pedestrian Master Plan (2014)*
- *City of Dublin Bicycle and Pedestrian Guidelines (2014)*
- *BART Bicycle Plan (2012)*
- *Alameda Countywide Bicycle Plan (2012)*
- *Alameda Countywide Pedestrian Plan (2012)*
- City of Pleasanton *Iron Horse Trail Feasibility Study and Master Plan* (2011)
- City of San Ramon *San Ramon Valley Iron Horse Trail Bicycle Pedestrian Corridor Concept Plan* (2009)

As part of this task, a series of CEQA documents were also screened, in order to identify environmental and/or physical conditions with the potential to impact the feasibility of Iron Horse Trail improvements. Environmental documents reviewed include:

- *City of Dublin General Plan (2014 amendment) Draft EIR*
- *City of Dublin General Plan (2014 amendment) Final EIR*
- *City of Dublin Bicycle and Pedestrian Master Plan Mitigated Negative Declaration (2014)*
- *Dublin Crossing Specific Plan Draft EIR (2013)*
- *Dublin Crossing Specific Plan Final EIR (2013)*
- *Eastern Dublin General Plan Amendment and Specific Plan Draft EIR (1992)*

- *The Village @ Dublin Draft EIR (2013)*
- *Dublin/Pleasanton BART Extension Project Draft EIR (1989)*
- *Dublin Transit Center Draft EIR (2001)*
- *Dublin Transit Center Final EIR (2002)*

A. Review of Existing Policies and Programs

Improving the connectivity of the Iron Horse Trail to the Dublin/Pleasanton BART Station is generally consistent with existing planning policy. As the following analysis demonstrates, numerous City policies related to land use, circulation, alternative transportation and civic identity target increased cyclist and pedestrian safety, and improved access to transit. Because the Iron Horse Trail is identified as a regional asset by the City of Dublin and other agencies, it is also prioritized for both physical improvements and associated funding.

1. City of Dublin General Plan

As noted above, City of Dublin policy generally supports Iron Horse Trail improvements that result in more people using the Trail, specifically to access the BART Station. An important consideration is that the Trail is labeled a "route of regional significance" in the General Plan. As a result, all physical improvements will be subject to design review. Relevant policies are listed in Table 1 and a brief description of each policy's relationship to the current project is provided.

Table 1: *City of Dublin General Plan* Policies

Section/Topic	Policy	IHT Connectivity Project Notes
Open Space	**3.4.1.B.4** *Use…design review process to preserve or enhance the ridgelines that form the skyline as viewed from freeways (I-580 or I-680) or major arterial streets (Dublin Boulevard…Dougherty Road…).*	Design of grade-separated overpasses at Dublin Blvd and Dougherty Road will be subject to the City's formal site design review process, including Community Development Department staff and Planning Commission review. Improvements should enhance views of the ridgelines as viewed from Dublin Blvd. and/or Dougherty Road.
Positive Regional Identity	**10.5**: Iron Horse Trail listed as one of 10 regional corridors, or "routes of regional significance."	Positive design, image and promotion of civic identity must be considered in all Iron Horse Trail improvements (see below).

Positive Regional Identity	**10.5.3 A**: *Incorporate distinctive design features along regional corridors that reinforce a positive image of Dublin. Both within the right-of-way and on adjacent private development, utilize features such as gateway elements, street trees, median planting, special lighting, separated and ample sidewalks, crosswalks, seating, special signs, street names, landscape, decorative paving patterns, and public art . Consider undergrounding utilities along these roadways*.	The design of IHT connectivity improvements should consider unique design strategies and incorporate design details that contribute to larger Trail aesthetic/identity.
Positive Regional Identity	**10.5.3 B**: *Maintain views through development to distant vistas (i.e. foothills) and view corridors along regional corridors, wherever feasible*.	Potential vertical elements such as grade-separated overpasses should not impede views from along Iron Horse Trail.
Pedestrian Routes and Bikeways	**Guiding Policies**: *1. Provide safe, continuous, comfortable and convenient bikeways...*	Intersection crossings that carry the flow if Iron Horse Trail users most smoothly and safely will be deemed most appropriate.
Pedestrian Routes and Bikeways	**Guiding Policies**: *2. Improve and maintain bikeways and pedestrian facilities... in conformance with the...Dublin Bicycle and Pedestrian Master Plan.*	See *Dublin Bicycle and Pedestrian Master Plan,* below.
Pedestrian Routes and Bikeways	**Guiding Policies**: *3. Enhance the multi-modal circulation network to better accommodate alternative transportation choices including BART, bus, bicycle, and pedestrian transportation.*	Connecting a multi-use path such as the IHT to BART fully supports this policy. One focus of Trail improvement should be highlighting this transit access, via wayfinding and informational signage.
Pedestrian Routes and Bikeways	**Guiding Policies**: *4. Provide comfortable, safe, and convenient walking routes...to key destinations such as...the BART Stations...*	Iron Horse Trail connectivity improvements directly support City pedestrian & bicycle policies.
Alternative Transportation	**5.3.1 B.5**: *Encourage the use of regional and local trail systems and consider infrastructure enhancements that could improve the operation and functionality of the most widely used trail corridors.*	The IHT improvement process should be approached with broad view Trail functionality, including consideration of a range of infrastructure enhancements.

2. Dublin Crossing Specific Plan

The *Dublin Crossing Specific Plan* establishes the policy foundation for a transit-oriented community of nearly 2,000 units adjacent the Iron Horse Trail. The Plan specifies that direct access to the Iron Horse Regional Trail should be provided, and contains numerous policies to establish a successful interface between elements of the development and Trail itself. Many of these policies will require that the design and strategy of Iron Horse Trail improvements be coordinated with future adjacent development.

Relevant policies are listed in Table 2 and a brief description of the policy's relationship to the *Iron Horse Trail Connectivity Study* is provided.

The location of the Dublin Crossing Specific Plan Area, as well as a summary of future growth and Iron Horse Trail-related policies associated with the Plan, are depicted in Figure x, Future Land Use Trends.

Table 2: *Dublin Crossing Specific Plan* Policies

Section/Topic	Policy	IHT Connectivity Project Notes
Land Use	**LU Policy 2.5**: *Locate the Central Park near the intersection of Dublin Boulevard, Scarlett Drive and the Iron Horse Regional Trail to provide physical and visual access to the Dublin Community and to enable a strong connection between the parks in the Specific Plan area and the Iron Horse Regional Trail.*	Key Iron Horse Trail improvements, including potential connections, widening strategies and buffers must consider the future Dublin Crossing Central Park.
Design Guidelines	**DG 3.1.1:** *Overall Building Design: Buildings shall be sited and designed to have a strong street presence…along the Iron Horse Regional Trail, parks, and public streets within the Specific Plan area.*	Iron Horse Trail widening, shoulder improvements, fencing and lighting-related improvements should be planned to harmonize with future adjacent frontages.
Circulation and Streetscape Design	**CIR 4.1**: *Provide a new east-west connection between Scarlett Drive and Arnold Road to provide a more direct route through the Specific Plan area for new development.*	Iron Horse Trail connectivity improvements must consider a new collector street that will intersect the Iron Horse Trail, which may constitute a barrier to future connectivity.
Circulation and Streetscape Design	**CIR 4.16**: *Provide pedestrian and bikeways connecting the Specific Plan's parks to the Iron Horse Regional Trail.*	Iron Horse Trail improvements will have to consider new connections with, and increased traffic to and from, future parks.
Circulation and Streetscape Design	**CIR 4.9**: *Establish an interconnected network of sidewalks and bicycle lanes, and multi-use paths that provide safe and convenient pedestrian and bicycle access between the Dublin/Pleasanton BART Station, Iron Horse Trail…*	Iron Horse Trail improvements will have to consider a series of future connection/access points from the east.
Circulation and Streetscape Design	**CIR 4.11**: *Work with the East Bay Regional Park District on the concept and final design of the Iron Horse Regional Trail realignment along Scarlett Drive and the potential creation of a secondary trail pathway through Central Park, if appropriate*.	EBRPD and the Dublin Crossing team should be consulted on potential Iron Horse Trail realignment, and the potential impacts of Iron Horse Trail improvements.
Circulation and Streetscape Design	**CIR 4.3.5**: *Perimeter Roadway/Intersection Improvements: Scarlett Drive will be widened to four lanes and extended from Houston Place south to Dublin Boulevard along the western edge of the*	The extension of Scarlett Drive may impact design of Dublin Blvd crossing and parallel Trail improvements, and needs to be

	Specific Plan area.	considered in Trail improvement process.

3. City of Dublin *Eastern Dublin Specific Plan 2014 Update*

The City's *Eastern Dublin Specific Plan* contains policy establishing a mixed-use, high density Transit Village Center subarea just south of Dublin Boulevard and east of the Iron Horse Trail. The location, land uses and potential and approved future development associated with the subarea are depicted in Figure x. As shown in Figure x, while all of the residential areas of the Transit Village are either occupied, under construction, or the location of approved projects, the majority of the areas designated Campus Office are vacant, and with high future development potential.

Subarea policy highlighted in Table 3 calls for a bikeways system that will directly impact use the Iron Horse Trail just north of the BART station.

Table 3: *Eastern Dublin Specific Plan* Policies

Section/Topic	Policy	IHT Connectivity Project Notes
Transit Village Center	*Create a logical, well-marked bicycle lane system that provides access to the BART station, the Iron Horse Trail, the East-West Trail located along the north side of Dublin Boulevard, and development within the subarea.*	Future bike lanes providing immediate access to the Iron Horse Trail will impact future Trail use and connections south of Dublin Boulevard.

4. City of Dublin *Bicycle and Pedestrian Master Plan*

The City's *Bicycle and Pedestrian Master Plan* contains a series of proposed bicycle networks that will feed into the Iron Horse Trail and potentially increase bicycle and pedestrian traffic on the Trail. The Plan also outlines a series of goals and policies that would be directly supported by improvements to Trail safety, increased connectivity to regional transit, and overall usability of the Trail (Table 4).

Table 4: *Bicycle and Pedestrian Master Plan* Policies

Section/Topic	Policy	IHT Connectivity Project Notes
Proposed Bicycle Networks	*Includes new and upgraded bikeways on Dougherty Road, Sierra Lane, Dublin Boulevard, and Dublin Crossing internal roadways, including a shared-use path on future G Street that will connect to the Iron Horse Trail. The Plan also details proposals for improvements to the Dougherty Road/Iron Horse Trail intersection.*	Future bikeways will increase Iron Horse Trail bicycle usage and add connections to/intersections with key roads.

Goals and Policies	**Goal 1**: *Support Bicycling and walking as practical, healthy, and convenient alternatives to automobile use in Dublin.*	Improving IHT connectivity to BART fulfills each element of this goal: convenience, safety and transit-friendliness.
Goals and Policies	**Policy 2-1**: *Implement and maintain an integrated transportation network that allows safe and convenient travel along and across streets for all users, including pedestrian and bicyclists' needs and access at key destinations, such as...transit stations…*	Improved Dougherty and Dublin crossings and BART access directly target goal of a well-connected, accessible transportation system.
Goals and Policies	**Policy 2-5:** *Plan and implement a citywide wayfinding program for bicyclists and pedestrians to provide route guidance to key destinations, with initial focus on the Downtown Area and transit centers.*	IHT connectivity should include a wayfinding and informational component that highlights access to BART.
Goals and Policies	**Goal 5**: *Maximize multi-modal connections in the transportation network.*	Improving the connection between a multi-use regional trail and the BART system is inherently multi-modal, and thus supports a key goal of this Plan.
Goals and Policies	**Policy 5-1***: Aim to ensure that the bicycle system serves transit stops and stations; that pedestrian crossing needs are met at transit stops; and that continuous, accessible pedestrian routes are provided.*	Improving this segment of the IHT will result in direct increases in continuity and transit accessibility.
Goals and Policies	**Policy 6-1:** *Work to reduce bicycle and pedestrian crashes, injuries and fatalities on all roadways.*	New IHT crossings at Dougherty Road and Dublin Blvd will respond to, and improve, existing crossing safety issues and associated risk to pedestrians and cyclists.

5. City of Dublin Bicycle and Pedestrian Design Guidelines

This document is intended to "guide the installation and design of bicycle and pedestrian facilities citywide." As such, it contains guidelines that should be consulted in the current assessment of the feasibility of various physical improvements to the Iron Horse Trail. These are introduced in Table 5, below.

Table 5 Bicycle *and Pedestrian Plan Design Guidelines*

Section/Topic	Policy	IHT Connectivity Project Notes
Pedestrian Wayfinding	*A pedestrian wayfinding system provides consistent and user-friendly information about distances and routes to and from major transit centers…making these places easier to connect to, and encouraging people to make short trips on foot. Wayfinding is an essential aspect of street infrastructure…*	IHT connectivity improvements should include a wayfinding program that includes basic information described here: Distance, direction, and route.

Pedestrian-scale lighting	*Pedestrian scale lighting improves pedestrian visibility and the perception of safety and comfort while walking. Well-lit pedestrian facilities are more inviting, and function well for pedestrians after sunset.*	Lighting guidelines also apply to the IHT. Users' perceptions of safety and comfort will determine Trail use by diverse groups such as commuters, students, BART riders and the elderly.
Intersection Design Guidelines	The *Guidelines* include guidance related to crosswalk striping, general crosswalk design, crossings pavement treatments, median islands, pedestrian crossing signage, and beacons.	All potential components of a safe, functional pedestrian intersection crossing should be considered in an assessment of IHT connectivity improvements.
Grade Separated Crossings	*Grade separations are a tool to help overcome barriers and help pedestrians connect to sidewalks, off-road trails and paths. They should be used where topography is supportive and no other pedestrian facility is available.*	This guideline reiterates the value of grade separated crossings, but also that all other options for safe, pedestrian flow should be exhausted before determining the necessity of a bridge or tunnel.
Class I Shared Use Paths	The *Guidelines* include standards for the design of shared use bicycle/pedestrian paths, included those related to basic dimensions, grade separation, fencing, curb ramps, crossing treatment, signalization, staging, lighting, rest areas and seating.	The IHT functions in the same manner as a Class I bike path. Therefore, these standards should be applied, wherever relevant, to potential Trail improvements and crossings.

6. BART Bicycle Plan

This Plan finds that non-auto access to the Dublin/Pleasanton BART station is limited. It follows that a connected, regional Trail that facilitates non-auto commuting directly to the station is of high value. The Plan also contains policy establishing support for specific types of projects outside BART jurisdiction. Improving the connectivity of Iron Horse Trail is likely one of those projects.

Table 6 *BART Bicycle Plan* Findings and Policies

Section/Topic	Finding/Policy	IHT Connectivity Project Notes
BART Station Typologies	Of the five modal typologies used in this Plan to assess the auto-centricity of BART stations, the Dublin/Pleasanton Station is placed in the "Auto Dependent" group, those with the highest auto share and least modal diversity.	This assessment is an indication of the need for improved IHT connectivity to the station, as well as BART's internal awareness that multi-modal access to the station is in need of improvement.

Bike Parking	*At the Dublin/Pleasanton Station [bike] racks classified as 'close' to the fare gates are 90% occupied, while 'medium' and 'far' rack spaces are only 60% and 3% occupied, respectively.*	One component of connecting the IHT to the BART station should be a bicycle parking strategy that increases the perception of security by locating bike racks in high-activity areas of the station.
Beyond BART Boundaries	**3.2**: *Support local efforts to improve bicycle access to stations. Where BART does not have jurisdiction to make changes—such as on local streets and pathways— supporting local efforts to fund and implement bicycle facilities that serve BART stations would help make these improvements happen. BART assistance could take the form of letters of support and participation in local meetings.*	Iron Horse Trail connectivity improvements will directly serve BART. Thus project support and feasibility may be increased by leveraging BART resources.

7. Alameda Countywide Bicycle and Pedestrian Plans

The countywide bicycle and pedestrian plans adopted by the County of Alameda contain policies that significantly increase the financial feasibility of Iron Horse Trail improvements. Both documents prioritize the Iron Horse Trail in the Countywide Transportation Expenditure Plan. Relevant policies are identified in Table 7.

Table 7: Alameda County Countywide Bicycle and Pedestrian Plans Policies

Section/Topic	Policy	IHT Connectivity Project Notes
Bicycle Plan: Countywide Transportation Plan (CWTP) and Transportation Expenditure Plan (TEP)	*The TEP would fund, or contribute towards funding: "Completion and maintenance of the three major trails in Alameda County—the Iron Horse Trail, Bay Trail and East Bay Greenway—and of local connectors and access routes."*	Significant funding may be available for Iron Horse Trail connectivity improvements, as well as Dougherty Road and Dublin Blvd crossings.
Pedestrian Plan: Countywide Transportation Plan (CWTP) and Transportation Expenditure Plan (TEP)	*The TEP would fund, or contribute towards funding: " Completion and maintenance of the three major trails in Alameda County—the Iron Horse Trail, Bay Trail and East Bay Greenway—and of local connectors and access routes."*	Significant funding may be available for Iron Horse Trail connectivity improvements, as well as Dougherty Road and Dublin Blvd crossings.

Pedestrian Plan: Priority System	Inter-jurisdictional trails, including Iron Horse Trail, are one of three areas prioritized for funding. "The purpose of the priority system is to focus Alameda CTC's funding efforts over the next several years—until the Pedestrian Plan is updated again—on those improvements that are anticipated to be most effective at accomplishing the goals of the plan."	Improving Iron Horse Trail connectivity is consistent with goals of the *Countywide Pedestrian Plan*. Thus, potential funding may be available for Iron Horse Trail improvements.

8. City of Pleasanton *Iron Horse Trail Feasibility Study and Master Plan*

In 2011, the City of Pleasanton studied the feasibility of closing a 1.6 mile gap in the Iron Horse Trail between the Dublin/Pleasanton BART station and Santa Rita Road, in Pleasanton. That segment is the immediate southerly link to the section of Trail currently under study. As a result of that continuity and proximity, certain constraints identified in the Pleasanton study may also impact the feasibility of Iron Horse Trail improvements in Dublin.

Table 8: ***Iron Horse Trail Feasibility Study and Master Plan***

Section/Topic	Finding	IHT Connectivity Project Notes
Opportunities and Constraints	The Iron Horse Trail corridor also serves as a utility corridor, containing a Kinder Morgan high pressure gas line, PG&E high voltage overhead power lines, a fiber optic cable, and a Zone 7 water main line.	Construction with heavy equipment may require additional safety measures, to be identified by specialists during preparation of construction documents, and/or more detailed site design. Undercrossings will demand special considerations. Inter-agency coordination will be required during project planning.
Opportunities and Constraints	The site is located within 3 miles of both the Mt. Diablo and Calaveras faults, therefore the soils are subject to liquefaction.	Potential construction of major structures, in the form of grade-separated crossings at Dublin Blvd and Dougherty Road, will need to consider seismic safety and adhere to acceptable design standards.
Opportunities and Constraints	The site is located in a 500 year flood plain – the Del Valle Dam inundation area.	Low-lying Trail improvements may be subject to damage from flooding and flood events.

9. City of San Ramon *San Ramon Valley Iron Horse Trail Bicycle Pedestrian Corridor Concept Plan*

In 2009, the City of San Ramon studied the feasibility of integrating a series of bicycle/pedestrian overcrossings along the Iron Horse Trail, at Sycamore Valley Road (Danville), Crow Canyon Road and Bollinger Canyon Road. Due to the common focus on grade-separated crossings, certain findings made in this study are relevant to the Iron Horse Trail improvements in Dublin.

Table 9: ***San Ramon Valley Iron Horse Trail Bicycle Pedestrian Corridor Concept Plan***

Section/Topic	Finding	IHT Connectivity Project Notes
Project Considerations	"The Barrier Effect:" The Study found that many trail users (as much as 25 percent) treat the existing at-grade crossings as turn-around points, and that grade separated overcrossings would reduce this barrier effect.	Similar perceived "barriers" of difficult crossings in Dublin could also be removed with safe, functional grade-separations. This would be key to overall Trail connectivity.
Project Considerations	The Study found that "Bicycle utility is further enhanced by the relationship of the trail to transit facilities. Busses serving the transit facilities have bicycle racks, further facilitating intermodal transportation."	Connecting the Trail to the BART station in Dublin would similarly promote bicycle use, intermodal transportation and non-auto commuting.
Project Considerations	The Study identified key opportunities for overpasses at target intersections, including: future housing and development near Trail, existing heavy traffic, and proximity to Interstate 680.	Target IHT crossings in Dublin present similar opportunities for grade separations: Adjacent future development, freeway proximity and heavy existing traffic.

B. Review of Environmental Documents

A series of major projects in the City Dublin were recently subject to environmental review under the California Environmental Quality Act (CEQA). The study areas of these projects intersect, are adjacent to, or are sufficiently proximate to the current project area that environmental impacts affecting them may also affect the feasibility of Iron Horse Trail upgrades. A cursory review of the current Iron Horse Trail site/study area, followed by brief descriptions of relevant project sites, and the nature of relevant environmental findings, demonstrates this.

Major findings from this review of environmental documents are shown on Figure xx, Potential Environmental and Policy Constraints.

1. Iron Horse Trail Connectivity Study Area

The goal of the *Iron Horse Trail Connectivity Feasibility Study* is to create a plan for a safe, functional "last mile" bicycle and pedestrian connection to the Dublin/Pleasanton BART station. The Trail segment under study is just over 1 mile long, capped by Dougherty Road to the north and the Dublin/Pleasanton BART station to the south. This Trail segment intersects Dublin Boulevard, Dougherty Boulevard, and future Dublin Crossings driveways and roadways, all of which are focus areas of the study. Dublin Boulevard and Dougherty Road are wide, busy regional corridors with multiple lanes of traffic, and the Trail crosses both at awkward, acute angles at signalized intersections. An additional signalized roadway will be provided with the development of Dublin Crossing at G Street. The ½-mile segment of the Trail between Dougherty Road and Dublin Boulevard is also a focus area. This approximately 8-foot wide Trail segment is characterized by what is often described as an unimproved, "back-door" facility, with poor quality surfacing and edges. Improvements to the segment must consider new standards and best practices for path design. The path parallels Scarlett Drive, similar to a side path. Driveways and side-streets will intersect the Trail as the Dublin Crossing development is built out.

The ½ mile area surrounding this segment of the Trail contains multiple land uses. Land to the east is dominated by the flat, partially-developed Camp Parks area, which contains former cattle grazing grassland and a series of structures used for U.S. Army operations. This grassy area is also contains a series of natural and man-made swales that carry the majority of runoff from the Camp Parks watershed to Alameda County Flood Control and Water Conservation District (Zone 7) drainage facilities. These swales are concentrated near the intersection of the proposed Scarlett Drive extension and Dublin Boulevard. The area east of the Trail is the future site of the transit-oriented, mixed use development outlined in the *Dublin Crossing Specific Plan,* and described above. The corner of the Parks Reserve Force Training Area lies just northeast of the Dougherty Road crossing. The area adjacent the Trail to the west, contains a pocket of medium density housing at the northern end, as well as business park/industrial uses further south and office and automotive uses just north of the freeway. South of Dublin Boulevard to the east of Trail, the partially-developed Transit Village subarea described in Section A.3 contains multi-family housing, as well as a series of large parking lots and undeveloped properties.

2. Relevant Environmental Studies

As demonstrated in Section A, above, policies and programs adopted in a series of major plans will influence the built landscape of the study area described above. These projects were subject to environmental review, and as noted, are close enough to the current study area that findings and conclusions may be relevant to the current study. The following environmental documents contained impacts, insights and information that may affect the feasibility of future Iron Horse Trail improvements in Dublin:

- ***City of Dublin General Plan Draft & Final EIR.*** The current study area is nearly fully contained within the City of Dublin's General Plan planning area, with the exception of the portion south of I-580, which is in the City of Pleasanton. As such, constraints to, and impacts of, surrounding development identified in the General Plan EIR, may also impact the feasibility of future Trail improvements.

- ***Eastern Dublin General Plan Amendment and Specific Plan Draft EIR.*** The southern portion of the segment of the Iron Horse Trail under study lies along the western boundary of the Eastern Extended Planning Area. Although that Planning Area spans 4,300 acres to the east and northeast of that boundary, the EIR contains relevant insights into local biology and geology.

- ***Dublin Crossing Specific Plan Draft & Final EIR.*** The Dublin Crossing project is critical to the future environment of the area immediately east of the Iron Horse Trail. The 2,000-unit, transit-oriented community was planned to provide residents with direct access to the Iron Horse Trail. The Dublin Crossing EIR identifies both environmental constraints to development, as well as project-related impacts that may impact the feasibility of Trail improvements.

- ***City of Dublin Bicycle and Pedestrian Master Plan Mitigated Negative Declaration.*** As demonstrated by the policies presented above, the *Bicycle and Pedestrian Master Plan* will influence multi-modal accessibility throughout Dublin. The Plan includes specific recommendations and policies that will influence access to the Iron Horse Trail. As such, associated environmental considerations are likely relevant to Trail connectivity improvements.

- ***The Village @ Dublin Draft EIR.*** This 2013 document analyses a proposed 167,200 square-foot retail commercial center in the City's Eastern Planning Area. The 14.3-acre site is located just south of Dublin Boulevard, between Hacienda Drive and Arnold Road. The EIR was reviewed for insights into possible traffic-related impacts to the Dublin Boulevard corridor.

- ***Dublin Transit Center Draft & Final EIR.*** As conceived of the in the 2001 EIR, the Dublin Transit Center project is a high-density mixed-use, transit and pedestrian-oriented development adjacent the Dublin/Pleasanton BART Station, to the east. In addition to its proximity to the Iron Horse Trail study area, the Transit Center Plan contains bicycle and pedestrian elements designed to promote connection to the Iron Horse Trail itself.

3. Overview of Environmental Findings

A screening of the above documents revealed five types of environmental constraints that may also impact the feasibility of connectivity improvements to the Iron Horse Trail:

- Air quality-related impacts related to the construction and operation of nearby projects;
- Existing geological and seismicity-related constraints;
- Existing biological constraints;
- Existing flood-related hazard areas; and
- Future traffic impacts of planned development

a. Air Quality Impacts

Numerous existing environmental documents identify potentially significant air quality impacts from the construction and operation of planned development. The immediate proximity of these large

development projects to the Trail, combined with the unrestricted nature of airborne contaminants, means that these conditions may also affect Trail users. These findings demand special consideration, given that the goal of improving the connectivity of the Iron Horse Trail is increased use and diversity of users. Successful improvements will result in more people on the Trail, including commuters, school children, active recreational cyclists and passive users such as the elderly. These are sensitive populations, vulnerable the impacts of low air quality that exceeds Bay Area Air Quality Management District (BAAQMD) significance thresholds.

b. Geological Conditions

A series of potentially significant geology and seismicity related impacts were identified in numerous relevant environmental documents. The location of Alquist-Priolo fault zone for the Pleasanton fault was identified as resulting in numerous findings of potential groundshaking, liquefaction, and expansive soils in areas that intersect the current study area. It follows that future Iron Horse Trail improvements, including the potential construction of above-grade or below-grade crossings, must adhere to current seismic-safety design standards and review.

c. Biological Constraints

The above analyses identified a series of potentially significant impacts to special status plant and animal species, including, but not limited to, Congdon's tarplant, California Burrowing Owl, California Red Legged Frog and Tiger Salamander, and protected species of Vernal Pool invertebrates such as Tadpole Shrimp and Fairy Shrimp. Populations of these species are located in the less developed areas of immediately east of the Iron Horse Trail. The limited range and lack of major construction on the Trail itself is unlikely to impact the above species to the degree that nearby major development projects may. However, potential construction of an above-grade crossing at either Dougherty Road or Dublin Boulevard may warrant a survey of bird or other populations, and the future biological impacts of a significant increase in Trail use should be considered.

d. Traffic Constraints

Traffic analyses completed as part of the above EIRs conclude that the traffic conditions in the immediate Iron Horse Trail study are subject to significant degradation, the result of planned development. Traffic impacts identified include Level of Service (LOS) impacts to various segments and intersections of Dublin Boulevard and Dougherty Road. For example, one EIR concluded that the Dougherty Road and Scarlett Drive intersection would degrade from LOS D under 2035 'no project' conditions to an unacceptable LOS E under 2035 cumulative project conditions. Mitigating this significant impact would require the conversion of the Dougherty Road eastbound all-movement lane to a shared through-right lane, and the addition of a new 60-foot eastbound left turn lane. In two of the documents, the recommended measure to mitigate the potentially significant impact to the intersection of Scarlett Drive and Dublin Boulevard is a grade separated pedestrian crossing. Similarly, the analyses predict increased use of local rail and bus transit due to increased development. One study estimated the generation of 1,228 new weekday daily bus and BART trips. Not only should this increase be considered in Trail connectivity strategies, but it should be leveraged for funding and political support. In assessing strategies for improving the Trail and Trail

crossings, all future traffic conditions and potential mitigation measures will need to be considered, both as potential leverage for Trail improvements and possible conflicts with connectivity strategies.

e. Flooding

Past environmental documents reveal that a large portion of the segment of the Iron Horse Trail under study lies within mapped 100-year and 500-year FEMA floodplains. In addition, as explained above, the area immediately east of the Trail contains numerous swales that drain that Camp Parks watershed, concentrating runoff near the future Dublin Boulevard/Scarlett Drive intersection. In and of themselves, these conditions are unlikely to decrease the feasibility of various Trail improvement strategies. However, the effect of future flooding on low-lying Trail improvements may be exacerbated by the increase in impervious surfaces that will accompany future development near the Trail. As Trail connectivity strategies are developed, drainage and floodplain impacts, as well as mitigation strategies developed in conjunction with future development, should be consulted, and Zone 7 staff kept appraised of potential Iron Horse Trail improvements.

B. Existing Conditions & BEF Methodology

FEHR PEERS

DRAFT MEMORANDUM

Date: May 7, 2015

To: Martha Aja, City of Dublin

From: Ryan McClain, Carrie Nielson, and Patrick Gilster, Fehr & Peers

Subject: DRAFT Task 4.4 Iron Horse Trail User Comfort Analysis

WC14-3178

This memorandum documents existing trail user comfort for the Iron Horse Trail (the Trail) in Dublin between Dougherty Road and the Dublin-Pleasanton BART Station as part of the Iron Horse Trail Connectivity Feasibility Study. The memorandum outlines a proposed approach for evaluating comfort using Built Environment Factors (BEF), which looks at the presence and quality of infrastructure to measure user comfort. The BEF assessment is then applied to the project study area as well as other portions of the Trail in nearby jurisdictions, including Pleasanton, Danville, San Ramon, and Pleasant Hill. Comparing results at various locations helps situate trail user comfort in the Dublin study area in the context of other popular areas of the Trail. This memorandum is divided into three sections:

- **Built Environment Factors (BEF) Methodology**: Summary of the criteria and scoring system,
- **Precedent Study BEF Evaluation**: Evaluation of other popular areas of the Trail, and
- **Dublin BEF Evaluation**: Evaluation of the Dublin portion of the Trail in the project study area.

This draft memorandum is submitted to the City to receive feedback on the proposed criteria and their weighting prior to finalizing the existing conditions comfort analysis for the study area.

BUILT ENVIRONMENT FACTORS METHODOLOGY

The built environment is generally understood to have a strong influence on transportation choices and the quality of service for different travel modes. Bicycle networks and pedestrian networks must not just simply be available, but also be comfortable in order to encourage their use. The Built Environment Factor approach to measuring comfort scores the presence, absence, and quality of specific infrastructural elements that are important to bicyclists and pedestrians' perception of trail comfort. This methodology allows for the identification of specific design elements to be included in the proposed project and can be used as a sketch planning tool for concept development, and provide a quantitative comparison between alternatives. The BEF methodology has been used to evaluate complete streets projects in the Cites of San Pablo and Richmond. The proposed BEF methodology for this study is contextualized for the City of Dublin and adapted for a trail. It is also informed by the public's feedback at Public Workshop #1, which included a walking and biking audit.

Because the needs of trail users are distinct as they travel along the path compared to roadway crossings, three BEF methodologies were developed:

- **Trail Segment** – evaluation of the trail user experience in the middle of a block without motor vehicle conflicts. Sample criteria include path width, quality of trail, landscaping, shade, and lighting.
- **At-Grade Crossing** – evaluation of the trail user experience at signalized intersections. Sample criteria include accessibility and comfort of accessing push buttons, comfort of path approach, gateway features, and roadway width and speeds.
- **Grade-Separated Crossing** – evaluation of the trail user experience at and leading to/from overcrossings. Sample criteria include accessibility and comfort of accessing push buttons, comfort of path approach, gateway features, and roadway width and speeds.

In order to maintain consistency with existing adopted City of Dublin plans and guidelines, the BEF methodology was adjusted to give credit for features and amenities prescribed in the City of Dublin *Bicycle and Pedestrian Plan and Design Guidelines* (October 2014). The *Design Guidelines* present current best practices related to the design of shared-use paths and were integrated into the BEF methodology for consistency. **Appendix A** details the design elements relevant to this Study.

The precedent study locations and existing Iron Horse Trail segments & crossings were then rated using this methodology. **Table 1** below shows the minimum and maximum possible ratings and highlights the score ranges to receive a Poor, Good, and Excellent rating.

TABLE 1 BEF RATING METHODOLOGY

Facility Type	Minimum Possible Rating	Maximum Possible Rating	Poor Rating Range	Good Rating Range	Excellent Rating Range
Trail Segment	-11 points	22 points	**<0 points**	**1-9 points**	**10+ Points**
At-Grade Trail Crossing	-12 points	21 points			
Grade Separated Trail Crossing	-9 points	16 points			

Source: Fehr & Peers, 2015..

Appendix B presents each criterion for the three methodologies, including the scoring associated with each. Additionally, Appendix B highlights the recommended consistent features associated with the *Design Guidelines* and additional best practices in the green +2 points columns on Table B-1, B-2, and B-3.

PRECEDENT STUDY BEF EVALUATION

As a regional trail that serves the needs of many different Alameda and Contra Costa County communities, understanding this portion of the Iron Horse Trail in the context of the whole trail is important. To facilitate this, we selected portions of the Trail to study to provide a diverse understanding of the Trail's characteristics in other jurisdictions and to identify the design elements that influence trail user comfort in that area. The following locations were selected for analysis:

Trail Segments:

- **Danville** – between Del Amigo Road and Linda Mesa Avenue, north of Downtown
- **Pleasant Hill** – between Harvey Drive and Treat Boulevard, east of the Contra Costa Centre BART Station
- **Pleasanton** – from Owens Drive to Hacienda Drive, south of Dublin/Pleasanton BART

At-Grade Crossing:

- **San Ramon** – at Bollinger Canyon Road, where the City is proposing a grade-separated crossing
- **San Ramon** – at Alcosta Boulevard

Grade-Separated Crossings:

- **Pleasant Hill** – at Treat Boulevard Overcrossing
- **Walnut Creek** – at Ygnacio Valley Boulevard

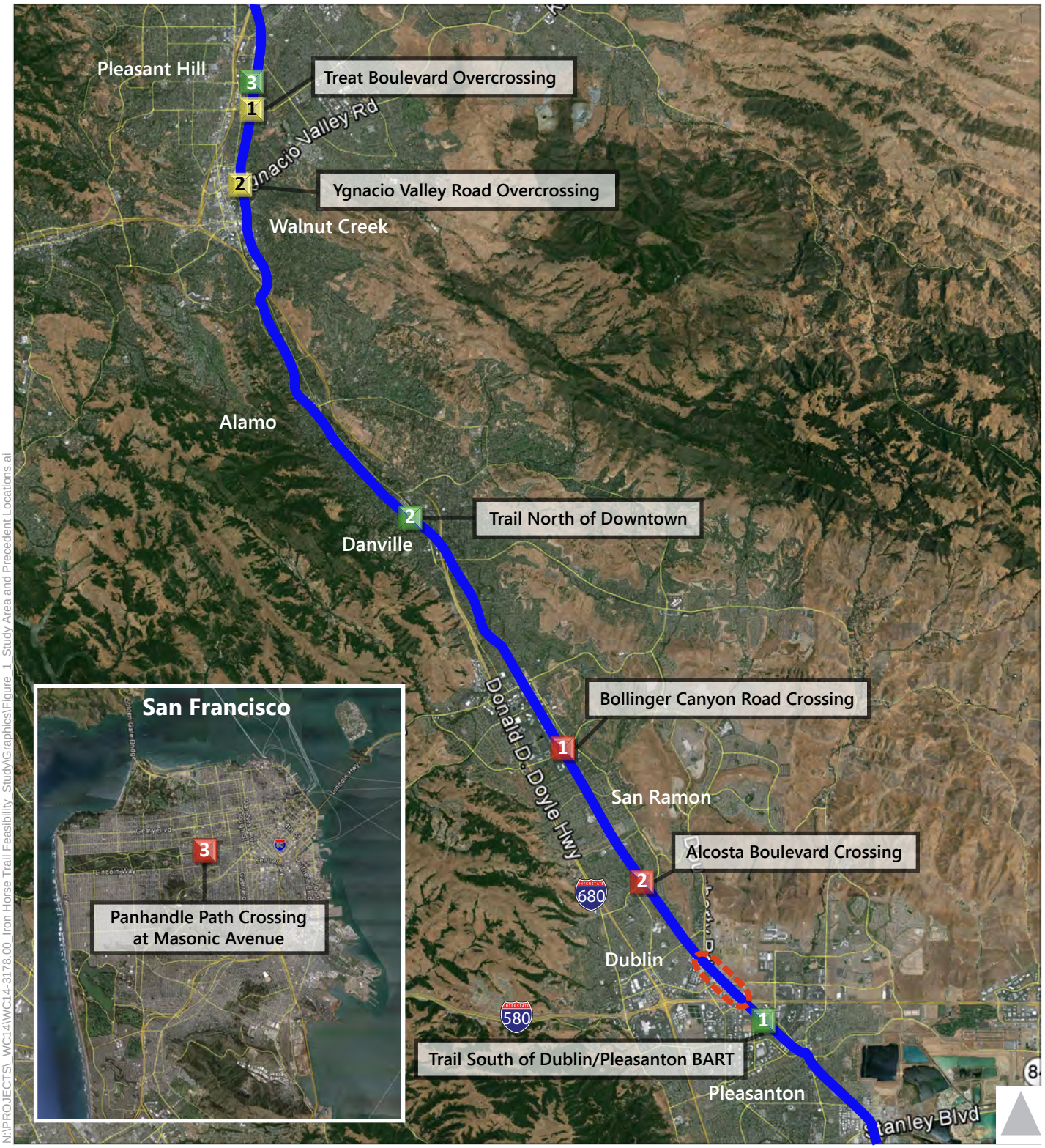
In addition to this, the Pandhandle Path in San Francisco was selected as a comparison for at-grade crossing as it has both bicycle signals and heavy roadway volumes. These six study sites are identified on **Figure 1**.

Based on the detailed methodology presented in Appendix A, the three precedent locations were evaluated. The results are presented on **Figure 2**. The findings of the precedent study can be used both to identify design elements to be incorporated into the proposed concept as well as to better understand how these issues are dealt with in adjacent jurisdictions.

Precedent Segment BEF Analysis

The following observations were made based on the precedent segment BEF analysis:

- **Trail Width & Shoulders**: Trail width is consistently 10 feet throughout, but some areas do not have consistent 2 foot shoulders.
- **Trees/Shade**: Mature trees are important for providing shade, but may not need to be planted on both sides of the trail to provide comfort benefits.
- **Landscaping**: Many portions of the trail have spontaneous vegetation that is maintained.
- **Lighting**: Except at overcrossings or at connections to City paths, lighting is not typically provided.
- **Amenities**: Benches, water fountains, and interpretative signage are limited on the trail. The best opportunities include tying the Iron Horse Trail into local parks or other destinations along the trail.
- **Wayfinding**: Except at Contra Costa Centre BART, almost no trail user destination wayfinding is provided.



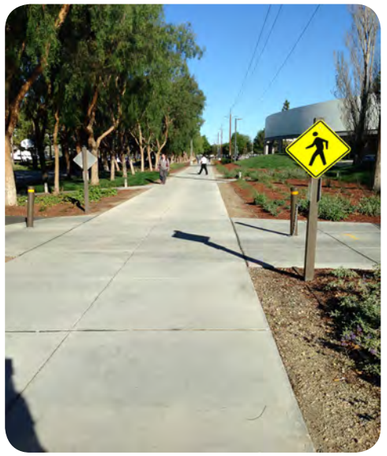
Legend

- Precedent At-Grade Crossing Locations
- Precedent Overcrossing Locations
- Precedent Segment Locations
- Project Study Area
- Iron Horse Regional Trail

Figure 1

Iron Horse Regional Trail Feasbility Study
Project Study Area and Precedent Locations

Precedent Segments



Iron Horse Trail between Owens Drive and Hacienda Drive, Pleasanton

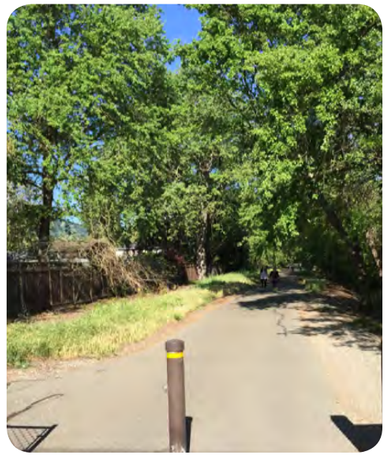
Features:
- *Trail Width:* 10′
- *Shoulder:* 2′ soft shoulders
- *Trees/Shade:* Trees typically on one-side of trail
- *Landscaping:* Well-maintained landscaping
- *Amenities*: Limited
- *Wayfinding*: EBRPD signage only
- *Pavement*: New concrete
- *Maintenance*: Well-maintained
- *Lighting*: Some adjacent to trail on City streets or private property
- *Connectivity*: Good paths/ connections to adjacent uses

BEF RATING **EXCELLENT**

Iron Horse Trail between Harvey Drive and Treat Boulevard, Pleasant Hill

Features:
- *Trail Width:* 10′
- *Shoulder:* None
- *Trees/Shade:* Trees typically on one-side of trail
- *Landscaping:* Well-maintained landscaping
- *Amenities*: Benches, picnic tables, and doggie bags
- *Wayfinding*: Signage provided to local retail, office, and transit amenities.
- *Pavement*: Asphalt
- *Maintenance*: Well-maintained
- *Lighting*: Some adjacent to trail on City streets
- *Connectivity*: Good paths/ connections to adjacent uses

BEF RATING **EXCELLENT**



Iron Horse Trail between Del Amigo Road and Linda Mesa Avenue, Danville

Features:
- *Trail Width:* 10′
- *Shoulder:* Less than 2′
- *Trees/Shade:* Trees typically provide full coverage
- *Landscaping:* Well-maintained natural landscaping
- *Amenities*: Limited
- *Wayfinding*: EBRPD signage only
- *Pavement*: Asphalt
- *Maintenance*: Well-maintained
- *Lighting*: None/Limited
- *Connectivity*: No path connections, except at crossings

BEF RATING **GOOD**

Precedent At-Grade Crossings

Panhandle Path at Masonic Avenue, San Francisco

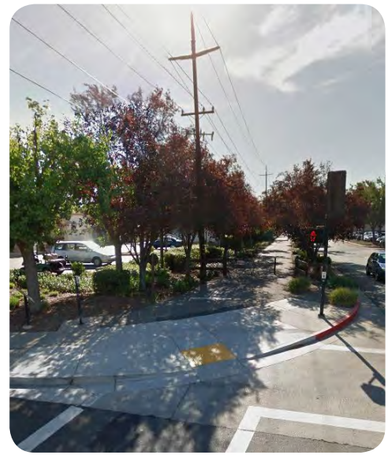
Features:
- *Speed:* 30 mph
- *Crossing Distance:* 58′
- *LPI:* No
- *Vehicular Turning Movements:* Protected turns
- *Curb Radii*: Small
- *Slip Lane:* No
- *Detection:* Poor push button location on one approach
- *Decorative Pavement or Triple Four Trail Crossing:* No
- *Wayfinding*: Minimal local signage at one approach
- *Approach Comfort*: Oversided directional curb ramps provide easy access to crossing

BEF RATING **GOOD**

Iron Horse Trail at Bollinger Canyon Road, San Ramon

Features:
- *Speed:* 40 mph
- *Crossing Distance:* 94′
- *LPI:* No
- *Vehicular Turning Movements:* Permitted right turns
- *Curb Radii*: Medium sized
- *Slip Lane:* No
- *Detection:* Push button located so cyclists do not need dismount
- *Decorative Pavement or Triple Four Trail Crossing:* No
- *Wayfinding*: No
- *Approach Comfort*: Diagonal ramp and sharp turns create some difficult movements

BEF RATING **POOR**

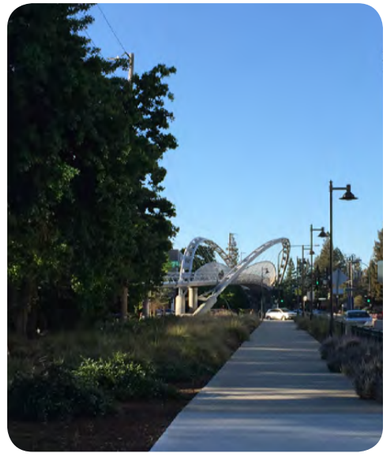


Iron Horse Trail at Alcosta Boulevard, San Ramon

Features:
- *Speed:* 35 mph
- *Crossing Distance:* 89′
- *LPI:* No
- *Vehicular Turning Movements:* Permitted right turns
- *Curb Radii*: Medium sized
- *Slip Lane:* No
- *Detection:* Push button located so cyclists do not need dismount*Decorative Pavement or Triple Four Trail Crossing:* No
- *Wayfinding*: No
- *Approach Comfort*: Diagonal ramp and sharp turns create some difficult movements

BEF RATING **POOR**

Precedent Overcrossings



Iron Horse Trail at Treat Boulevard, Pleasant Hill

Features:

- *Trail Width:* 10'
- *At-grade crossing:* Crosswalks provided on all intersection approaches
- *Path Approach:* Easily navigable turns, no switch backs and good desire lines
- *Wayfinding:* Signage provided to local retail, office, and transit amenities.
- *Sight Distance*: Good
- *Bridge Lighting*: At entrances and along structure.
- *Bridge Structure - Fencing*: Permeable railing
- *Bridge Structure - Design*: Custom gateway with high viusal interest

BEF RATING **EXCELLENT**

Iron Horse Trail at Ygnacio Valley Road, Walnut Creek

Features:

- *Trail Width:* 10'
- *At-grade crossing:* No crossing provided at-grade or at nearest intersection
- *Path Approach:* Easily navigable turns, no switch backs and good desire lines
- *Wayfinding:* EBRPD signage
- *Sight Distance*: Bridge curve makes it difficult to see users on the bridge
- *Bridge Lighting*: None
- *Bridge Structure - Fencing*: Semi-Permeable chain link fencing
- *Bridge Structure - Design*: Minimal visual interest with no sense of place

BEF RATING **GOOD**

- **Connectivity**: New or rebuilt portions of the trail in Pleasant Hill and Pleasanton successfully demonstrate how to provide good connections to private development

Precedent At-Grade Crossing BEF Analysis

The following observations were made based on the at-grade crossing BEF analysis:

- **Roadway Characteristics**: Some portions of the Iron Horse Trail cross major roadways at grade, such as in San Ramon, but these are typically uncomfortable and provide a high level of traffic stress for trail users.
- **Protected Turns and Leading Pedestrian Intervals**: Many at-grade crossings allow permitted turns across the trail. Best practice examples include protected turns across the trail crossing, such as the Panhandle Path.
- **Curb Radii**: Curb radii are typically 20-25 feet or more despite the at-grade roadways being multi-lane, limiting the need for such generous radii. Tightening the curb radii would allow for wide, directional curb ramps to be installed and to help manage speeds of turning vehicles across the crossings.
- **Detection**: There are a mix of examples of very convenient push buttons located in the correct direction of traffic.
- **Approach Comfort**: Newer or rebuilt portions of the trail typically have wider areas for trail users to queue and do not require bicyclists to make a 90-degree turn to actuate the signal or enter the crosswalk.
- **Connectivity**: New or rebuilt portions of the trail in Pleasant Hill and Pleasanton successfully demonstrate how to provide good connections to private development.
- **Bridge Landings**: Ease of use and access of slopes to cross bridge.

Precedent Grade-Separated Crossing BEF Analysis

The following observations were made based on the grade-separated crossing BEF analysis:

- **At-Grade Crossings**: In order for trail users to connect to the on-street bicycle network and sidewalk network, at-grade crossings are important even with grade separation.
- **Path Approach**: Good sight lines between paths leading up to the crossing are needed.
- **Bridge Lighting**: Lighting is important on structures but is not present on older overcrossings.

- **Bridge Structure**: Newer examples have designs and fencing that makes the bridge structure feel open and maximizes usable trail width. In doing so, this may identify the overcrossing as a gateway to the Trail.

DUBLIN IRON HORSE TRAIL BEF EVALUATION

Based on the methodology outlined above and detailed in Appendix B, the trail segment BEF and at-grade crossing BEF within the study area were evaluated. The study area was divided into the following segments:

- Dublin Boulevard to Dougherty Road
- Dougherty Road to Demarcus Boulevard/Frontage Road
- Demarcus Boulevard/Frontage Road to Dublin/Pleasanton BART

The segments were divided based on changes in the cross-section of the Trail. In addition, at-grade crossings were evaluated at Dublin Boulevard and Dougherty Road. The summary of that analysis is presented on **Figure 3**. All segments and crossing received a score of "poor."

Generally, the trail segments in the study area scored low for comfort. Key design elements that negatively affect existing trail user comfort in the study area include:

- Lack of a maintained shoulder along both sides of the Trail
- Lack of shade elements and mature trees
- Quality of pavement

For the at-grade crossing trail user comfort, the following design elements had the strongest effect on the score:

- Long crossing distance, high speed roadways, and long cycle lengths
- Uncomfortable maneuvers for bicyclists on most path approaches, such as sharp turns or crossing into oncoming traffic to actuate the push button
- Presence of slip lane at Dougherty

SAMPLE CONCEPT EVALUATION

Using the proposed BEF methodology, sample concepts were tested to determine how the proposed methodology would score the Study links and crossings with the implementation of

comfort enhancements consistent with the City's *Design Guidelines*. In order to understand how the concept alternatives for this Study may be evaluated, sample scenario testing was done to understand how the Study Area could move from a score of "Poor" to "Good."

Iron Horse Trail Segments

Segments were evaluated by looking at feasible design features that would enhance comfort. Note that for the Dublin Boulevard to Dougherty Road segment, the cross-section proposed in the *Dublin Crossing Specific Plan*, which indicates a 25 foot trail right-of-way (20 actual available right-of-way), was evaluated as a sample. This discussion is intended to highlight combinations of sample design features that would boost the comfort score and does not represent a specific proposal associated with this Study. Under the proposed BEF methodology, the following combinations of design features would improve the BEF score to "Good" in the three segments:

- **BART to Demarcus Boulevard/Bus Frontage Road:** Wayfinding program to highlight local bicycle and pedestrian destinations at key decision points in combination with pavement resurfacing.g
- **Demarcus Boulevard/Bus Frontage Road to Dublin Boulevard** –Distinctive, well-maintained landscape features and amenities such as benches.
- **Dublin Boulevard to Dougherty Road** – Five foot shoulders on both sides of the trail with a ten foot wide path, street trees that would provide at least 50% coverage, new pavement, indirect non-pedestrian scale lighting, and some connectivity to the new park and local uses, all of which are proposed under the Plan. This would receive a score of "excellent."

Iron Horse Trail At-Grade Crossings

The existing at-grade crossings were evaluated by looking at potentially necessary features that would be required to bring the crossings up to the minimum score necessary for a "Good" rating. Under the proposed BEF methodology, the following combinations of design features would improve the BEF score to "Good" at the two crossings:

- **Dublin Boulevard** – Install leading pedestrian intervals with extinguishable no right turn signs, reduce the curb radii at the southern approach, fix the location of the southbound approach push-button to make it easier for cyclists to use, upgrade the path approach to reduce the amount of sharp turns, and install decorative pavement or a triple four trail crossing.

- **Dougherty Road** –Install a bulbout at the southern side of the intersection, install leading pedestrian intervals with extinguishable no right turn signs, change the signal to incorporate protected left turns, fix the placement of the northbound approach pushbutton, and widen the pork chop paths at the northern side of the intersection to allow for easier bicycle navigation, install an oversized directional ramp at the southern side of the trail crossing, and install decorative pavement or a triple four crossing.

Iron Horse Trail Grade Separated Crossings

No grade separated crossings currently exist within the project boundaries.

NEXT STEPS

Based on the methodology presented above, the immediate next step for the City is to review the detailed scoring criteria and variables used in the assessment. We will finalize the methodology and revise the analysis based on comments and incorporate the results into the Existing Conditions Report and Preliminary Improvement Plan.

Additionally, the findings above outline the design elements that should be considered to provide a high level of comfort for trail users of all ages and abilities. These design elements can be incorporated as potential solutions into the Preliminary Improvement Plan.

Finally, as the concept alternatives are developed, it is anticipated that the methodology may be revisited again to develop criteria for unsignalized crossings and/or driveway crossings, as needed.

FEHR PEERS

APPENDIX A CITY OF DUBLIN BICYCLE & PEDESTRIAN DESIGN GUIDELINES (2014) CONSISTENCY

The bulleted list below details the recommendations from the *Design Guidelines* that pertain to shared-use paths and trails:

Trail Segments

- **Trail Width –** Shared-use paths should be a minimum of 8′ wide and can be up to 12′. Paths with significant pedestrian volumes should be wider.
- **Shoulder** – 2′ graded shoulders are recommended along both sides of the path and a 4-decomposed granite jogging path should be included next to bicycle paths where possible. (The California Highway Design Manual Chapter 1000 recommends 3′ shoulders where possible.)
- **Landscaping** – Viewpoints and distinctive landscaping are encouraged.
- **Amenities** - Furnishings along a shared-use path should be concentrated at specific points to form gathering nodes. Shared-use path support facilities consist of stagin areas, seating and tables, weather-protected structures, drinking fountains, waste receptacles, fencing, bicycle racks, interpretive and directional signage and restrooms.
- **Wayfinding** – This is generally recommended through the use of various types of signage that is encouraged along bikeways including confirmation signage along routes, turning indicators, and decision point signage.

Signalized At-Grade Crossings

- **Crossing Comfort** - Median refuge width should be minimum of 6' for facilities that bicycles are expected to use. Curb extensions/bulbouts are also encouraged.
- **Leading Pedestrian Interval** - One instance of implementation within the City is noted in the guidelines but the guidelines state that the City is open to this treatment, where appropriate. Pedestrians should receive 2-4 seconds of signal time before permissive turns. However, no language about including extinguishable right-turn signage.
- **Vehicular Turning Movements** - Where right-turn conflicts are expected, protecting the right-turn phase, separating out the pedestrian phase, and/or adding a separate bicycle signal phase may be appropriate.

Figure 3

Dublin Iron Horse Trail BEF Evaluation

- **Curb Radii** - The design guidelines recommend that where there is no curbside parking, the curb radii can be as low as 10'. When there is curbside parking a 20' radius is recommended. Therefore, the difference was split to create the two point standard. There is a table with recommended curb radii by street type, however there is no standard for addressing trail crossing near intersections.
- **Detection** - Pedestrian pushbuttons should be located with easy reach of both pedestrians and bicyclists, who should not have to dismount to reach the pushbutton. In-path bicycle loop detectors or other detection should be used up to 100 feet from the intersection, so bicyclists can approach the intersection slowly but without having to stop.
- **Path Approach Comfort** - The safe and convenient passage of all modes through the intersection is the primary design objective. When shared use paths parallel roadways at intersections, the path should generally be assigned the same traffic control as the parallel roadway (ie. if the adjacent roadway has a green signal, the path should also have a green/walk signal; if the parallel roadway is assigned the right-of-way with a stop or yield sign for the intersecting street, the path should also be given priority).
- **Cycle Length** - In the pedestrian facilities section, the preferred crossing treatment details that best practices include minimizing cycle lengths. However, there is no discussion of what constitutes good cycle lengths or the application to shared-use paths and trails.
- **Slip Lanes** – If slip lanes are present, they are encouraged to include advanced yield markings such as shark's teeth.

Grade Separated Trail Crossings

- **Trail Width** – Similar to the segment widths of the trail, Bridges should be a minimum of 8' wide (between handrails) and preferably as wide as the approaching trail. Paths with significant pedestrian volumes should also be wider than 10'.
- **Bridge Structure: Fencing** - Railing should be a minimum of 42" high. Openings between railings should be a 4" maximum. Fencing material types are only discussed in terms of use for preventing trespassing along segments, not along grade-separate structures.
- **Bridge Structure: Design** - Crossing can utilize pre-fabricated bridges made from self-weathering steel with wood decks.

APPENDIX B BEF SCORING MATRICES

TABLE B-1: TRAIL SEGMENT BEF RATING

Criteria	-2	-1	0	+1	+2	+3
Trail Width	<8'	8'	8-10'	-	11-13'	14 + Up
Shoulder	No Shoulder present (-1 point per side) OR fence/barrier directly against the trail (-1 per side)	Unmaintained Shoulder (-0.5 points per side)	Maintained shoulder	-	2' DG shoulders (1 point per side)	>3' (1.5 points per side)
Shade*	-	No trees present	Trail has immature trees	-	Trail has trees and/or shade structures (50% trail coverage)	Trail is shaded by trees or structure with little gaps in coverage (75% or more coverage)
Landscaping	-	No vegetation	Unmaintained landscaping	-	Yes, distinctive landscaped plantings alongside of trail	-
Amenities	-	-	None present	-	Bench OR Water fountain OR Restrooms OR Interpretative Signage (1 point each, up to 3 points)	-
Wayfinding	-	-	None present. EBRPD trail head signs only.	EB Park Signage or limited local wayfinding	Local bicycle and pedestrian destination wayfinding at all key decision points	-
Pavement Quality*	Failed or Unpaved trail (PCI: 0-24)	Poor or At-risk pavement quality (PCI: 25-59)	Average quality-occasional buckling or paving issues (PCI: 60-69)	Good quality-smooth riding surface (PCI: 70-79)	Excellent quality-smooth riding surface, newly repaved (PCI: 80-100)	-
Connectivity*		Barriers along trail that prevent access (eg. fences or topography)	No path connections	Some path connections to adjacent streets or uses	Good path connections to adjacent streets or uses	-
Maintenance*	-	Debris or vegetation protruding into trail OR Trees may need some additional maintenance (-1 point for each)	Yes	-	-	-
Lighting*	-	-	No lighting present	Minimal lighting provided by adjacent land uses or streets	-	Pedestrian-scale lighting present along trail

*Note: The City of Dublin *Bicycle and Pedestrian Design Guidelines* does not provide specific guidance on these topics for Shared-Use Paths, but this does not imply that these categories are inconsistent with the intent of the guidelines.
Source: Fehr & Peers, 2015.

TABLE B-2: SIGNALIZED TRAIL AT-GRADE CROSSING BEF RATING

Criteria	-2	-1	0	+1	+2	+3
Crossing Distance	>=100' crossing distance	60-100' crossing distance	<60'	-	-	-
Crossing Comfort	-	-	-	-	Median refuge present with push button regardless of crossing distance (1 point) OR curb extensions / bulbout (0.5 point per side of street) (*Can include points for both*)	-
Leading Pedestrian/Bicycle Interval	LPI with No Extinguishable No Right-Turn Sign	-	No	-	Yes with Extinguishable No Right-Turn Sign	-
Vehicular Turning Movements	-	Permitted turns across the trail crossing with >= 50 turning vehicles during the peak hour (-1 point per turning movement)	Permitted turns across the trail crossing with <= 49 turning vehicles during the peak hour	-	Protected turns (1 point per turning movement)	-
Curb Radii			>25' (0 points per side of the street)	16-25' (0.5 point per side of the street)	<= 15' (1 point per side of the street)	
Detection	Bicyclists must dismount to use push button (-1 point per approach)	-	Accessible push button located in difficult position but does not require dismounting (0 points per approach)	-	Accessible push button located on the correct side of trail (i.e. directional with two-way traffic) (1 point per approach)	Passive detection
Path Approach Comfort	Bicyclists must make sharp turns to use crossing and/or access push button (-1 point per approach)	Diagonal ramps (-0.5 point for each ramp)	-	Path approach is of appropriate size for trail users to make comfortable turning movements to use crossing with standard size directional ramp & reach push button (0.5 point per approach)	Oversized directional ramps (1 point per each) OR Path approach meets trail user desire lines (1 point per approach)	-
Gateway / Wayfinding*	-	-	No	Local bicycle and pedestrian wayfinding provided at key decision points (0.5 points per location)	Yes, banners, signage, structure, art, and/or landscaping defines gateway	-
Decorative Paving or Triple Four Trail Crossing*	-	-	None	1 point for decorative pavement OR 1 point for Triple Four Crossing	-	-
Cycle Length*	-	>120 seconds	90-120 seconds	<90 seconds	-	-
Speed*	-	>30 MPH	<=30 MPH	-	-	-
Slip Lane*	-	Yes	No	-	-	-

*Note: The City of Dublin *Bicycle and Pedestrian Design Guidelines* does not provide specific guidance on these topics for Shared-Use Paths, but this does not imply that these categories are inconsistent with the intent of the guidelines. Source: Fehr & Peers, 2015.

TABLE B-3: GRADE SEPARATED TRAIL CROSSING BEF RATING

Criteria	-2	-1	0	+1	+2	+3
Trail Width	-	<8'	8'	8-10'	11-13'	14 + Up
At Grade Crosswalk*	No At-Grade Crosswalk or Nearest Crosswalk does not facilitate trail access to/from adjacent amenities	-	-	Nearest intersection incorporates a crosswalk that provides easy access for trail users to/from farther amenities	Good at-grade crosswalk with curb radii <=15', no obstructions, oversized directional ramps, and audible/ accessible push buttons	-
Path Approach Comfort to / from Adjacent Networks*	Bicyclists must make sharp turns to navigate between bridge and bicycle network (-1 point per approach)	Connection between bridge approach and bicycle network is inconvenient and doesn't meet bike desire line (-1 point per approach)	-	Path approach is generally of appropriate size for trail users but require bikes to slow down to make occasional sharp turns in order to use bridge and connect to bike/ped networks in limited areas (0.5 point per approach)	Bridge approach meets trail user desire lines and requires little to no sharp movements/turns and connects to bike/ped network (1 point per approach)	-
Gateway / Wayfinding*	-	-	None present	Local bicycle and pedestrian wayfinding provided at key decision points and highlights connection between bridge, IHT, and bike/ped networks (0.5 points per location)	Yes, banners, signage, structure, art, bridge design, and/or landscaping defines gateway	-
Bridge Lighting*	No lighting is provided	-	-	Indirect lighting from other sources	Trail-user scaled lighting at bridge entry/exit and along path	-
Bridge Structure: Fencing	-	Chain-link fencing provides a "caged" feel and is uninviting with minimum visibility of surroundings	-	Fencing is permeable and secure but does not create an attractive environment for trail users	Bridge allows for good trail user visibility and has permeable features that make the bridge feel open and inviting	-
Bridge Structure: Design	-	-	Grade separation has minimal or no visual interest and does not highlight Trail	-	Design has some visual interest and provides but minimal sense of gateway/entry to the trail	Custom bridge design that provides an important visual gateway and strong sense of place
Sight Distance / Visibility on Path*	-	Sight distance obstructed (-.5 per approach)	Clear lines of sight along path	-	-	-

*Note: The City of Dublin *Bicycle and Pedestrian Design Guidelines* does not provide specific guidance on these topics for Shared-Use Paths, but this does not imply that these categories are inconsistent with the intent of the guidelines.

Source: Fehr & Peers, 2015 .

C. Crosswalk & Non-motorized User Detection Guidance

FEHR PEERS

MEMORANDUM

Date: December 11, 2015

To: Obaid Kahn, City of Dublin

From: Ryan McClain and Patrick Glister, Fehr & Peers

Subject: Task 4.5 – Iron Horse Trail Intersection Treatments

WC15-3178

The Iron Horse Regional Trail Feasibility Study will provide recommendations for improvements at two signalized intersections within the City of Dublin. Trail crossings often have higher volumes of users which necessitate the use multiple treatments to enhance the crossings. This could be achieved through a combination of high-visibility striping, signage, signal phasing, and other enhancements. Specialized branding and pavement textures can also create a unique landmark feeling that highlights the trail as a local destination and regional corridor. The following memo discusses the main concerns regarding the signalized intersections including the legality of riding a bicycle through a marked trail crossing and best practices for striping the marked crosswalks.

TRAIL CROSSING MARKINGS AT INTERSECTIONS

TRAIL CROSSING USER APPLICABILITY

In most jurisdictions a crosswalk is understood to function as an extension of the sidewalk; it is designed to safely guide people across the street in a direct path. Therefore, most laws that apply to pedestrians also apply when they are utilizing the crosswalk. The City of Dublin does not currently have an ordinance that would restrict bicyclists from riding on the sidewalk. Bicyclists would therefore be treated the same as pedestrians within crosswalks.

Using this same nexus, trail crossings should function as an extension of the path by directing trail users across while also notifying roadway users to expect a larger volume of bicyclists and

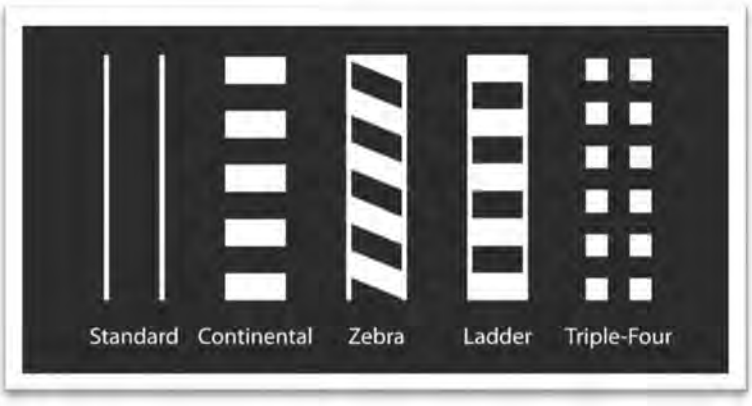
pedestrians than in an average crosswalk. Trail crossings would likewise operate the same as other marked crossings and allow both bicyclists and pedestrians within the crosswalk.

CITY OF DUBLIN DESIGN GUIDANCE

Standard & High Visibility Crosswalk Striping

The existing City of Dublin Bicycle and Pedestrian Design Guidelines (Design Guidelines) specify the preferred design features for crosswalks. All treatments in the guidelines are MUTCD compliant and represent best practices for unsignalized, signalized, midblock, and uncontrolled crosswalks. Adhering to these guidelines ensures that crosswalks are consistent citywide and ensure roadway users properly expect where bicyclists and pedestrians are supposed to be. **Figure 1** shows the five types of crosswalk striping patterns that are approved by the FHWA and included in the Design Guidelines.

FIGURE 1 – FHWA APPROVED CROSSWALK TYPES



The City of Dublin Bicycle and Pedestrian Design Guidelines recommend standard crosswalk striping on all approaches of a signalized or stop-controlled intersection. The Design Guidelines specify that high-visibility striping should be used at roadways with more than four lanes or speeds greater than 40 mph, mid-block, and uncontrolled crossings. High-visibility crosswalks include continental, zebra, ladder, and triple-four striping. Continental-style striping is thought to have the most effective compliance rate from drivers.[1] The Design Guidelines also discuss

[1] http://www.pedbikeinfo.org/cms/downloads/PBIC_WhitePaper_Crosswalks.pdf

additional treatments that are encouraged in conjunction with the use of high-visibility crosswalks to increase safety and bring attention to the presence of pedestrians or bicyclists.

Special Paving Treatments

The Design Guidelines encourage the use of colored pavement in crosswalks to distinguish and enhance the character of the overall pedestrian environment. Similar to high-visibility striping, using special paving treatments can both incorporate enhanced safety for users by increasing the visibility of the crosswalk and draw attention to a more specific area. These treatments typically include colored concrete, stamped asphalt or concrete to resemble bricks, and pavement stencils.

Currently, the FHWA allows the use of color treatments in crosswalks so long as they do not have retro-reflective properties and that the color does not diminish the contrasting quality of required transverse white lines. Designers must also ensure that visual design enhancements do not confuse the visually impaired or cause other problems for people with disabilities. The crosswalk surface must also be able to accommodate wheelchairs.

Examples of special paving treatments are provided below:

Pavers or stamped concrete in Dublin, CA near Dougherty Road along the Iron Horse Trail were used to simulate bricks and other materials other than roadway asphalt. Speed humps also serve to slow vehicle traffic.

Colored pavers in Danville, CA along the Iron Horse Trail utilized special pavers to add coloring and texture to a continental crosswalk with double white transverse lines. The signal provides a crossing phase for trail users and is actuated by a push button and inductive loops. A median refuge allows trail users to wait for another phase if they cannot cross in time.

ADDITIONAL CROSSWALK MARKING ENHANCEMENTS

While the Design Guidelines provide recommendations for most crossings, it does not specify a preferred treatment for trail crossings. There is little best practice guidance on which treatments are preferable for these types of crossings. Some jurisdictions default to the standard FHWA approved striping presented earlier in this memo, while others have begun to customize the crossings to better highlight the presence of a trail.

The following examples show alternative trail crossing markings:

Triple-four striping with bicycle stencils or sharrows have been used in Albany, CA to demarcate the crosswalk as a shared-use crossing. This requires conditional approval from the FHWA.

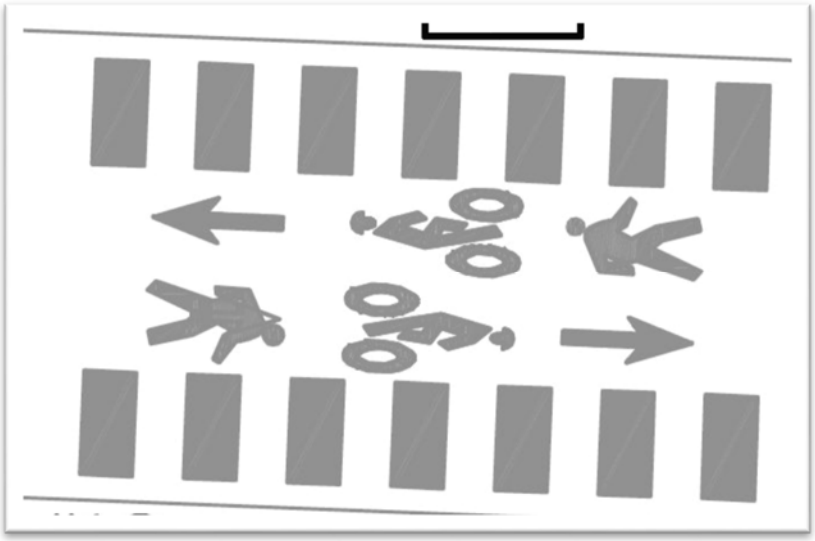
Stamped concrete with multiple user symbols in Indianapolis, IN along the Indianapolis Cultural Heritage Trail were utilized to create a customized colorful stamped concrete with branding to both delineate a space for walking, biking, and the disabled and draw attention to a local destination.

PROPOSED CROSSING TREATMENTS FOR THE IRON HORSE TRAIL

The existing City of Dublin Bicycle and Pedestrian Design Guidelines outline a range of safety treatments for intersection and mid-block crossings. A combination of preferred treatments from the guideline can be used to create a comfortable environment at crossings as well as develop a sense of place around the Iron Horse Trail.

Based on input from the public workshops and Alameda CTC Bicycle and Pedestrian Advisory Committee, the Iron Horse Trail intersection crossings should more visible than standard intersection crossings to reinforce the higher expected volume of users that are likely to be using the crossings. Additionally, bicycle and pedestrian symbols were requested during the Advisory Committee meeting to encourage all trail users to share the crossing. This could be done similar to Triple-Four crossing marking with bicycle stencils (shown previously) by adding the pedestrian symbol alongside the bicycle stencil. **Figure 2** shows a Triple Four crossing marking with bicycle and pedestrian symbols to reinforce the shared crossing that could be adapted to incorporate at the Iron Horse Trail crossings in Dublin.

FIGURE 2 – TRIPLE FOUR CROSSWALK STRIPING WITH BICYCLE & PEDESTRIAN STENCILS



TRAIL CROSSING DETECTION & SIGNAL TIMING/PHASING AT INTERSECTIONS

EXISTING DETECTION ALONG THE IRON HORSE TRAIL

Detection at Mid-block Crossings

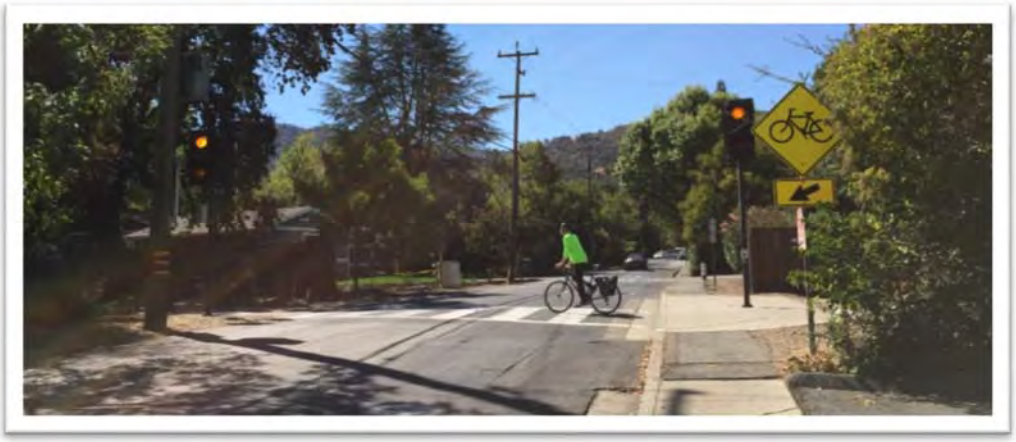
A majority of the crossings along the Iron Horse are uncontrolled mid-block crossings. There is currently no standard detection treatment utilized along the Iron Horse Trail which creates varying user expectations from jurisdiction to jurisdiction as users travel along the trail. The most common method for actuation is the standard pedestrian push buttons which are ubiquitous at most signalized intersections. For mid-block trail crossings, it is common to see rectangular rapid flashing beacons (RRFBs) which require users to either actively push a button at the crossing or push a button in advance of the crossing to activate the beacons.

A smaller amount of mid-block crossings along the Iron Horse Trail offer passive detection for trail users through microwave or infrared detection. Microwave detection sensors can sense bikes or pedestrians approaching the crossing within a given location to trigger the RRFBs. Infrared bollard detectors sense user passing through a set of bollards near the crossing to trigger the

RRFBs. A combination of the two can also be used to provide advanced passive detection to allow bicyclists to continue riding through the crossing by starting the RRFBs ahead of the bicyclist arriving at the crossing. This minimizes the crossing time and level of effort for the bicyclist to come to a complete stop at crossings along low volume roadways. On the Iron Horse Trail, buttons on mid-block crossings activate a flashing beacon that alerts drivers to the presence of trail users in the crosswalk, but does not require them to stop as shown on **Figure 3**.

In limited instances, a mid-block crossing is furnished with a traffic signal that requires vehicles to stop, usually at very wide roads or when the trail crossing is shared with a route for maintenance vehicles. At such a crossing, the push button calls for a bicycle or pedestrian signal phase which forces vehicles to stop similar to a fully signalized intersection. Only in one instance were bicycle loop detectors used in Danville, CA at a signalized mid-block crossing.

FIGURE 2 - PUSH BUTTON ACTUATED CROSSING BEACON AT A MID-BLOCK CROSSING



Detection at Signalized Intersection Crossings

The Iron Horse Trail has limited crossings at fully signalized intersections. There is currently no standard treatment used at these locations and the final design is ultimately up to each jurisdiction. The primarily detection used at these locations were standard push buttons placed directly at the intersection. Many of the signalized intersection crossings had long signal cycle lengths with no advanced bicycle or pedestrian detection to reduce the amount of delay experienced by those users. With heavy traffic volumes in these locations, many jurisdictions have or are currently converting to grade-separated crossings such as Treat Boulevard near Pleasant Hill or Bollinger Canyon Road in San Ramon.

NATIONAL BEST PRACTICES FOR DETECTION TREATMENTS

Newer technologies for signal actuation do not require active input from trail users, instead detecting their presence passively before or at the entrance to a crosswalk. A summary of these technologies, along with the estimated cost per intersection is shown in **Table 1**. A literature review of best practices indicates that there is little agreed upon consensus for applying certain detection technologies outside of the standard push button. However, the use of more advanced detection technologies is encouraged by planning and design documents from the National Association of City Transportation Officials (NACTO)[2], Washington State Department of Transportation (WSDOT)[3], and the Alameda County Transportation Commission (ACTC)[4] due to improved convenience and safety for bicycles and pedestrians.

FIGURE 3. RADAR-ACTUATED CROSSING AND RRFP AT A MID-BLOCK CROSSING

As noted previously, many jurisdictions along the Iron Horse Trail have installed radar-actuated crossing beacons at mid-block crossings as shown in **Figure 4**. However, a combination of inductive loops or radar/microwave technologies with push buttons directly at the intersection can be adapted to be applied at signalized intersections to provide convenient access to multiple user types. The inductive loops or radar/microwave technology can provide advanced detections of bicycles to call the trail crossing signal phase prior to their arrival at the intersection and reduce the amount delay experienced by trail users. The ADA-accessible, audible pedestrian push buttons directly at the intersection allows users not approaching from the trail to actively call the signal.

[2] http://nacto.org/publication/urban-bikeway-design-guide/bicycle-signals/signal-detection-and-actuation/
[3] http://www.wsdot.wa.gov/publications/manuals/fulltext/M22-01/1515.pdf
[4] http://www.alamedactc.org/files/managed/Document/10088/ACTC_Bike_Plan_Final_10-25-12_011013.pdf

TABLE 1: SUMMARY OF BICYCLE DETECTION TECHNOLOGIES

Technology	Description	Bicycle or Person Detection?	Accuracy	Mounting Configuration	Calibration Difficulty	Maintenance Difficulty	Power Supply	Cost - Intersection (per approach)
Inductive Loop	Wires embedded in the pavement detect the presence of metal objects.	Bicycle only	Excellent	Roadway	Low	Moderate to High	DC power	$8,000 - $10,00
Video	Computer analyzes video input to detect trail users (bikes and peds).	Bicycle only	Good	Overhead or Side Fire	Moderate	Moderate to High	AC power	$8,000 - $15,000
Magnetometers	Detects changes in the ambient magnetic field. Typically wireless communication to signal controller.	Bicycle only	Very Good	Sensors in roadway surface; Access Point and Repeaters mounted	Low	Low	DC Power for Access Point, Batter Sensors for Repeaters	$10,000 - $12,000
Radar/Microwave	Reflects electromagnetic waves off of a moving target. Can detect a trail user in advance of them arriving at crossing.	Both	Very good	Overhead or side fire	Moderate	Low	DC Power or Solar	$13,000 - $15,000
Infrared	An infrared beam is sent from a scanner to a receiver across the trail. Trail users are counted when they break the beam.	Both	Good	Overhead or Side Fire	Low	Low	DC Power or Solar	$15,000

TABLE 1: SUMMARY OF BICYCLE DETECTION TECHNOLOGIES

Technology	Description	Bicycle or Person Detection?	Accuracy	Mounting Configuration	Calibration Difficulty	Maintenance Difficulty	Power Supply	Cost - Intersection (per approach)
Push Button	User-operated device to call for signal phase or activate crossing beacon.	Both (requires user input)	Good	ADA-compliant pole at crosswalk entrance.	-	Similar to those at intersections.	DC Power	$350 per unit.

Source: Metropolitan Transportation Commission

ADVANCED SIGNAL TIMING AND PHASING METHODS

In combination with the above mentioned detection treatments, signal timing and phasing changes can be made once both the pedestrian push buttons and inductive loops or other advanced detection method for bicycles is installed. Some intersection delay can potentially be reduced by providing variable green times for bicyclists and pedestrians.

This would be accomplished by associating different green times and clearance times to each detection method that is used to call the signal. The push buttons at the intersection would provide a longer green time and clearance time to account for pedestrian users while loop detectors or other advanced detection method could provide shorter green times and clearance times for bicycles if no pedestrian call occurs.

This timing and phasing strategy would require the use of both pedestrian walk signal heads and bicycle signal heads to ensure that pedestrians would not attempt to cross large intersections during the shorter bicycle-only signal phase if they did not activate the push button. The National Association of City Transportation Officials' (NACTO) Urban Bikeway Design Guide encourages the use of both types of signal heads to reinforce that both bicycles and pedestrians can cross through the intersection. The bicycle signal head bicycle work to protect cyclists since clearance times are longer than automobile clearance times but shorter than pedestrian clearance times. The inclusion of specific green times and clearance times by mode helps to ensure adequate time for all users to safely clear the intersection. **Figure 5** shows an example of the use of both types of signal heads.

FIGURE 4 – BICYCLE SIGNAL HEAD AND PEDESTRIAN SIGNAL[5]

Along with variable green times and clearance times associated with pedestrian or bicycle phases, the trail crossing should restrict turning movements across the trail at high volume locations whenever possible to. This is preferable to reduce to number of conflict points with users in the trail crossing by assigning the crossing to signal phase that does have turning conflicts. However, turn restrictions may not need to be implemented where turning volumes are low and the potential for conflicts would be reduced.

Therefore, multiple options exist to address this including the following:

- Restrict right-turns where turning movements conflict with the trail when the crossing by overlapping the turning movements with corresponding left-turns from the adjacent street. This is generally used where U-turns are not necessitated or where nearby intersections would accommodate those movements.
- Provide protected left-turns and have the trail cross with the through movements to separate trail users from turning vehicles.
- Provide an extinguishable no right-turn sign that only activates when a trail user activates the trail crossing (either passively or actively). This would allow vehicles right-turning vehicles to turn when no trail user are present during the green phase and minimizes the potential for delay at medium to high turning volume intersections. Figure 6 shows an

[5] Image from National Association of City Transportation Officials *Urban Bikeway Design Guide (*2nd Edition)

example of the extinguishable no right-turn signs uses in Pleasanton, CA at a crossing with the Iron Horse Trail.

- If left- or right-turn conflicts cannot be separated from trail crossing, then Leading Pedestrian Intervals (LPIs) should be incorporated. LPIs provide bicyclists and pedestrians with a few seconds head-start to enter the crossing before the turning movements are allowed to go. This helps to make both bicyclists and pedestrians better visible to turning vehicles.

FIGURE 5 – EXTINGUISHABLE NO RIGHT-TURN SIGN[6]

PROPOSED SIGNAL TIMING AND PHASING TREATMENTS

Two projects that will be constructed and directly impact trail operations include the widening of Dougherty Road and the extension of Scarlett Drive to Dublin Boulevard. Signal phasing changes were applied to the following scenarios to test whether trail user safety improvements will impact intersection Level of Service. An existing conditions scenario was not tested since the near-term scenario that includes the Dougherty Widening is already funded and set to start construction in early 2016. The "No Project" scenarios use the given lane configuration, volumes, and signal timings provided in the Dublin Kaiser Environmental Impact Report. The "With Project" scenario

[6] Extinguishable no right-turn sign at the Iron Horse Trail crossing with Owens Drive in Pleasanton, CA near the Dublin/Pleasanton BART station.

represents the signal phasing changes made to the study intersections. (For detail intersection geometry, see Figure 8 in the City of Dublin *Iron Horse Trail Preliminary Improvement Plan*, 2015).

The following intersection improvements were tested using industry standard traffic analysis Synchro 8:

Near-term AM and PM with Project (Dougherty Widening Only)

1. ***Dublin Boulevard and Scarlett Drive*** – The northbound approach lane configuration was changed to a left/thru lane and a dedicated right-turn lane. The right-turn movement was overlapped with the westbound left-turn to separate the trail crossing from the turn movement. This improvement may not be necessary due to the low volume of right-turning vehicles; however, this represents the least amount of turning conflicts possible.
2. ***Dougherty Road and Scarlett Drive*** – Split phasing for left-turns from Scarlett Drive to Dougherty Road were incorporated to prevent southbound turning movement conflicts with trail users. Due to the low volume of right-turning vehicles, the southbound right-turn movement from Scarlett Drive to Dougherty road was not prohibited.

Future AM and PM With Project (Dougherty Widening and Scarlett Extension)

1. ***Dublin Boulevard and Scarlett Drive*** – The northbound approach lane configuration was changed to a left/thru lane and a dedicated right-turn lane. The right-turn movement was then overlapped with the westbound left-turn to separate the trail crossing from the turn movement. This improvement may not be necessary due to the low volume of right-turning vehicles; however, this represents the least amount of turning conflicts possible. Additionally, the westbound right-turn from Dublin Boulevard to Scarlett Drive was changed to prohibit right-turns on red to protect users that may be in the trail crossing. The westbound right-turn lanes were then overlapped with the southbound left-turns to reduce the amount of automobile delay. The southbound double left-turn lanes were also changed to split phase to allow the trail crossings after the left-turns are completed.
2. ***Dougherty Road and Scarlett Drive*** – Split phasing for left-turns from Scarlett Drive to Dougherty Road were incorporated to prevent eastbound turning movement conflicts with trail users. Due to higher volumes of westbound right-turning vehicles from Scarlett Drive to Dougherty Road in the future scenario, the double right-turn lanes were changed to protected and then overlapped with the southbound left-turning movement from

Dougherty Road to Scarlett Drive to reduce potential automobile delay. This scenario represents the least amount of turning conflicts possible.

Table 2 below shows the intersection Level of Service results without and with the changes described above. It should be noted that the extinguishable right-turn signs and LPI cannot be tested using Synchro 8. However, the results would fall within the range of the change in delay shown below in Table 2.

TABLE 2: SIGNALIZED INTERSECTION LEVELS OF SERVICE

Intersection	Peak Hour	Avg. Delay (seconds)	LOS	Avg. Delay (seconds)	LOS	Δ in Avg. Delay (seconds)
Near-Term Scenario						
1. Dublin Boulevard and Scarlett Drive	AM PM	10.2 16.6	B B	10.3 17.1	B B	+0.1 -0.5
2. Dougherty Road and Scarlett Drive	AM PM	14.1 18.7	B B	14.4 15.9	B B	+0.3 -2.8
Future Scenario						
1. Dublin Boulevard and Scarlett Drive	AM PM	129.9 128.3	F F	129.4 130.3	F F	-0.5 +2.0
2. Dougherty Road and Scarlett Drive	AM PM	130.2 128.7	F F	128.8 155.4	F F	-1.4 +26.7

Source: Fehr & Peers (2015) using Synchro 8 HCM 2000 results.

D. Grade Separation Cost Estimates & Designs

MARK THOMAS & COMPANY, INC.
Providing Engineering, Surveying and Planning Services

February 4, 2016
Job No.: AL-14107

CITY OF DUBLIN - IRON HORSE TRAIL FEASIBILITY STUDY
Dublin Boulevard Overcrossing
Main Span Truss Bridge Option 1

PRELIMINARY ESTIMATE

No.	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization (10%)	1	LS	$ 397,678	$ 397,678
2	Traffic Control Allowance	1	LS	$ 25,000	$ 25,000
3	Import Borrow	900	CY	$ 50	$ 45,000
4	Hot Mix Asphalt (Type A)	150	TON	$ 150	$ 22,500
5	Class 2 Aggregate Base	100	CY	$ 75	$ 7,500
6	Signage Allowance	1	LS	$ 50,000	$ 50,000
7	Lighting Allowance	1	LS	$ 100,000	$ 100,000
8	West Slab and Retaining Wall	1,950	SF	$ 150	$ 292,500
9	West Flat Slab	2,190	SF	$ 200	$ 438,000
10	Main Span Truss Bridge	3,525	SF	$ 450	$ 1,586,250
11	East Flat Slab	2,700	SF	$ 200	$ 540,000
12	East Slab and Retaining Wall	3,390	SF	$ 150	$ 508,500
13	Minor Items (10% of Construction Cost)	1	LS	$ 361,525	$ 361,525

Construction Subtotal		$	4,374,453
Contingency	30%	$	1,312,336
Construction Total		$	5,687,000
Design Fees	15%	$	854,000
Construction Engineering/Construction Management	15%	$	854,000
		$	**7,400,000**

MARK THOMAS & COMPANY, INC.
Providing Engineering, Surveying and Planning Services

February 4, 2016
Job No.: AL-14107

CITY OF DUBLIN - IRON HORSE TRAIL FEASIBILITY STUDY
Dublin Boulevard Overcrossing
Main Span Tied Arch Bridge Option 2

PRELIMINARY ESTIMATE

No.	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization (10%)	1	LS	$ 584,045	$ 584,045
2	Traffic Control Allowance	1	LS	$ 25,000	$ 25,000
3	Import Borrow	900	CY	$ 50	$ 45,000
4	Hot Mix Asphalt (Type A)	150	TON	$ 150	$ 22,500
5	Class 2 Aggregate Base	100	CY	$ 75	$ 7,500
6	Signage Allowance	1	LS	$ 50,000	$ 50,000
7	Lighting Allowance	1	LS	$ 100,000	$ 100,000
8	West Slab and Retaining Wall	1,950	SF	$ 150	$ 292,500
9	West Flat Slab	2,190	SF	$ 200	$ 438,000
10	Main Span Tied Arch Bridge	3,645	SF	$ 900	$ 3,280,500
11	East Flat Slab	2,700	SF	$ 200	$ 540,000
12	East Slab and Retaining Wall	3,390	SF	$ 150	$ 508,500
13	Minor Items (10% of Construction Cost)	1	LS	$ 530,950	$ 530,950

Construction Subtotal		$	6,424,495
Contingency	30%	$	1,927,349
Construction Total		$	8,352,000
Design Fees	15%	$	1,253,000
Construction Engineering/Construction Management	15%	$	1,253,000
		$	**10,900,000**

MARK THOMAS & COMPANY, INC.
Providing Engineering, Surveying and Planning Services

April 19, 2016
Job No.: AL-14107

CITY OF DUBLIN - IRON HORSE TRAIL FEASIBILITY STUDY
Dublin Boulevard Overcrossing
Main Span Cable Stay Bridge Option 3 (curved option)

PRELIMINARY ESTIMATE

No.	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization (10%)	1	LS	$ 861,410	$ 861,410
2	Traffic Control Allowance	1	LS	$ 25,000	$ 25,000
3	Import Borrow	900	CY	$ 50	$ 45,000
4	Hot Mix Asphalt (Type A)	150	TON	$ 150	$ 22,500
5	Class 2 Aggregate Base	100	CY	$ 75	$ 7,500
6	Signage Allowance	1	LS	$ 50,000	$ 50,000
7	Lighting Allowance	1	LS	$ 100,000	$ 100,000
8	West Slab and Retaining Wall	1,950	SF	$ 150	$ 292,500
9	West Flat Slab	690	SF	$ 200	$ 138,000
10	Main Span Cable Stay Bridge	5,085	SF	$ 1,200	$ 6,102,000
11	East Flat Slab	2,700	SF	$ 200	$ 540,000
12	East Slab and Retaining Wall	3,390	SF	$ 150	$ 508,500
13	Minor Items (10% of Construction Cost)	1	LS	$ 783,100	$ 783,100

Construction Subtotal		$	9,475,510
Contingency	30%	$	2,842,653
Construction Total		$	12,319,000
Design Fees	15%	$	1,848,000
Construction Engineering/Construction Management	15%	$	1,848,000
		$	**16,100,000**

MARK THOMAS & COMPANY, INC.
Providing Engineering, Surveying and Planning Services

February 4, 2016
Job No.: AL-14107

CITY OF DUBLIN - IRON HORSE TRAIL FEASIBILITY STUDY
Dougherty Road Overcrossing

PRELIMINARY ESTIMATE

No.	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization (10%)	1	LS	$ 515,611	$ 515,611
2	Traffic Control Allowance	1	LS	$ 25,000	$ 25,000
3	Import Borrow	600	CY	$ 50	$ 30,000
4	Hot Mix Asphalt (Type A)	300	TON	$ 150	$ 45,000
5	Class 2 Aggregate Base	225	CY	$ 75	$ 16,875
6	Signage Allowance	1	LS	$ 50,000	$ 50,000
7	Lighting Allowance	1	LS	$ 100,000	$ 100,000
8	West Slab and Retaining Wall	3,000	SF	$ 150	$ 450,000
9	West Flat Slab	5,250	SF	$ 200	$ 1,050,000
10	Main Span Truss Bridge	3,750	SF	$ 450	$ 1,687,500
11	East Flat Slab	3,285	SF	$ 200	$ 657,000
12	East Slab and Retaining Wall	3,840	SF	$ 150	$ 576,000
13	Minor Items (10% of Construction Cost)	1	LS	$ 468,738	$ 468,738

Construction Subtotal		$	5,671,724
Contingency	30%	$	1,701,517
Construction Total		$	7,374,000
Design Fees	15%	$	1,107,000
Construction Engineering/Construction Management	15%	$	1,107,000
		$	**9,600,000**

MARK THOMAS & COMPANY, INC.
Providing Engineering, Surveying and Planning Services

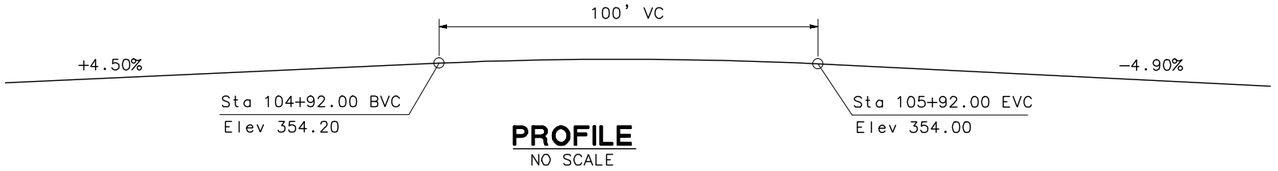
February 4, 2016
Job No.: AL-14107

CITY OF DUBLIN - IRON HORSE TRAIL FEASIBILITY STUDY
Dougherty Road Underpass

PRELIMINARY ESTIMATE

No.	Description	Quantity	Unit	Unit Price	Amount
1	Mobilization (10%)	1	LS	$ 580,676	$ 580,676
2	Traffic Control Allowance	1	LS	$ 250,000	$ 250,000
3	Roadway Excavation	675	CY	$ 150	$ 101,250
4	Hot Mix Asphalt (Type A)	525	TON	$ 150	$ 78,750
5	Class 2 Aggregate Base	425	CY	$ 75	$ 31,875
6	Signage Allowance	1	LS	$ 50,000	$ 50,000
7	Pump Station and Storm Drain Modifications	1	LS	$ 250,000	$ 250,000
8	Lighting Allowance	1	LS	$ 100,000	$ 100,000
9	West Approach	2,100	SF	$ 150	$ 315,000
10	West Slab and Retaining Wall	2,240	SF	$ 200	$ 448,000
11	Full Tunnel Section	8,260	SF	$ 350	$ 2,891,000
12	East Slab and Retaining Wall	2,240	SF	$ 200	$ 448,000
13	East Approach	2,100	SF	$ 150	$ 315,000
14	Minor Items (10% of Construction Costs)	1	LS	$ 527,888	$ 527,888

Construction Subtotal		$ 6,387,439
Contingency	30%	$ 1,916,232
Construction Total		$ 8,304,000
Design Fees	15%	$ 1,246,000
Construction Engineering/Construction Management	15%	$ 1,246,000
		$ 10,800,000



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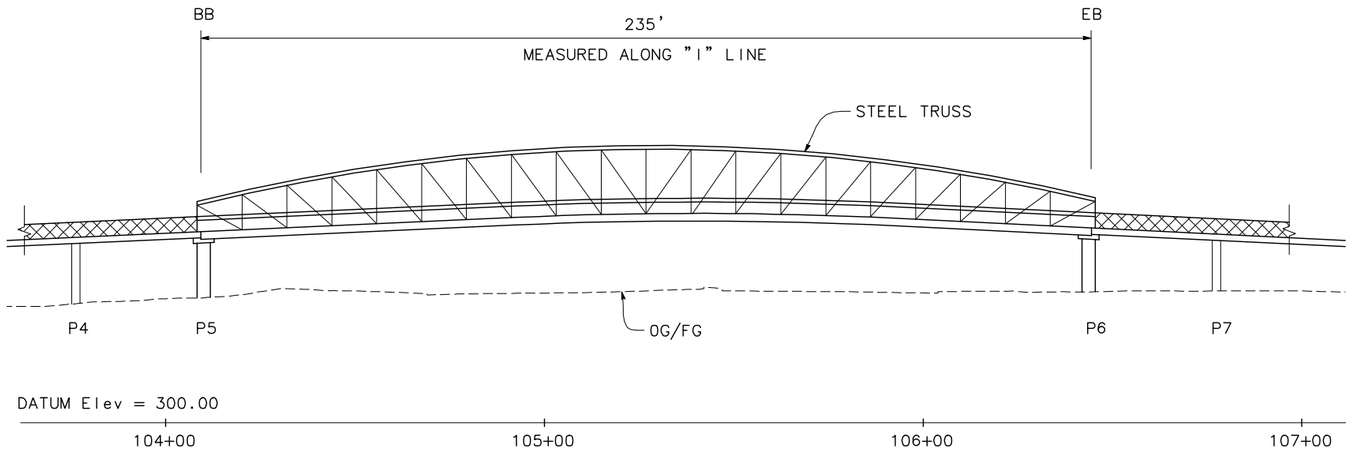

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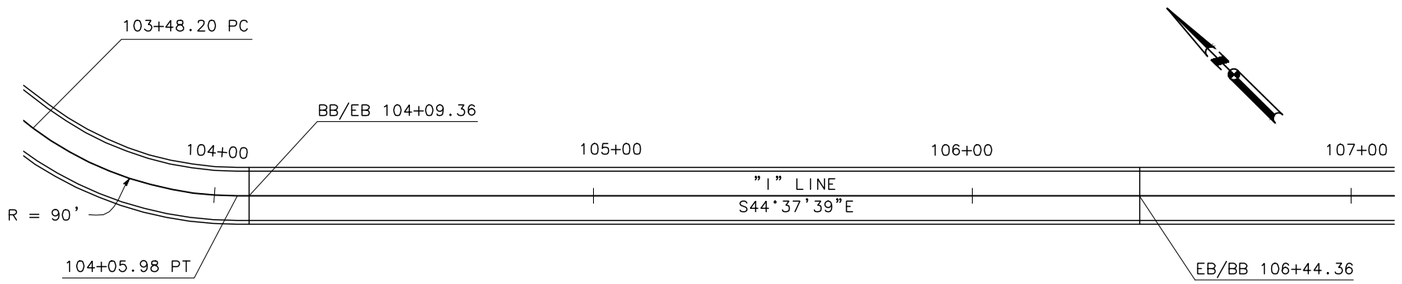

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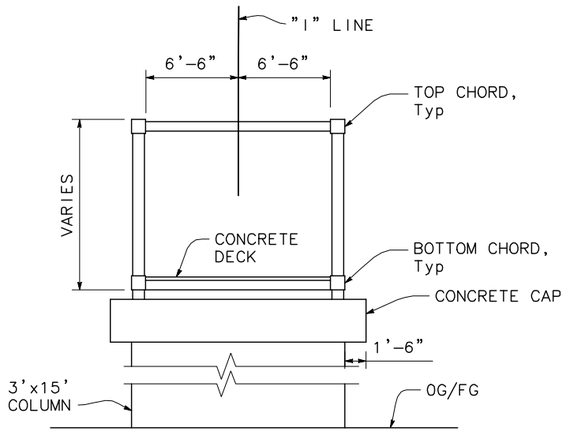

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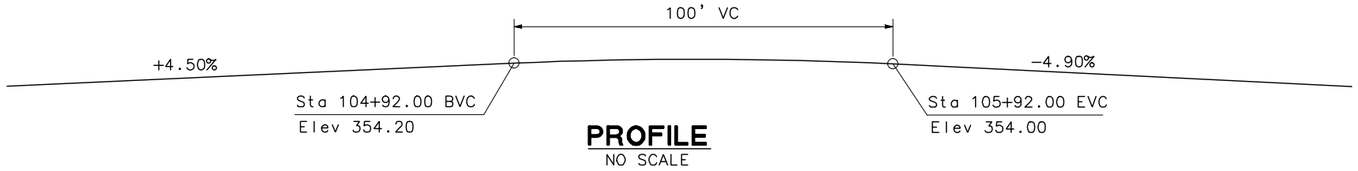
SCALE: AS SHOWN
DATE: FEBRUARY 2016
FILE: AL-14107-004

IRON HORSE TRAIL PEDESTRIAN TRAIL
DUBLIN BLVD OVERCROSSING
STEEL TRUSS GENERAL PLAN

MARK THOMAS & COMPANY, INC.
Providing Engineering, Surveying and Planning Services
3000 OAK ROAD, SUITE 650
WALNUT CREEK, CALIFORNIA 94597
TEL: (925) 938-0383 FAX: (925) 938-0389



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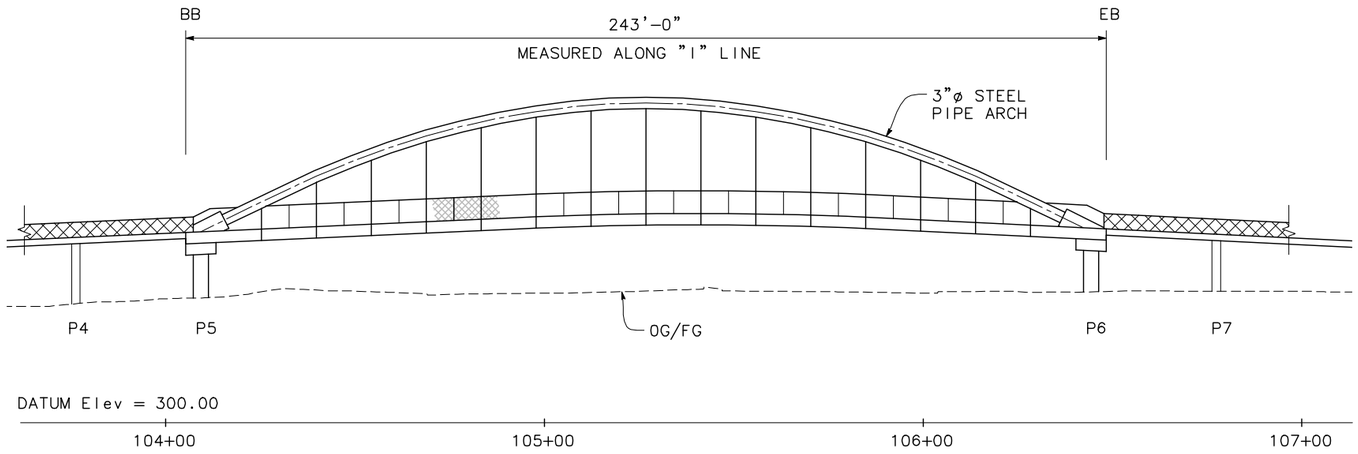

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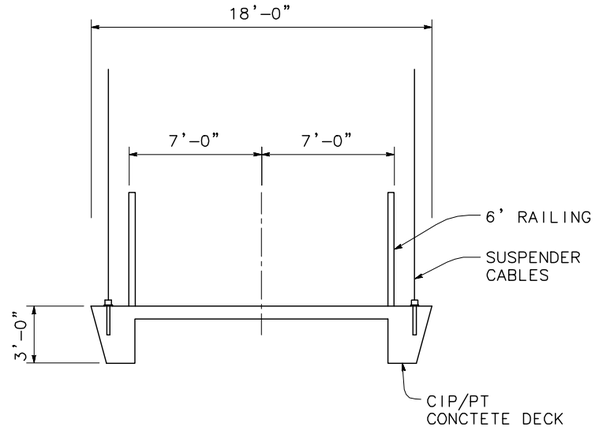

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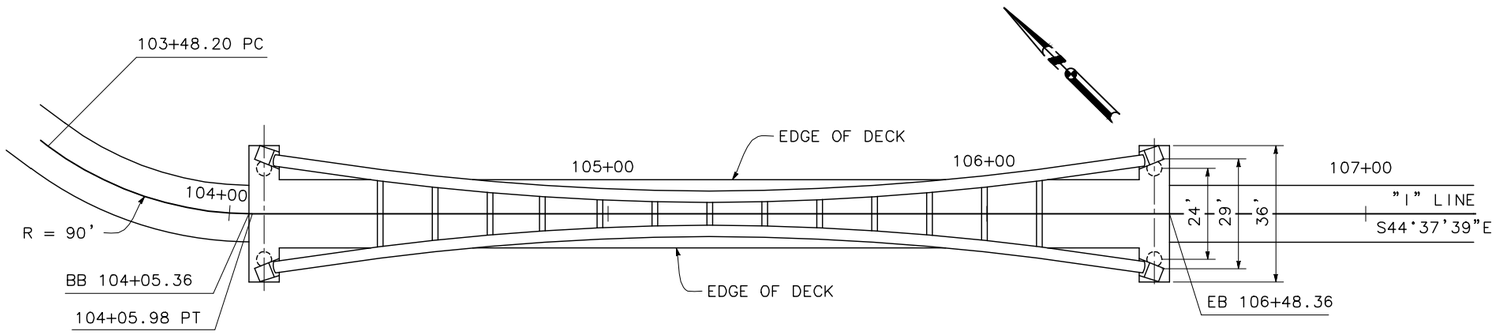

PLAN
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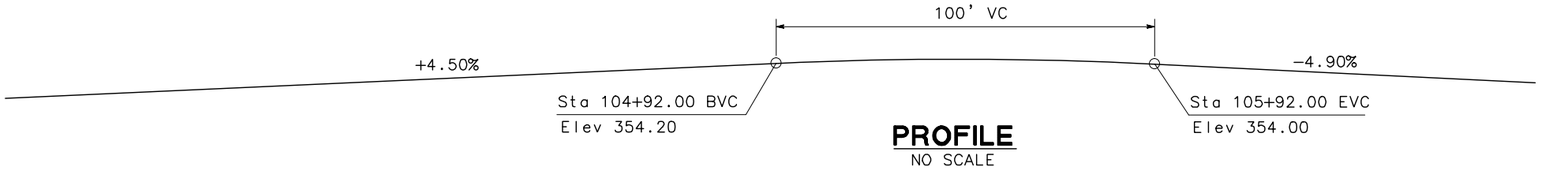
SCALE: AS SHOWN
DATE: FEBRUARY 2016
FILE: AL-14107-004

IRON HORSE TRAIL PEDESTRIAN TRAIL
DUBLIN BLVD OVERCROSSING
BASKET HANDLE TIED - ARCH GENERAL PLAN

MARK THOMAS & COMPANY, INC.
Providing Engineering, Surveying and Planning Services
3000 OAK ROAD, SUITE 650
WALNUT CREEK, CALIFORNIA 94597
TEL: (925) 938-0383 FAX: (925) 938-0389



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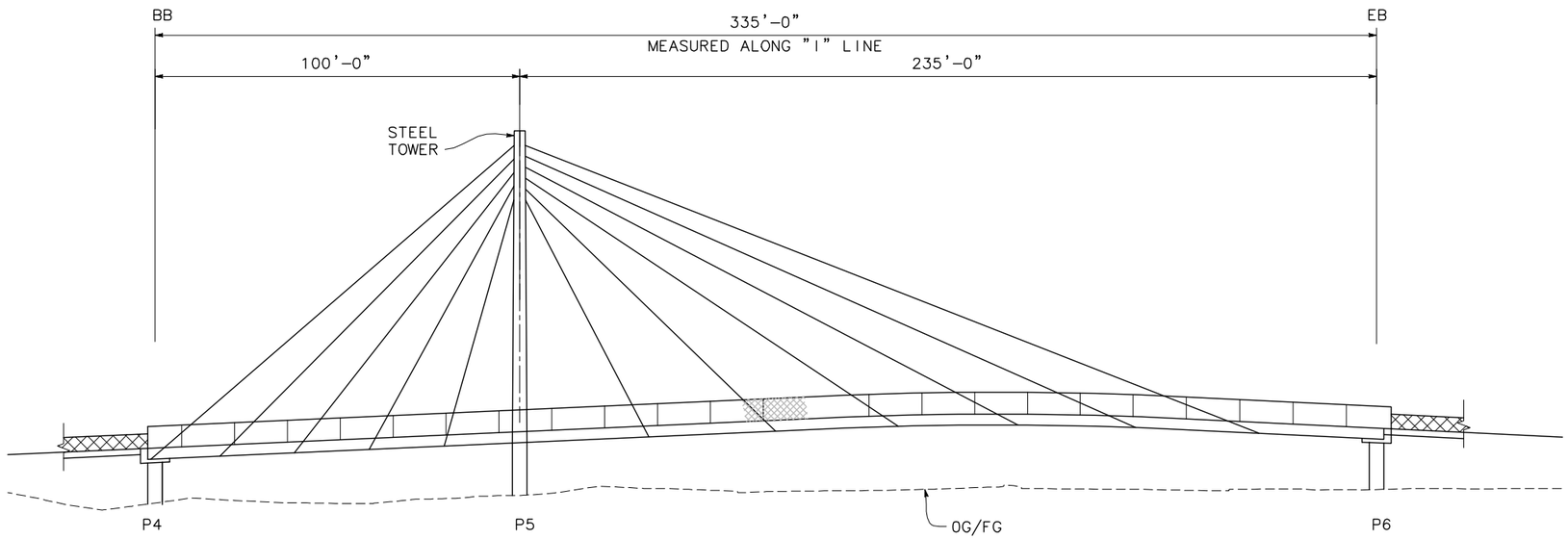

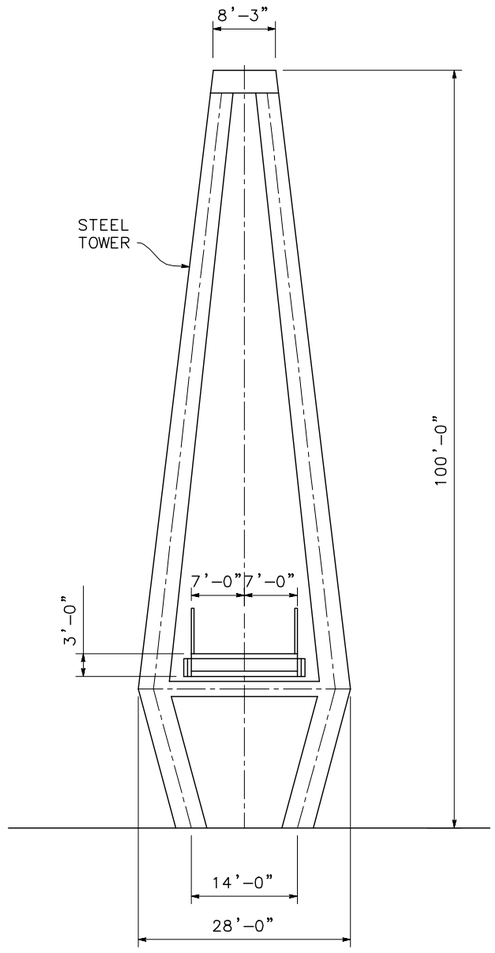

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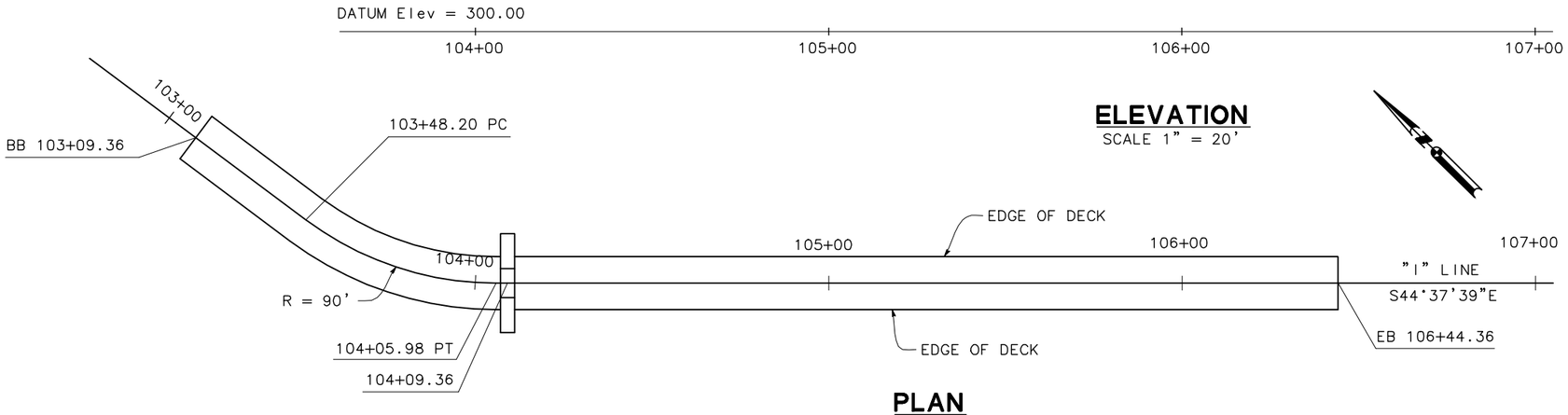

ELEVATION
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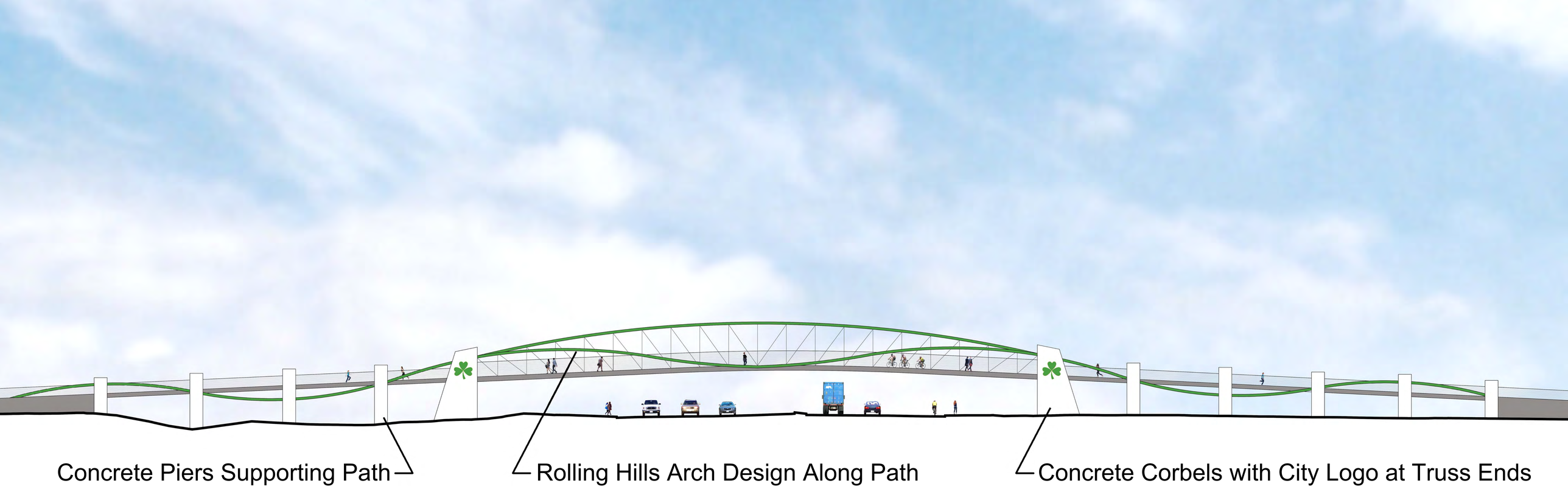
PLAN
SCALE 1" = 20'

SCALE: AS SHOWN
DATE: MARCH 2016
FILE: AL-14107-004

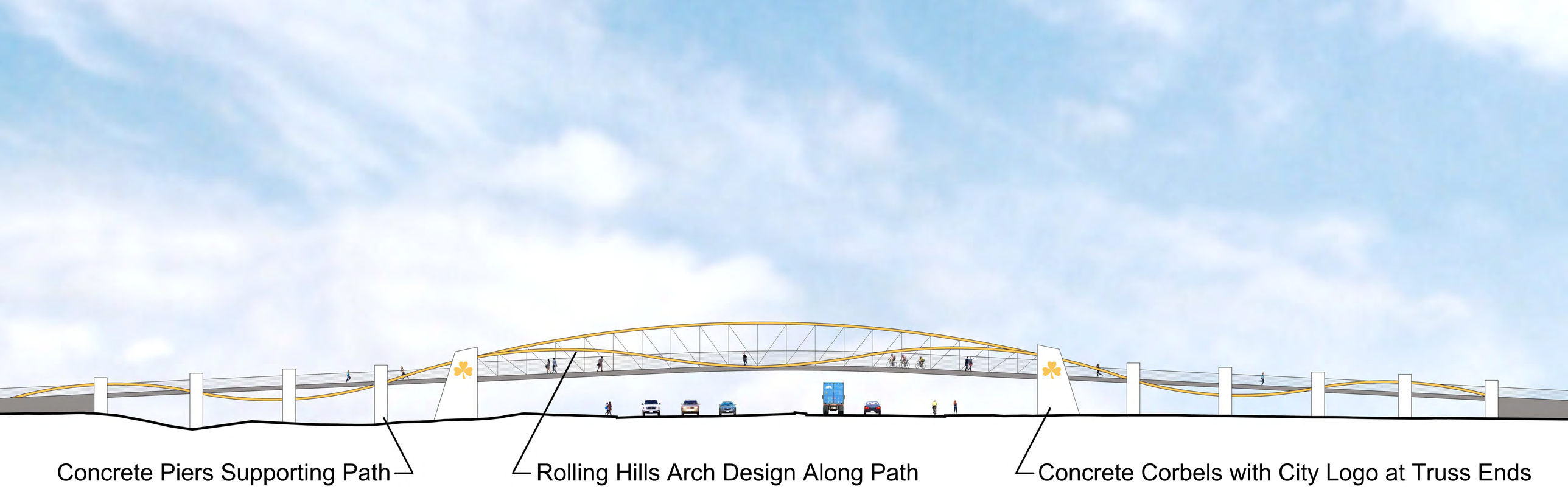
IRON HORSE TRAIL PEDESTRIAN TRAIL
DUBLIN BLVD OVERCROSSING
CABLE STAYED GENERAL PLAN

MARK THOMAS & COMPANY, INC.
Providing Engineering, Surveying and Planning Services
3000 OAK ROAD, SUITE 650
WALNUT CREEK, CALIFORNIA 94597
TEL: (925) 938-0383 FAX: (925) 938-0389



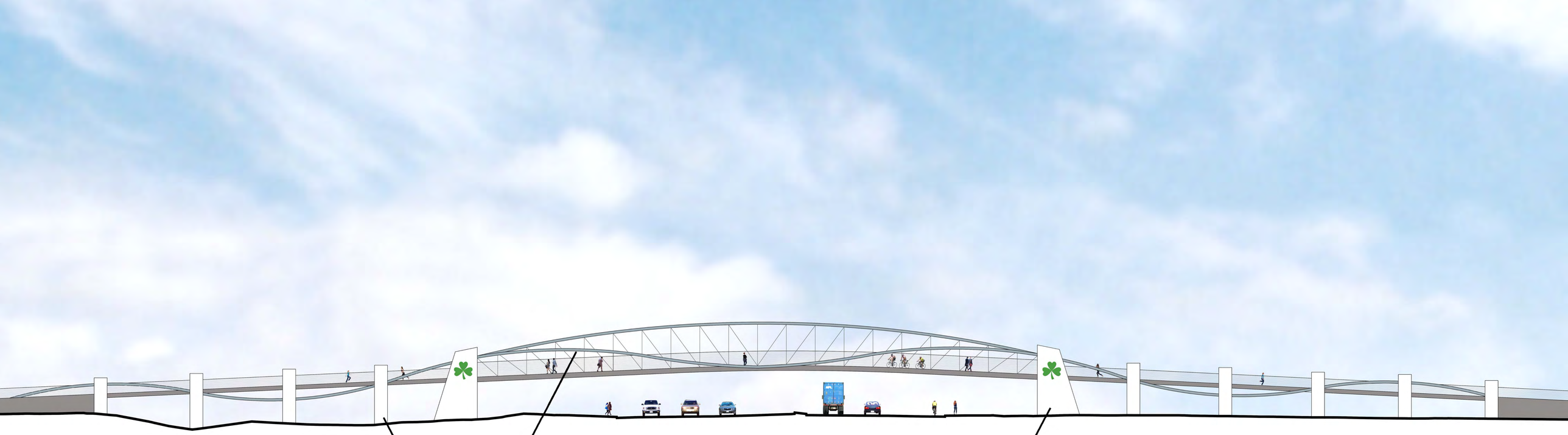
Steel Truss Arch - Option 1A

Iron Horse Trail Dublin Boulevard Overcrossing



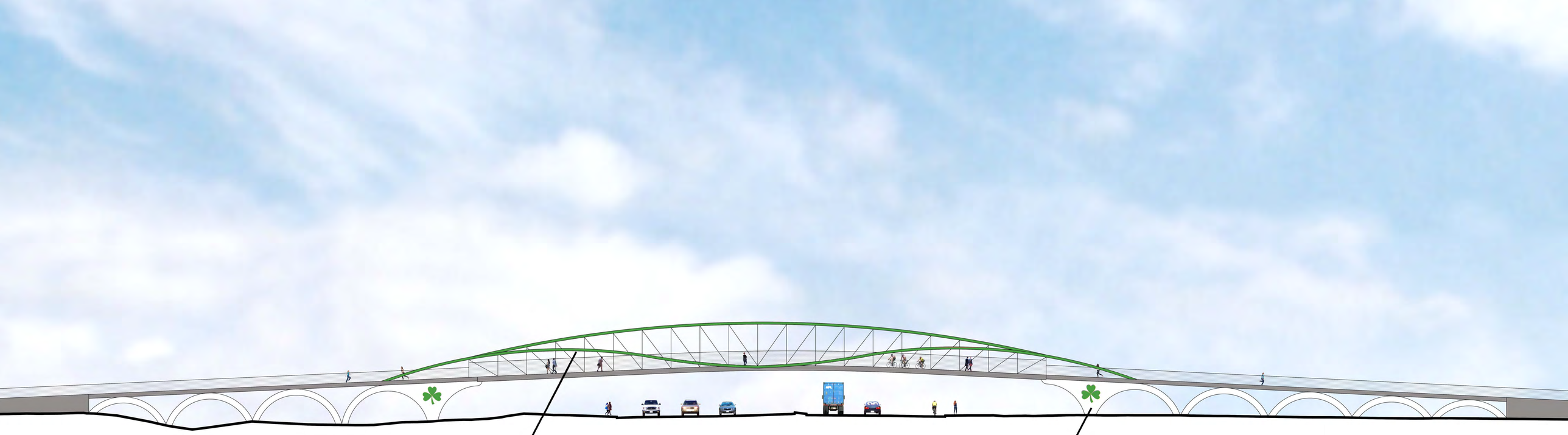
Steel Truss Arch - Option 1A

Iron Horse Trail Dublin Boulevard Overcrossing



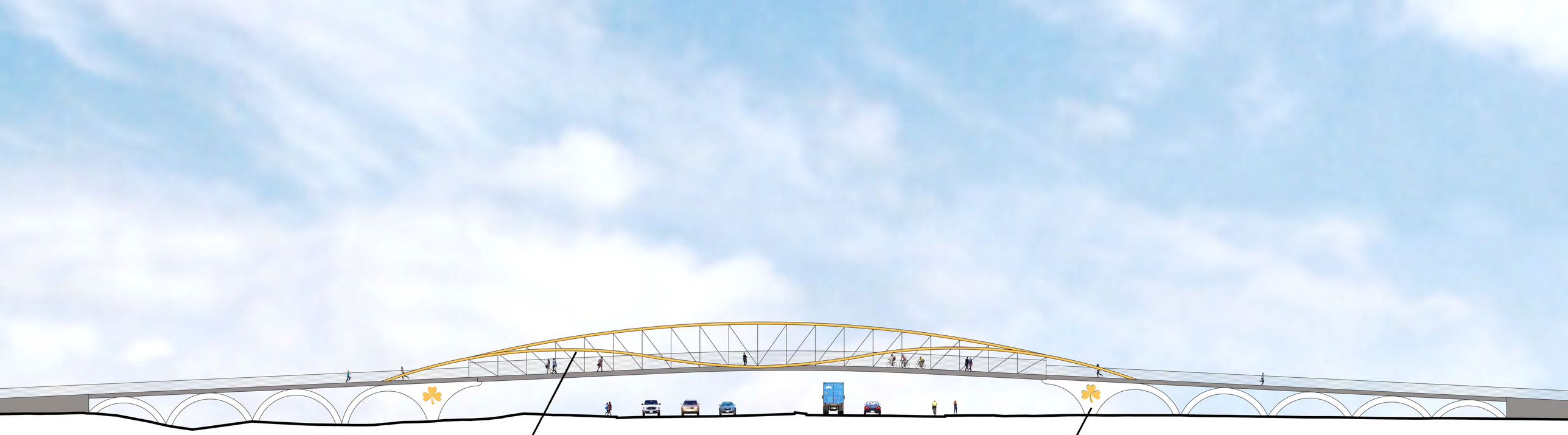
Steel Truss Arch - Option 1A

Iron Horse Trail Dublin Boulevard Overcrossing



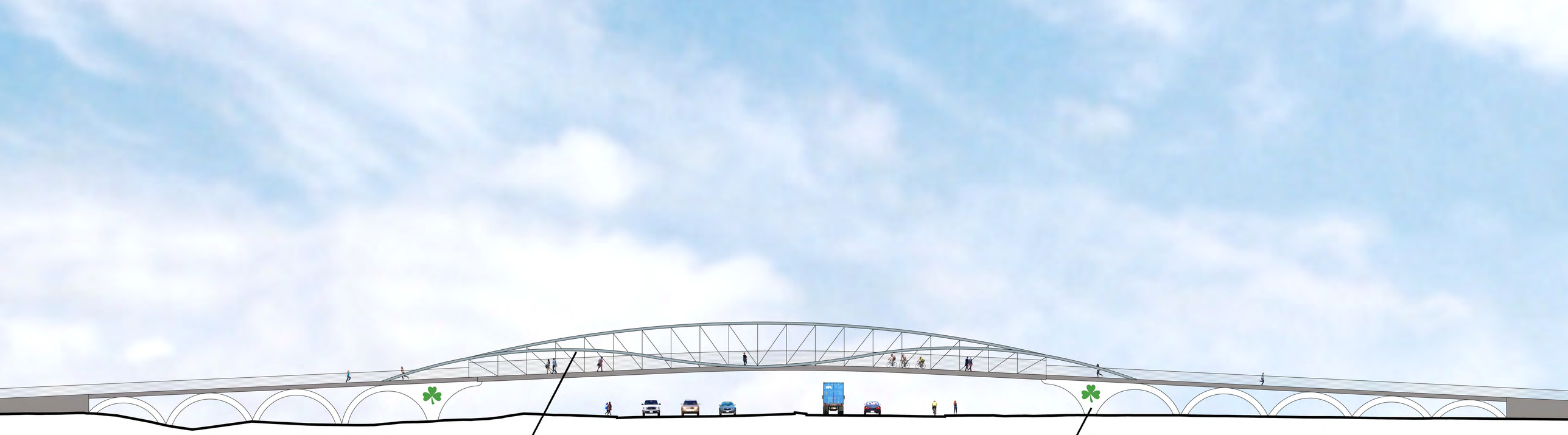
Steel Truss Arch - Option 1B

Iron Horse Trail Dublin Boulevard Overcrossing



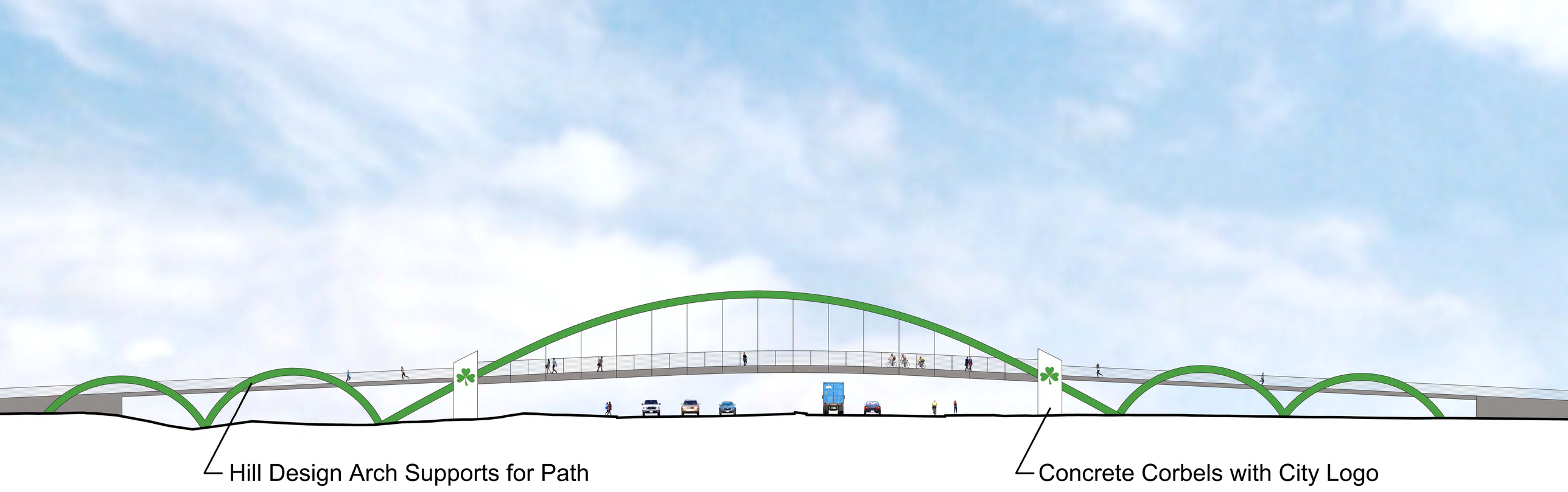
Steel Truss Arch - Option 1B

Iron Horse Trail Dublin Boulevard Overcrossing



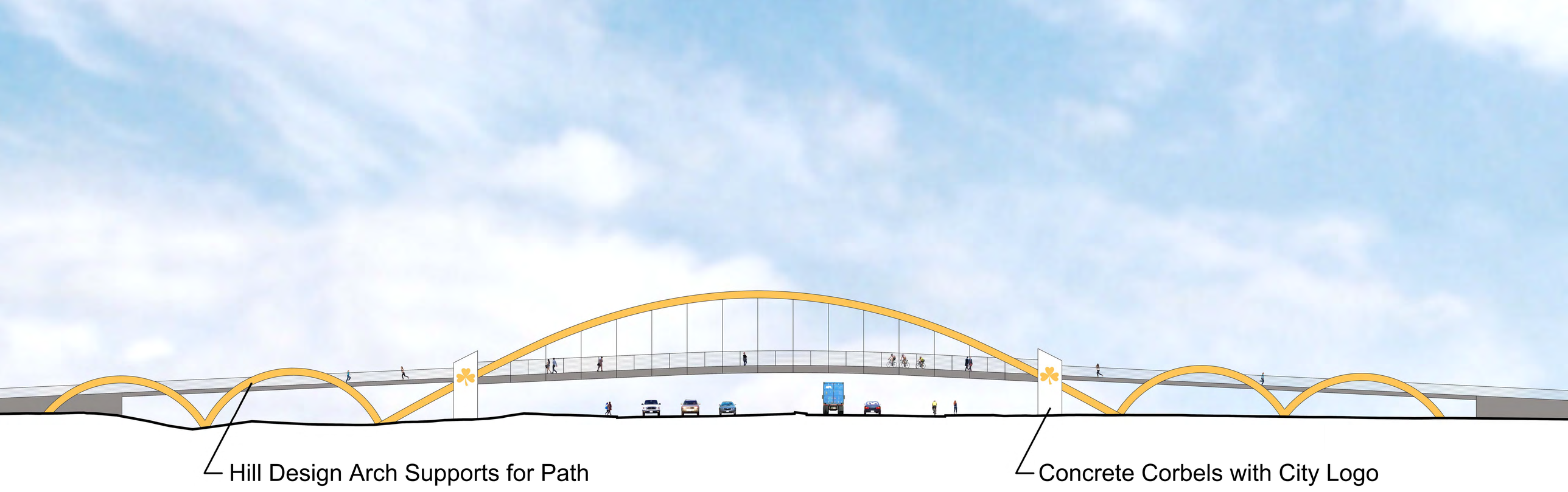
Steel Truss Arch - Option 1B

Iron Horse Trail Dublin Boulevard Overcrossing



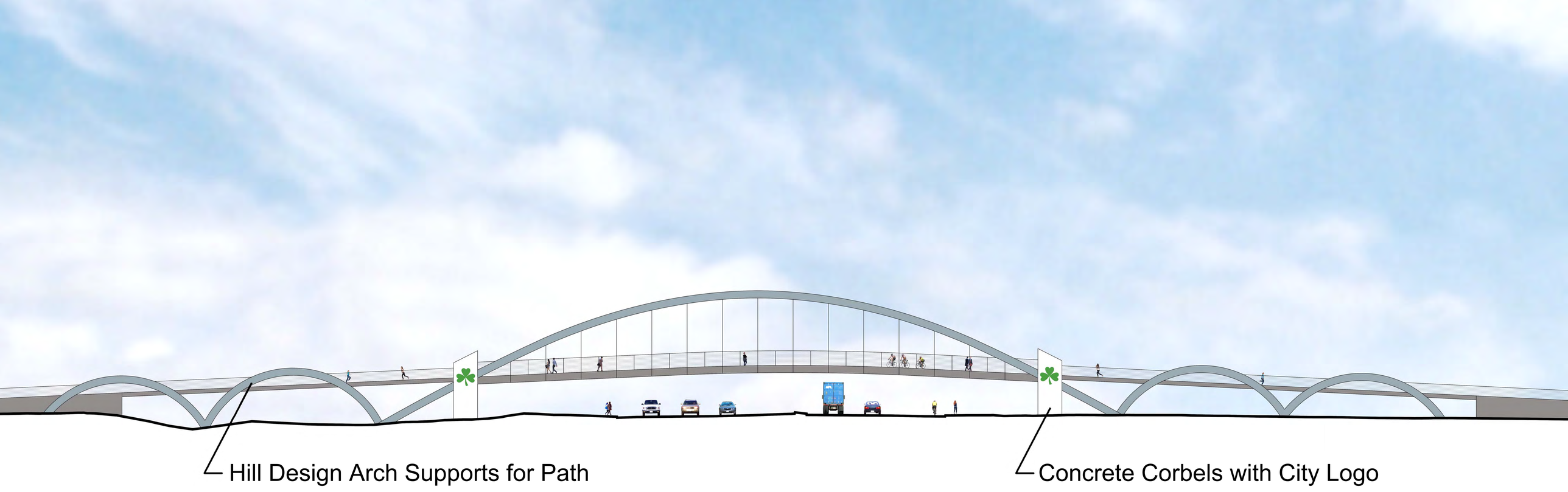
Basket Handle Arch - Option 2A

Iron Horse Trail Dublin Boulevard Overcrossing



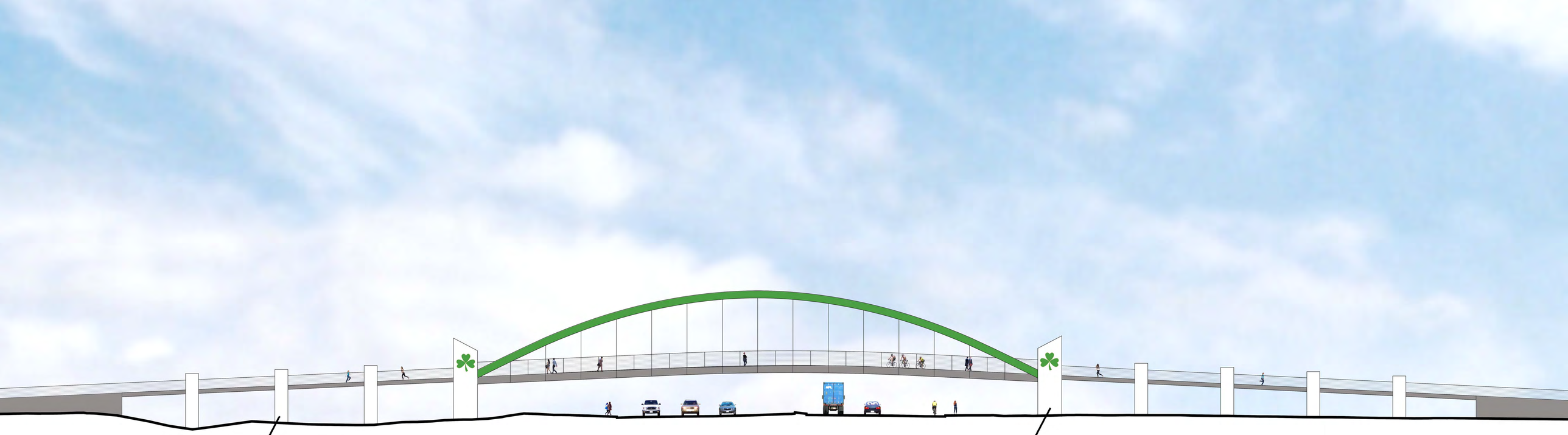
Basket Handle Arch - Option 2A

Iron Horse Trail Dublin Boulevard Overcrossing



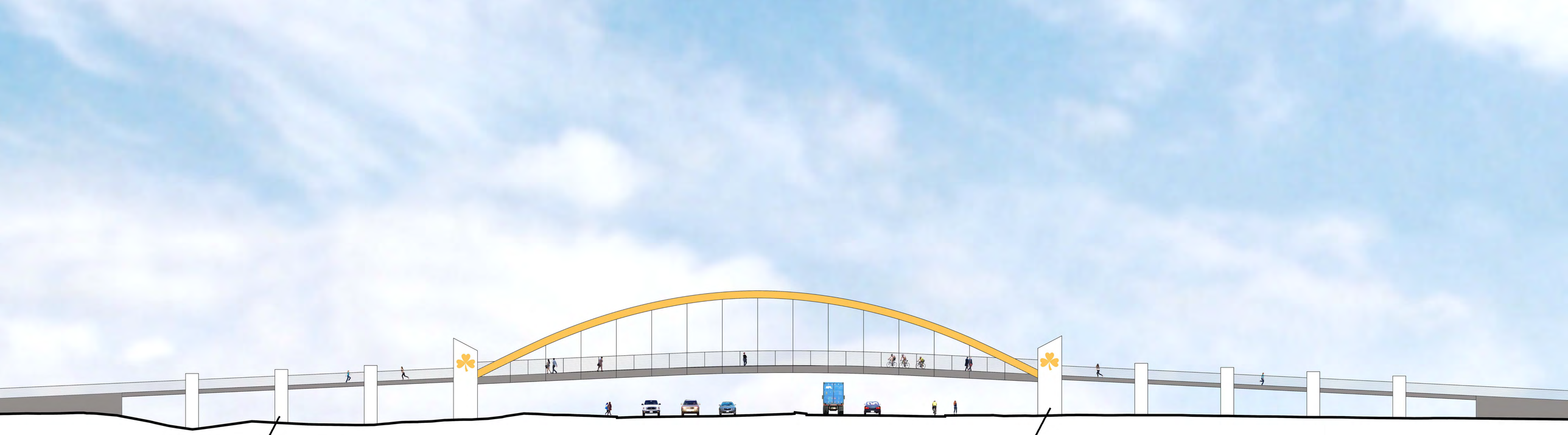
Basket Handle Arch - Option 2A

Iron Horse Trail Dublin Boulevard Overcrossing



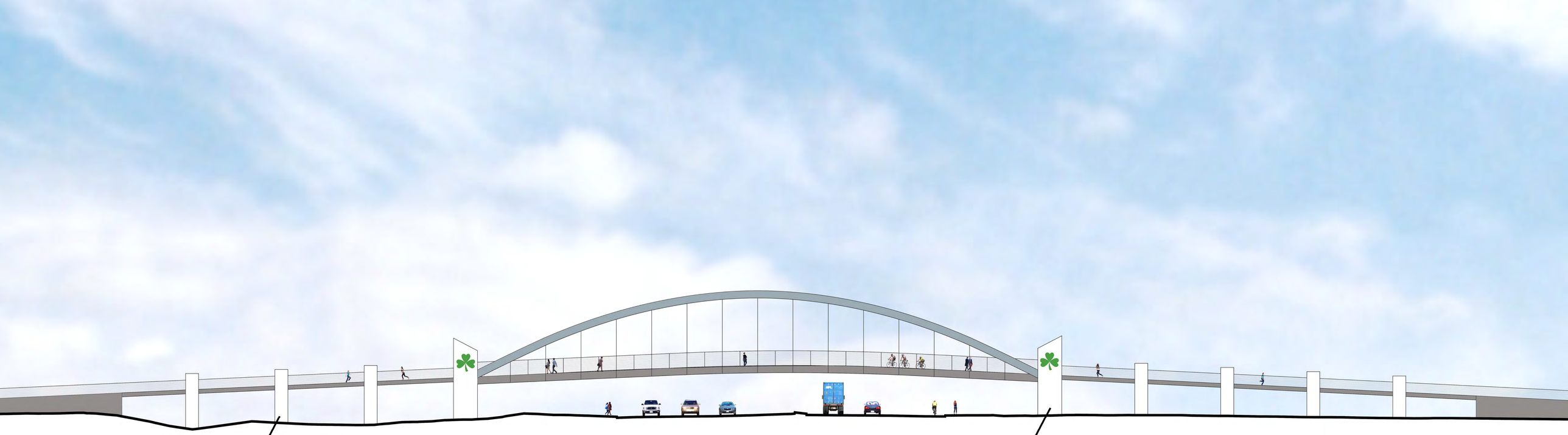
Basket Handle Arch - Option 2B

Iron Horse Trail Dublin Boulevard Overcrossing



Basket Handle Arch - Option 2B

Iron Horse Trail Dublin Boulevard Overcrossing



Basket Handle Arch - Option 2B

Iron Horse Trail Dublin Boulevard Overcrossing

Cable Stayed Crossing - Option 3

Iron Horse Trail Dublin Boulevard Overcrossing

Cable Stayed Crossing - Option 3

Iron Horse Trail Dublin Boulevard Overcrossing

Cable Stayed Crossing - Option 3

Iron Horse Trail Dublin Boulevard Overcrossing

Pipe Railing

Cable Railing

Vertical Picket Railing

Iron Horse Trail Dublin Boulevard Overcrossing

E. Detail Near-term & Long-term Cost Estimates

Active Transprotation Plannning Level Estimate

Iron Horse Trail Feasibility Study

Project Location: **S1: Iron Horse Trail Segment north of Dougherty Road - Neart Term**

Work Description:

Resurface trail, raised crossing at Park Sierra driveway

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	Resurface Trail	22500	SF	$3	$68,000
2	Raised Crosswalk	1	LS	$10,000	$10,000
	Estimated Construction Cost Subtotal				**$78,000**
	Miscellaneous Items (10% of Estimated Construction Cost Subtotal)				$8,000
	Mobilization (10% of Estimated Construction Cost Subtotal)				$8,000
	Traffic Control (10% of Estimated Construction Cost Subtotal)				$8,000
	Contigencies (25% of Estimated Construction Cost Subtotal)				$20,000
	ESTIMATED CONSTRUCTION COST TOTAL				$122,000
	Planning & Design (20% of Estimated Construction Cost Total)				**$25,000**
	Construction Administration (10% of Estimated Construction Cost Total)				**$13,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$38,000
	TOTAL ESTIMATED PROJECT COST:				**$160,000**

Active Transprotation Plannning Level Estimate

Iron Horse Trail Feasibility Study

Project Location: **I3: Dougherty Road/Iron Horse Trail Intersection - Near Term**

Work Description: Reconstruct passageways through islands, enhance crosswalk, passive detection for trail users, modifiy signal to eliminate vehicle-trail user conflicts, reconstruct ramps, wayfinding signs

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	Concrete Curb and Gutter	150	LF	$40	$6,000
2	Median Curb	100	LF	$25	$3,000
3	Concrete Sidealk	500	SF	$12	$6,000
4	Curb Ramps	2	EA	$4,500	$9,000
5	Pavement Delineation	1	LS	$20,000	$20,000
6	Wayfinding Signs	3	EA	$1,800	$6,000
7	Gateway or Art Installation	1	LS	$75,000	$75,000
8	Speed Feedback Signs	2	EA	$10,000	$20,000
9	Traffic Signals Modifications	1	EA	$350,000	$350,000
	Estimated Construction Cost Subtotal				**$495,000**
	Miscellaneous Items (10% of Estimated Construction Cost Subtotal)				$50,000
	Mobilization (10% of Estimated Construction Cost Subtotal)				$50,000
	Traffic Control (10% of Estimated Construction Cost Subtotal)				$50,000
	Contigencies (25% of Estimated Construction Cost Subtotal)				$124,000
	ESTIMATED CONSTRUCTION COST TOTAL				$769,000
	Planning & Design (20% of Estimated Construction Cost Total)				**$154,000**
	Construction Administration (10% of Estimated Construction Cost Total)				**$77,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$231,000
	TOTAL ESTIMATED PROJECT COST:				**$1,000,000**

Active Transprotation Plannning Level Estimate

Iron Horse Trail Feasibility Study

Project Location: **S4: Iron Horse Trail Segment between Dougherty Road and Dublin Boulevard - Near Term**

Work Description: Provide decomposed granite soulders on each side of trail, street trees adjacent to Scarlett Drive (north of Houston Place), drought-tolerant/native landscaping adjacent to trail, bences, rest area, wayfinding signs,

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	Decomposed Granite Shoulders	9600	SF	$4	$39,000
2	Street Trees	47	EA	$4,000	$187,000
3	Landscaping	24000	SF	$12	$288,000
4	Wayfinding Signs	4	EA	$1,800	$8,000
5	Benches	5	EA	$1,800	$9,000
Estimated Construction Cost Subtotal					**$531,000**
	Miscellaneous Items (10% of Estimated Construction Cost Subtotal)				$54,000
	Mobilization (10% of Estimated Construction Cost Subtotal)				$54,000
	Traffic Control (10% of Estimated Construction Cost Subtotal)				$54,000
	Contigencies (25% of Estimated Construction Cost Subtotal)				$133,000
	ESTIMATED CONSTRUCTION COST TOTAL				$826,000
	Planning & Design (20% of Estimated Construction Cost Total)				**$166,000**
	Construction Administration (10% of Estimated Construction Cost Total)				**$83,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$249,000
	TOTAL ESTIMATED PROJECT COST:				**$1,075,000**

Active Transprotation Plannning Level Estimate

Iron Horse Trail Feasibility Study

Project Location: **S4: Iron Horse Trail Segment between Dougherty Road and Dublin Boulevard - Long Term**

Work Description: Reconstruct trail with soulders (including base repair), landscaping and trees south of Houston Place, update wayfinding signs

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	Decomposed Granite Shoulders	9600	SF	$5	$48,000
2	Asphalt Trail	28800	SF	$8	$231,000
2	Street Trees	33	EA	$4,000	$134,000
3	Landscaping	10000	SF	$12	$120,000
4	Wayfinding Signs	8	EA	$1,800	$15,000
5	Benches	4	EA	$1,800	$8,000
Estimated Construction Cost Subtotal					**$556,000**
	Miscellaneous Items (10% of Estimated Construction Cost Subtotal)				$56,000
	Mobilization (10% of Estimated Construction Cost Subtotal)				$56,000
	Traffic Control (10% of Estimated Construction Cost Subtotal)				$56,000
	Contigencies (25% of Estimated Construction Cost Subtotal)				$139,000
	ESTIMATED CONSTRUCTION COST TOTAL				$863,000
	Planning & Design (20% of Estimated Construction Cost Total)				**$173,000**
	Construction Administration (10% of Estimated Construction Cost Total)				**$87,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$260,000
	TOTAL ESTIMATED PROJECT COST:				**$1,123,000**

Active Transprotation Plannning Level Estimate

Iron Horse Trail Feasibility Study

Project Location: **I6: Houston Place/Scarlett Drive Intersection - Near Term**

Work Description: Enhance crosswalk across Scarlett Drive to Trail, widen path connection and provide ADA compliant curb ramps, wayfinding signs

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	Concrete Curb and Gutter	10	LF	$40	$1,000
2	Modify Fence	1	LS	$1,000	$1,000
3	Curb Ramps	2	EA	$4,500	$9,000
4	Pavement Delineation	1	LS	$4,000	$4,000
5	Wayfinding Signs	3	EA	$1,800	$6,000
	Estimated Construction Cost Subtotal				**$21,000**
	Miscellaneous Items (10% of Estimated Construction Cost Subtotal)				$3,000
	Mobilization (10% of Estimated Construction Cost Subtotal)				$3,000
	Traffic Control (10% of Estimated Construction Cost Subtotal)				$3,000
	Contigencies (25% of Estimated Construction Cost Subtotal)				$6,000
	ESTIMATED CONSTRUCTION COST TOTAL				$36,000
	Planning & Design (20% of Estimated Construction Cost Total)				**$8,000**
	Construction Administration (10% of Estimated Construction Cost Total)				**$4,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$12,000
	TOTAL ESTIMATED PROJECT COST:				**$48,000**

Active Transprotation Plannning Level Estimate

Iron Horse Trail Feasibility Study

Project Location: **I7: Dublin Boulevard/Iron Horse Trail Intersection - Near Term**

Work Description: Reduce curb radii, install wide directional ramps, enhance crosswalk, adjust push button placement, provide passive detection for cyclists, install wayfinding signs, speed feedback signs, gateway or art installation

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	Concrete Curb and Gutter	160	LF	$40	$7,000
2	Median Curb	20	LF	$25	$1,000
3	Concrete Sidealk	200	SF	$12	$3,000
4	Curb Ramps	4	EA	$4,500	$18,000
5	Pavement Delineation	1	LS	$10,000	$10,000
6	Wayfinding Signs	4	EA	$1,800	$8,000
7	Gateway or Art Installation	1	LS	$75,000	$75,000
8	Speed Feedback Signs	2	EA	$10,000	$20,000
9	Drainage Allowance	1	LS	$25,000	$25,000
10	Traffic Signals Modifications	1	EA	$200,000	$200,000
	Estimated Construction Cost Subtotal				**$367,000**
	Miscellaneous Items (10% of Estimated Construction Cost Subtotal)				$37,000
	Mobilization (10% of Estimated Construction Cost Subtotal)				$37,000
	Traffic Control (10% of Estimated Construction Cost Subtotal)				$37,000
	Contigencies (25% of Estimated Construction Cost Subtotal)				$92,000
	ESTIMATED CONSTRUCTION COST TOTAL				$570,000
	Planning & Design (20% of Estimated Construction Cost Total)				**$114,000**
	Construction Administration (10% of Estimated Construction Cost Total)				**$57,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$171,000
	TOTAL ESTIMATED PROJECT COST:				**$741,000**

Active Transprotation Plannning Level Estimate

Iron Horse Trail Feasibility Study

Project Location: **S8: Iron Horse Trail Segment between Dublin Boulevard and BART Access Road - Near Term**

Work Description:

Pedestrian-scale lighting at gateway locations, landscaping, wayfinding signs

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	Landscaping	12000	SF	$12	$144,000
2	Wayfinding Signs	8	EA	$1,800	$15,000
3	Pedestrian Scale Lighting	4	EA	$10,000	$40,000
4	Benches	4	EA	$1,800	$8,000
	Estimated Construction Cost Subtotal				**$207,000**
	Miscellaneous Items (10% of Estimated Construction Cost Subtotal)				$21,000
	Mobilization (10% of Estimated Construction Cost Subtotal)				$21,000
	Traffic Control (10% of Estimated Construction Cost Subtotal)				$21,000
	Contigencies (25% of Estimated Construction Cost Subtotal)				$52,000
	ESTIMATED CONSTRUCTION COST TOTAL				$322,000
	Planning & Design (20% of Estimated Construction Cost Total)				**$65,000**
	Construction Administration (10% of Estimated Construction Cost Total)				**$33,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$98,000
	TOTAL ESTIMATED PROJECT COST:				**$420,000**

Active Transprotation Plannning Level Estimate

Iron Horse Trail Feasibility Study

Project Location: **S8: Iron Horse Trail Segment between Dublin Boulevard and BART Access Road - Long Term**

Work Description:

Pedestrian-scale lighting, reconsruct trail with decomposed granite shoulders, landscaping

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	Decomposed Granite Shoulders	4800	SF	$5	$24,000
2	Asphalt Trail	14400	SF	$8	$116,000
3	Landscaping	10000	SF	$12	$120,000
4	Pedestrian Scale Lighting	24	EA	$10,000	$240,000
5	Benches	4	EA	$1,800	$8,000
	Estimated Construction Cost Subtotal				**$508,000**
	Miscellaneous Items (10% of Estimated Construction Cost Subtotal)				$51,000
	Mobilization (10% of Estimated Construction Cost Subtotal)				$51,000
	Traffic Control (10% of Estimated Construction Cost Subtotal)				$51,000
	Contigencies (25% of Estimated Construction Cost Subtotal)				$127,000
	ESTIMATED CONSTRUCTION COST TOTAL				$788,000
	Planning & Design (20% of Estimated Construction Cost Total)				**$158,000**
	Construction Administration (10% of Estimated Construction Cost Total)				**$79,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$237,000
	TOTAL ESTIMATED PROJECT COST:				**$1,025,000**

Active Transprotation Plannning Level Estimate

Iron Horse Trail Feasibility Study

Project Location: **S9: Iron Horse Trail Segment adjcent to BART Access Road - Near Term**

Work Description: Two-way cycle track, resurface trail, high-vibisbily crosswalk connecting trail to bus bays, pedestrian-scale lighting, landscaping, wayfinding signs

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	Landscaping	6000	SF	$12	$72,000
2	Resurface Trail	4800	SF	$3	$15,000
3	Wayfinding Signs	4	EA	$1,800	$8,000
4	Cycle track (striping/channelizers)	1000	LF	$10	$10,000
5	Pavement Delineation	1	LS	$5,000	$5,000
6	Pedestrian Scale Lighting	12	EA	$10,000	$120,000
7	Benches	2	EA	$1,800	$4,000
	Estimated Construction Cost Subtotal				**$234,000**
	Miscellaneous Items (10% of Estimated Construction Cost Subtotal)				$24,000
	Mobilization (10% of Estimated Construction Cost Subtotal)				$24,000
	Traffic Control (10% of Estimated Construction Cost Subtotal)				$24,000
	Contigencies (25% of Estimated Construction Cost Subtotal)				$59,000
	ESTIMATED CONSTRUCTION COST TOTAL				$365,000
	Planning & Design (20% of Estimated Construction Cost Total)				**$73,000**
	Construction Administration (10% of Estimated Construction Cost Total)				**$37,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$110,000
	TOTAL ESTIMATED PROJECT COST:				**$475,000**

Active Transprotation Plannning Level Estimate

Iron Horse Trail Feasibility Study

Project Location: **S9: Iron Horse Trail Segment adjcent to BART Access Road - Long Term**

Work Description: Relocate lighting, reconsruct trail with decomposed granite shoulders, landscaping, trail plaza area, enhance connections between Trail and DeMarcus Boulevard

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	Decomposed Granite Shoulders	2400	SF	$5	$12,000
2	Asphalt Trail	7200	SF	$8	$58,000
3	Landscaping	6000	SF	$12	$72,000
4	Concrete Curb & Gutter	200	LF	$40	$8,000
5	Plaza Paving	2700	SF	$15	$41,000
6	Trees (for Plaza)	8	EA	$4,000	$32,000
7	Wayfinding Signs	4	EA	$1,800	$8,000
8	Pavement Delineation	1	LS	$5,000	$5,000
9	Pedestrian Scale Lighting	12	EA	$10,000	$120,000
10	Relocate Lighting	12	EA	$2,000	$24,000
11	Relocate Chain-link Fence	600	LF	$10	$6,000
12	Plaza Amenities	1	LS	$150,000	$150,000
13	Drainage Allowance	1	LS	$50,000	$50,000
	Estimated Construction Cost Subtotal				**$586,000**
	Miscellaneous Items (10% of Estimated Construction Cost Subtotal)				$59,000
	Mobilization (10% of Estimated Construction Cost Subtotal)				$59,000
	Traffic Control (10% of Estimated Construction Cost Subtotal)				$59,000
	Contigencies (25% of Estimated Construction Cost Subtotal)				$147,000
	ESTIMATED CONSTRUCTION COST TOTAL				$910,000
	Planning & Design (20% of Estimated Construction Cost Total)				**$182,000**
	Construction Administration (10% of Estimated Construction Cost Total)				**$91,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$273,000
	TOTAL ESTIMATED PROJECT COST:				**$1,183,000**

Active Transprotation Plannning Level Estimate

Iron Horse Trail Feasibility Study

Project Location: **S10: Iron Horse Trail Segment through BART Station (under I-580) - Near Term**

Work Description:

Create two-way bikeway through BART station area on the BART Access Road

ITEM	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	TOTAL
1	Remove Curb & Gutter	600	LF	$5	$3,000
2	Roadway Paving	15900	SF	$12	$191,000
3	Reconstruct Sidewalk	1000	SF	$15	$15,000
4	Raised Crosswalk	1	LS	$10,000	$10,000
5	Curb Ramps	4	EA	$4,500	$18,000
6	Concrete Curb & Gutter	650	LF	$40	$26,000
7	Median Curb	400	LF	$25	$10,000
8	Median Paving	800	SF	$8	$7,000
9	Wayfinding Signs	8	EA	$1,800	$15,000
10	Pavement Delineation	1	LS	$30,000	$30,000
11	Adjust Utilities	1	LS	$75,000	$75,000
12	Drainage Allowance	1	LS	$75,000	$75,000
	Estimated Construction Cost Subtotal				**$475,000**
	Miscellaneous Items (10% of Estimated Construction Cost Subtotal)				$48,000
	Mobilization (10% of Estimated Construction Cost Subtotal)				$48,000
	Traffic Control (10% of Estimated Construction Cost Subtotal)				$48,000
	Contigencies (25% of Estimated Construction Cost Subtotal)				$119,000
	ESTIMATED CONSTRUCTION COST TOTAL				$738,000
	Planning & Design (20% of Estimated Construction Cost Total)				**$148,000**
	Construction Administration (10% of Estimated Construction Cost Total)				**$74,000**
	ENGINEERING AND ADMINISTRATION TOTAL				$222,000
	TOTAL ESTIMATED PROJECT COST:				**$960,000**

F. Preliminary Environmental Review Memorandum

URBAN PLANNING PARTNERS INC.
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MEMORANDUM

DATE: June 8, 2016

TO:
Ryan McClain
r.mcclain@fehrandpeers.com
Patrick Gilster
p.gilster@fehrandpeers.com

FROM:
Brianna C. Bohonok, AICP
P. 510.251.8210
E. bbohonok@up-partners.com
CC: ldias@up-partners.com

RE: Task 7, Environmental Screening: *Iron Horse Trail Connectivity Feasibility Study*

This memo contains a preliminary, screening-level analysis of potential environmental issues related to the Iron Horse Trail Connectivity Feasibility Study (IHTC project), and provides a summary of recommendations that may avoid or reduce potential impacts. This screening-level evaluation is a first step in understanding whether the IHTC project is likely to result in environmental impacts under the California Environmental Quality Act (CEQA) or the National Environmental Policy Act (NEPA).

The 2016 CEQA Guidelines Environmental Checklist and applicable sections of the Code of Federal Regulations (CFR) were used to guide this screening analysis. Table 1 provides the results of the CEQA screening analysis in a matrix, organized by topic area. As significance determinations under NEPA differ from those of CEQA and are generally broader, a summary of the NEPA analysis is included separately from Table 1, under section 4, Anticipated Level of NEPA Review. Figure 1 provides a map of identified environmental issues that will need to be considered during CEQA and NEPA review for the IHTC project.

As part of Task 3 of the IHTC project, a series of prior CEQA documents completed for projects within or adjacent to the IHTC project area were screened. This screening provided an overview of existing environmental issues in and around the IHTC project area, and has served as a basis for evaluation of CEQA topic areas for the IHTC project. This memo builds upon the review completed under Task 3 and provides guidance on what level of CEQA and/or NEPA review may be required for the IHTC project.

Environmental Documents reviewed under Task 3 and used to inform this analysis include:

- City of Dublin General Plan Draft EIR and Final EIR (1984 and 2014 amendment)
- Eastern Dublin General Plan Amendment and Specific Plan Draft EIR (1992)
- Dublin Crossing Specific Plan Draft EIR and Final EIR (2013)
- City of Dublin Bicycle and Pedestrian Master Plan Mitigated Negative Declaration (2014)
- The Village at Dublin Supplemental EIR (2013)
- Dublin Transit Center Draft EIR (2001) and Final EIR (2002)
- Dublin/Pleasanton BART Extension Project Draft EIR (1989)

A descriptive list of these projects and the associated environmental documents is contained in Attachment A.

The Dublin Crossing Specific Plan EIR identified a potentially significant traffic-related impact to the Scarlett Drive and Dublin Boulevard intersection. A mitigation measure requiring a fair-share contribution towards a future bike and pedestrian overcrossing at this intersection was found to mitigate the impact to a less-than-significant level. The impact and related mitigation measure state that the impact is cumulative, as a result of future land use growth in the region. This mitigation measure specified that the design and environmental analysis for the overcrossing had not yet been completed. Additionally, the mitigation measure allowed that if an overcrossing could not be constructed by 2025, alternative at-grade crosswalk reconfigurations would also be sufficient to mitigate this impact, however an overcrossing was preferred. For reference, this mitigation measure is provided as an attachment.

1. Project Understanding

The goal of the Iron Horse Trail Connectivity Feasibility Study is to create a plan for a safe, functional "last mile" bicycle and pedestrian connection to the Dublin/Pleasanton BART station. The Trail segment under study is just over 1 mile long, capped by Dougherty Road to the north and the Dublin/Pleasanton BART station to the south. This Trail segment intersects Dublin Boulevard, Dougherty Boulevard, and future Dublin Crossings driveways and roadways, all of which are focus areas of the feasibility study.

Dublin Boulevard and Dougherty Road are wide, busy regional corridors with multiple lanes of traffic, and the Trail crossing at these signalized intersections is not bike or pedestrian-friendly. An additional signalized intersection will be constructed with the development of Dublin Crossing at G Street. The ½-mile segment of the Trail between Dougherty Road and Dublin Boulevard is approximately 8 feet wide and is characterized by what is often described as an unimproved, "back-door" facility, with poor quality surfacing and edges. Improvements to this segment will include new standards and best practices for path design.

The ½ mile area surrounding the IHTC project segment of the Trail contains multiple land uses:

- Northeast of the IHTC project, adjacent to the Dougherty Road crossing, is the Parks Reserve Force Training Area.
- The area east of the Trail is largely undeveloped, but is planned for transit-oriented, mixed use development outlined in the *Dublin Crossing Specific Plan* and the *Eastern Dublin Specific Plan* as amended for the Dublin Transit Center project.
- South of Dublin Boulevard and east of the Trail is the partially-developed Transit Village subarea of the Dublin Transit Center, which contains multi-family housing, as well as a series of large parking lots and undeveloped properties. Immediately south of the IHTC project area is a mix of campus-style office uses and undeveloped land. A large amount of the area is dedicated to surface parking.
- The area west of the Trail contains a pocket of medium-density housing at the northern end, as well as business park/industrial uses further to the south and office and automotive uses just north of the I-580 freeway.

Land to the east is dominated by the flat, partially-developed Camp Parks area, which contains former cattle grazing grassland and a series of structures used for U.S. Army operations. This area contains a

series of natural and man-made swales that carry the majority of stormwater runoff to Alameda County Flood Control and Water Conservation District (Zone 7) drainage facilities. These swales are concentrated near the intersection of the proposed Scarlett Drive extension and Dublin Boulevard.

2. Environmental Issues by Topic Area

A series of major projects adjacent to the IHTC project have completed environmental review under CEQA over the last several years. In some cases the project area(s) overlapped a portion of the IHTC project area. The environmental conditions and project-related impacts identified by the prior EIRs reviewed under Task 3 provide a background for environmental issues that maybe encountered on the IHTC project. A summary of environmental issues identified by these analyses and their relationship to the IHTC project is included in Table 1. In addition, Urban Planning Partners has completed a high-level evaluation of topics that did not present major issues in prior EIRs, to evaluate whether the project is likely to result in significant impacts for these topics.

As shown in Table 1, this screening indicates the IHTC project is likely to have the following CEQA effects:

<u>Less than significant (mitigation not likely needed)</u>

- Agriculture and forest resources,
- Greenhouse gas emissions, hazards,
- Land use and planning,
- Mineral resources,
- Population and housing,
- Public services, or
- Utilities and services systems

<u>Significant impacts (likely reduced to less-than-significant level with mitigation measures):</u>

- Air quality,
- Cultural resources,
- Geology and soils,
- Hydrology and Water quality, and
- Noise

<u>Potentially significant impacts:</u>[1]

- Aesthetics,
- Biological resources, and
- Transportation and traffic

These assumptions are based on analysis of the IHTC project against the criteria found in the 2016 CEQA Guidelines Environmental Checklist (Attachment B) and the review of prior EIRs.

[1] The screening indicated further analysis and information will be required to assess the likelihood of project-related CEQA impacts to these topic areas.

3. Anticipated Level of CEQA Review

Based on the screening-level findings described above, Urban Planning Partners believes that an Initial Study with Mitigated Negative Declaration (IS/MND) is likely to provide an adequate level of CEQA review. However, it is possible that the IHTC project CEQA analysis may determine the IHTC project would result in significant impacts that cannot be mitigated to a less-than-significant level. Possibly, air quality analysis and the exposure of cyclists and pedestrians to air quality that exceeds BAAQMD thresholds may result in significant and unavoidable impacts[2]. Once an initial study is complete a final determination can be made. If no significant and unavoidable impacts are found, no further analysis would be required. If significant impacts are found and cannot be mitigated to less-than-significant levels, an EIR would be prepared.

However, completing an EIR would reduce risk, as the standard of review if challenged in court would be "substantial evidence"[3], and preparation of an EIR could provide a more thorough environmental analysis. Given the size, public visibility, and funding sources of the IHTC project, it may be advisable and efficient to prepare an EIR without a prior initial study.

4. Anticipated Level of NEPA Review

It is anticipated that the IHTC project may have a federal nexus, and would therefore be required to complete NEPA review. Depending on the agency with federal delegation to complete this review, a set of significance thresholds may or may not be used[4]. Significant determinations under NEPA review differ from CEQA; under NEPA, significance is determined based on the impact of a project as a whole, rather than by topic areas individually. This, in addition to separate significance criteria, means impacts that are determined to be significant under CEQA may not be determined significant under NEPA. Based on a screening of the IHTC project, it is considered to be unlikely that the IHTC project as a whole would have a significant impact on the environment, and therefore an Environmental Impact Statement (EIS) is not likely to be required.

A review of NEPA categorical exclusions (23 CFR 771.117) found that the IHTC project may qualify as a categorical exclusion under criteria (c)(3), which covers construction of bicycle and pedestrian lanes, paths, and facilities. However, it is important to note that categorical exclusions may only be used if a project will not have a significant environmental impact or substantial controversy on environmental grounds.

Ultimately, the lead federal agency will determine the level of NEPA review required for the IHTC project; however this screening-level review indicates that a categorical exclusion may be sufficient. If further analysis determines that the IHTC project could potentially result in significant impacts under NEPA, an Environmental Assessment may be prepared to determine if an EIS is necessary.

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[2] Per CBIA v. BAAQMD (2015) 62 Cal. 4th 369, CEQA may require analysis and mitigation of existing environmental conditions on a project's future users if the project may "exacerbate" an existing environmental condition

[3] Initial studies are held to the "fair argument" standard, which places a greater burden of proof on the project proponent. Conversely, the "substantial evidence" standard places the burden of proof largely on the plaintiff.

4 While NEPA delegates the responsibility of developing thresholds of significance to federal agencies, many have not formally adopted thresholds. In particular, Caltrans does not currently have adopted thresholds for NEPA review.

TABLE 1: IDENTIFIED ISSUES AND RECOMMENDATIONS

Topic Area	Prior CEQA documents	Potential project-related impacts	Anticipated potentially significant impact (denoted with "X")	Recommendations/Notes
Aesthetics	**Finding of Significant or Potentially Significant Impact:** *The Village at Dublin EIR, Dublin Transit Center EIR* The EIRs listed above found impacts relating to new sources of light, and impacts to scenic views and vistas.	The project would construct a new bike and pedestrian overcrossing at the Dublin Boulevard intersection. <u>Potential Impacts:</u> • Impacts to scenic views or vistas as identified in the General Plan.		• Assess effects of the overcrossing on scenic vistas in the project area will need to be completed, including views of the ridgeline enhancement areas identified in the General Plan. If potential impacts to scenic vistas are identified, design features such as materials and color choice may reduce or eliminate this impact.
Agriculture and Forest Resources	**Finding of Significant or Potentially Significant Impact:** *General Plan EIR* The General Plan identified impacts relating to the conversion of agricultural and grazing land.	*None*		*This topic area is not likely to be an issue, as the project will not effect an agriculture or forest resources.*
Air Quality	**Finding of Significant or Potentially Significant Impact:** *The Village at Dublin EIR, Dublin Transit Center EIR, General Plan EIR* The EIRs listed above identified potentially significant air quality impacts from the construction and operation of planned development in the vicinity of the	Successful improvements will result in more people on the Trail, including commuters, school children, active recreational cyclists and passive users such as the elderly. These are sensitive populations, vulnerable to the impacts of poor air quality in excess of Bay Area Air Quality Management District (BAAQMD) significance thresholds. <u>Potential Impacts:</u>	**X**	• Conduct a Health Risk Assessment. • Consider cumulative impacts of existing and proposed sources of air pollution in the vicinity of the trail. • Construction-related emissions can generally be reduced with standard conditions of approval and/or BMPs such as engine tier requirements, restrictions on idling times, etc.

	project. Due to the immediate proximity of these large development projects to the Trail, as shown in Figure 2, and the unrestricted nature of airborne contaminants, trail users could be exposed to elevated levels of air pollution. These findings demand special consideration, given the goals of the project include increasing the use of the Trail. ***[Fehr & Peers: Please provide projected increase in trail use, if known (e.g. % increase or # of users per day)]***	• Exposure of sensitive receptors to air quality that does not meet BAAQMD thresholds. • Emissions during construction.		
Biological Resources	**Finding of Significant or Potentially Significant Impact:** *Dublin Crossing EIR, The Village at Dublin EIR, Dublin Transit Center EIR, General Plan EIR* The EIRs listed above identified a series of potentially significant impacts to special status plant and animal species, including, but not limited to, Congdon's tarplant, California Burrowing Owl, California Red Legged Frog and Tiger Salamander, and protected	Populations of listed species are located in the less developed areas immediately east of the Iron Horse Trail. The limited range and lack of major construction on the Trail itself is unlikely to impact the listed species to the degree of nearby major development projects. However, potential construction of the Dublin Boulevard overcrossing may warrant a survey of nesting birds and a database search for listed species. <u>Potential Impacts:</u> • Impacts to listed species,		• Conduct an updated database search. Once it is determined which species are likely to occur in the project area, impacts to species can likely be reduced to less-than-significant levels through implementation of mitigation measures such as work windows, designated work areas, or possibly a biological monitor. • Consider the future biological impacts of a significant increase in Trail use.

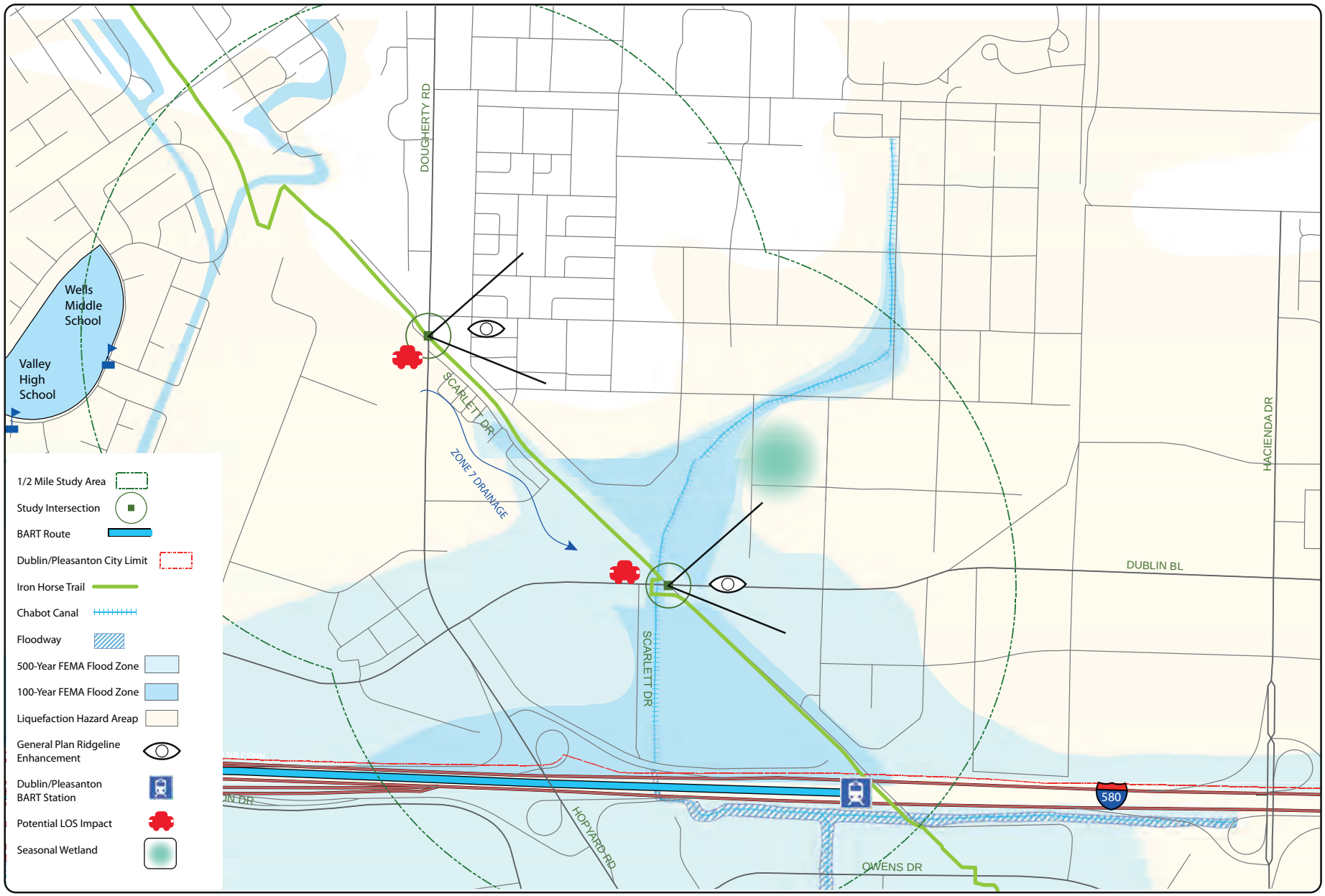
	species of Vernal Pool invertebrates such as Tadpole Shrimp and Fairy Shrimp.	nesting/migratory birds, or sensitive plant communities.		
Cultural Resources	**Finding of Significant or Potentially Significant Impact:** *Dublin Crossing EIR,* *Dublin Transit Center EIR* The EIRs listed above identified potentially significant impacts relating to the accidental discovery of unrecorded historical artifacts, archeological resources, or human remains. Additionally, the Dublin Crossing EIR identified historic resources that are eligible for inclusion in the NRHP. One of these resources is the Camp Parks entrance sign.	The Camp Parks entrance sign is in proximity to the project area. Although somewhat unlikely, there is a potential for accidental discovery of archeological resources, human remains, or paleontological resources. <u>Potential Impacts:</u> • Impacts to historic resources. • Discovery of archeological resources, human remains, or paleontological resources during construction.	**X**	• Determine whether the Trail is adjacent to any properties that are historic resources for the purposes of CEQA. If structures exist, potential construction-related vibratory impacts will need to be evaluated. Additionally, if historic structures are found to be in the vicinity of the Dublin Boulevard overcrossing, the design will need to be evaluated for potential impacts. • Standard conditions of approval and/or BMPs that include protocols for accidental discovery of archeological resources, human remains, or paleontological resources would likely be sufficient to reduce impacts to less-than-significant levels.
Geology and Soils	**Finding of Significant or Potentially Significant Impact:** *Dublin Crossing EIR,* *Dublin Transit Center EIR* A series of potentially significant geology and seismicity-related impacts were identified in the environmental documents listed above. The location of an Alquist-Priolo fault zone for the Pleasanton fault was identified,	Future Iron Horse Trail improvements, including the potential construction of the Dublin Boulevard overcrossing, will place new structures and encourage a higher frequency of users in an area at risk for potential groundshaking, liquefaction, and expansive soils. <u>Potential Impacts:</u> • Exposure of users to seismic risk including groundshaking and	**X**	• Examine the specific geologic conditions that underlay the trail in order to determine potential impacts of the project. • Adhere to current seismic-safety design standards and review for future Iron Horse Trail improvements, including the potential construction of the Dublin Boulevard overcrossing. • Adherence to current seismic-safety design standards and review will likely be sufficient to reduce this potential impact.

	and resulted in findings of potential groundshaking, liquefaction, and expansive soils in areas that intersect the current study area.	liquefaction.		
Greenhouse Gas Emissions	*[no prior EIRs reviewed for this analysis identified significant or potentially significant impacts]*	*None*		*This topic area is not likely to be an issue, as the project will not increase greenhouse gas emissions or create new sources of greenhouse gas emissions.*
Hazards	**Finding of Significant or Potentially Significant Impact:** *Dublin Crossing EIR, The Village at Dublin EIR* The EIRs listed above found impacts relating to encountering previously identified hazardous materials on-site during construction.	*None*		*This topic area is not likely to be an issue, as the project area is currently used for public recreation and is unlikely to contain hazardous materials on-site.*
Hydrology and Water Quality	**Finding of Significant or Potentially Significant Impact:** *Dublin Crossing EIR, General Plan EIR* A large portion of the project segment of the Iron Horse Trail lies within mapped 100-year and 500-year FEMA floodplains. In addition, the area immediately east of the Trail contains numerous swales which drain the Camp Parks watershed, concentrating runoff near the future Dublin	Independently, the conditions identified under prior EIRs are unlikely to result in a significant impact under CEQA for this project. However, the effect of future flooding on low-lying Trail improvements may be exacerbated by anticipated new development near the Trail, which will increase the amount of impervious surfaces in the project vicinity. <u>Potential Impacts:</u> • Increase in stormwater runoff as a result of construction and a net increase in paved area/impervious	**X**	• Review drainage and floodplain impacts as well as mitigation strategies developed under previous CEQA documents, and identify opportunities for cooperative mitigation measures. • Conduct a cumulative analysis to accurately characterizing potential flood-related impacts. Design and engineering solutions may reduce this potential impact. • Preparation of a SWPPP and standard conditions of approval and/or BMPs will likely be sufficient to reduce potential construction-related impacts associated with the Dublin Boulevard Overcrossing and on-trail improvements. • Communicate with Zone 7 staff on Iron Horse

	Boulevard/Scarlett Drive intersection.	areas. • Exposure of users to potential risk due to flooding. • Construction of the Dublin Boulevard Overcrossing and on-trail improvements could result in impacts to water quality.		Trail improvements and progress.
Land Use and Planning	*[no prior EIRs reviewed for this analysis identified significant or potentially significant impacts]*	*None*		*This topic area is not likely to be an issue, as the project area is currently used for public recreation and no change in land use is proposed.*
Mineral Resources	*[no prior EIRs reviewed for this analysis identified significant or potentially significant impacts]*	*None*		*This topic area is not likely to be an issue, as the project will not effect mineral resources.*
Noise	**Finding of Significant or Potentially Significant Impact:** *Dublin Crossing EIR,* *Dublin Transit Center EIR* The EIRs listed above identified impacts to sensitive receptors as a result of short-term increases in noise during construction and exposure of new sensitive receptors (residents) to unacceptable levels of noise from the I-580 freeway and the BART line.	Construction of on-trail improvements and the Dublin Boulevard overcrossing is likely to create noise in excess of normal levels within the project area. It is not anticipated that the project would result in permanent noise impacts. <u>Potential Impacts:</u> • Construction-related noise impacts.	**X**	• Standard conditions of approval and/or BMPs, which may include daytime work windows, will likely be sufficient to reduce this potential impact.
Population and Housing	*[no prior EIRs reviewed for this analysis identified significant or potentially significant impacts]*	*None*		*This topic area is not likely to be an issue, as the project will not induce substantial population growth or result in displacement.*
Public Services	*[no prior EIRs reviewed for this analysis identified significant or potentially significant impacts]*	*None*		*This topic area is not likely to be an issue, as the project will not increase demand for public services.*

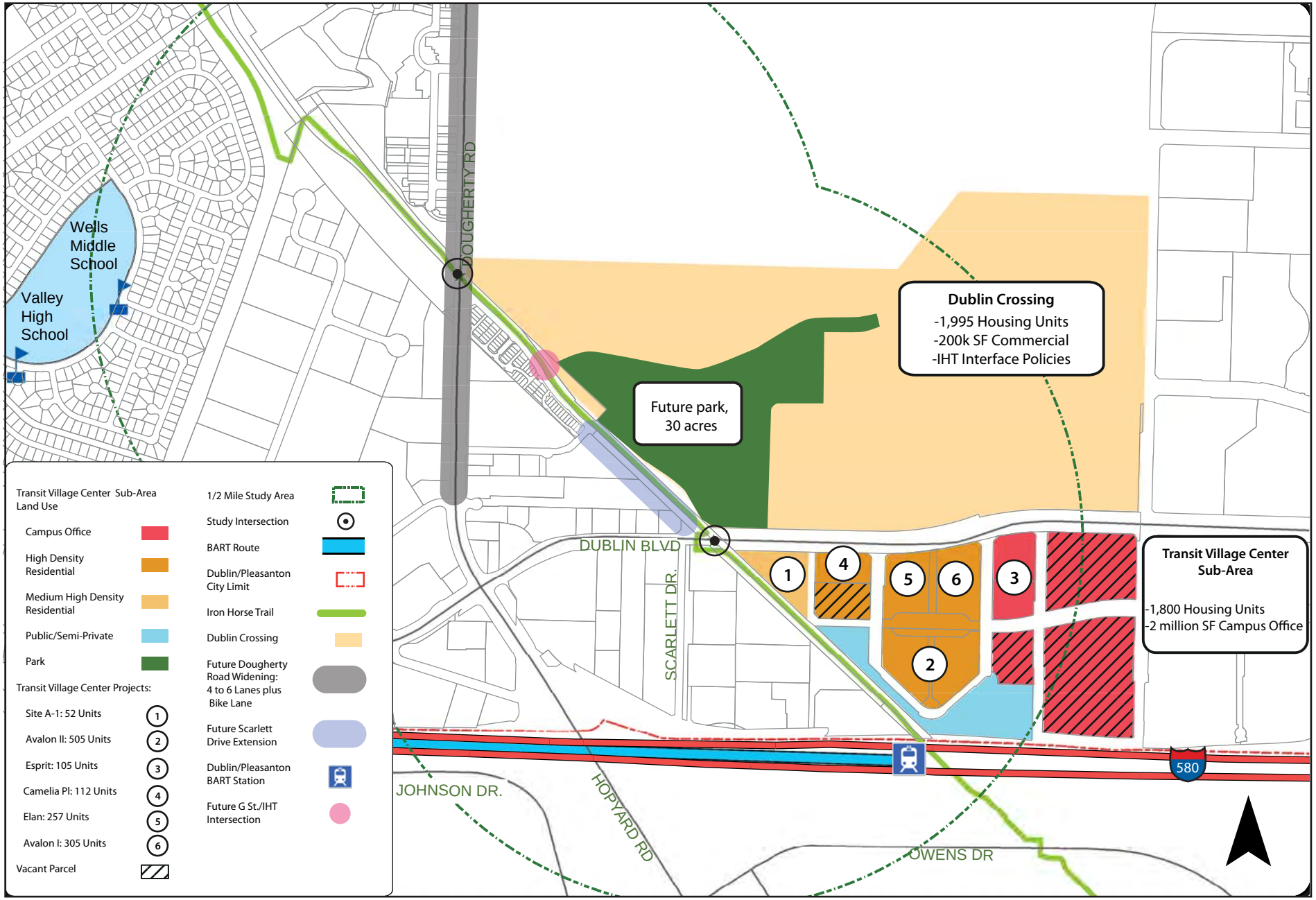
Recreation	*[no prior EIRs reviewed for this analysis identified significant or potentially significant impacts]*	The express purpose of the project is to increase the use of the project segment of the Iron Horse Trail. Potential Impacts: • Increased use of existing recreational facilities.		• Increased use of the Iron Horse Trail does not necessarily indicate a significant or potentially significant impact will result. • Assess long-term impacts of increased trail use and the associated need for increased maintenance.
Transportation and Traffic	**Finding of Significant or Potentially Significant Impact:** *Dublin Crossing EIR, The Village at Dublin EIR, Dublin Transit Center EIR, General Plan EIR* Traffic analyses completed for the CEQA documents reviewed concluded that the traffic conditions in the immediate Iron Horse Trail study are subject to significant degradation as the result of planned development, but also anticipated an increase in transit use as a result of these projects. As these analyses were completed using the Level of Service (LOS) methodology, rather than the more current VMT approach, increased intersection waiting times were considered to be impacts under CEQA. Traffic impacts identified include LOS impacts to various segments	Trail improvements are likely to result in VMT reductions as a result of increased bicycle and pedestrian trips, and significant impacts relating to traffic or transportation are considered to be unlikely. It is likely that the project would result in increased transit trips. Potential Impacts: • Construction-related traffic impacts. • Cumulative impacts to transit system ridership/capacity. • Operation of the project is likely to result in an overall reduction in VMT, and significant traffic impacts are considered to be unlikely.		• Standard conditions of approval and/or BMPs will likely be sufficient to reduce potential construction-related impacts. • VMT analysis is recommended, in compliance with Senate Bill 743, to accurately capture the project's reduction in vehicle trips as a result of enhanced bicycle and pedestrian access to transit. • Compare any anticipated increase in transit trips as a result of the project against existing ridership projections and consider this increase cumulatively with surrounding transit-oriented development projects that are anticipated or currently underway.

	and intersections of Dublin Boulevard and Dougherty Road, including the Scarlett Drive intersection.			
Utilities and Service Systems	**Finding of Significant or Potentially Significant Impact:** *Dublin Transit Center EIR* The EIR identified impacts relating to increased demand electric power.	*None*		*This topic area is not likely to be an issue, as the project will not increase demand for utilities.*



California Geologic Survey, Seismic Hazards Zoning Program, 2008
Alameda County Registrar of Voters, Mapping Section, ROV_Flood, 2011
Federal Emergency Management Agency, National Flood Hazard Layer, 2014
City of Dublin, 2014, *General Plan Amendment*
City of Dublin, 2013, *Dublin Crossing Specific Plan Draft Environmental Impact Report*

Figure 1
Iron Horse Trail Connectivity Feasibility Study
Potential Environmental and Policy Constraints



City of Dublin, 2013, *Dublin Crossing Specific Plan*
City of Dublin, 2014, *Updated Eastern Dublin Specific Plan*
City of Dublin, 2015, *Annual Progress Report on the Dublin General Plan and Housing Element*

Figure 2
Iron Horse Trail Connectivity Feasibility Study
Future Land Use Trends

ATTACHMENT A:
RELEVANT CEQA ANALYSIS REVIEWED FOR IRON HORSE TRAIL

As described above, several recent projects in the Iron Horse Trail vicinity have competed CEQA review, and the findings and conclusions from these analyses may be relevant to the current study.

Environmental documents reviewed include:

- *City of Dublin General Plan (2014 amendment*) *Draft EIR and Final EIR*
- *Eastern Dublin General Plan Amendment and Specific Plan Draft EIR (1992)*
- *Dublin Crossing Specific Plan Draft EIR and Final EIR (2013)*
- *City of Dublin Bicycle and Pedestrian Master Plan Mitigated Negative Declaration (2014)*
- *The Village at Dublin Draft EIR (2013)*
- *Dublin Transit Center Draft EIR (2001) and Final EIR (2002)*
- *Dublin/Pleasanton BART Extension Project Draft EIR (1989)*

The following environmental documents contain impacts, insights and information that can shed light on potential environmental issues for the current project:

- ***City of Dublin General Plan Draft & Final EIR, 1984.*** The project study area is nearly fully contained within the City of Dublin's General Plan planning area, with the exception of the portion south of I-580, which is in the City of Pleasanton. As such, constraints and impacts identified in the General Plan EIR may apply to the current project.

- ***Eastern Dublin General Plan Amendment and Specific Plan Draft EIR, 1993.*** The southern portion of the project area lies along the western boundary of the Eastern Extended Planning Area. Although that Planning Area spans 4,300 acres to the east and northeast of that boundary, the EIR contains relevant insights into local biology and geology.

- ***Dublin Crossing Specific Plan Draft & Final EIR, 2013.*** The Dublin Crossing project will play a critical role in the future land use environment of the area immediately east of the Iron Horse Trail. The 2,000-unit, transit-oriented community was planned to provide residents with direct access to the Iron Horse Trail. The Dublin Crossing EIR identifies environmental constraints to development and project-related impacts that may also be issues for the current project.

- ***City of Dublin Bicycle and Pedestrian Master Plan Mitigated Negative Declaration, 2014.*** The *Bicycle and Pedestrian Master Plan* will influence multi-modal accessibility throughout Dublin. The Plan includes specific recommendations and policies that will influence access to the Iron Horse Trail. As such, associated environmental considerations are likely relevant to the current project.

- ***The Village at Dublin Draft EIR, 2013.*** This document analyses a proposed 167,200 square-foot retail commercial center in the City's Eastern Planning Area. The 14.3-acre site is located just south of Dublin Boulevard, between Hacienda Drive and Arnold Road. The EIR was reviewed for insights into possible traffic-related impacts to the Dublin Boulevard corridor.

- ***Dublin Transit Center Draft & Final EIR, 2001.*** The Dublin Transit Center project is a high-density mixed-use, transit and pedestrian-oriented development adjacent the Dublin/Pleasanton BART Station, to the east. In addition to its proximity to the Iron Horse Trail study area, the Transit Center Plan contains bicycle and pedestrian elements designed to promote connection to the Iron Horse Trail itself.

ATTACHMENT B:
2016 CEQA GUIDELINES ENVIRONMENTAL CHECKLIST

APPENDIX G:
ENVIRONMENTAL CHECKLIST FORM

NOTE: The following is a sample form and may be tailored to satisfy individual agencies' needs and project circumstances. It may be used to meet the requirements for an initial study when the criteria set forth in CEQA Guidelines have been met. Substantial evidence of potential impacts that are not listed on this form must also be considered. The sample questions in this form are intended to encourage thoughtful assessment of impacts, and do not necessarily represent thresholds of significance.

1. Project title: _____
2. Lead agency name and address:

   _____

   _____

   _____
3. Contact person and phone number: _____
4. Project location: _____
5. Project sponsor's name and address:

   _____

   _____

   _____
6. General plan designation: _____ 7. Zoning: _____
8. Description of project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)

   _____

   _____

   _____

   _____
9. Surrounding land uses and setting: Briefly describe the project's surroundings:

   _____

   _____

   _____

   _____
10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)

    _____

    _____

    _____

    _____

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology /Soils
☐ Greenhouse Gas Emissions	☐ Hazards & Hazardous Materials	☐ Hydrology / Water Quality
☐ Land Use / Planning	☐ Mineral Resources	☐ Noise
☐ Population / Housing	☐ Public Services	☐ Recreation
☐ Transportation/Traffic	☐ Utilities / Service Systems	☐ Mandatory Findings of Significance

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

_____ _____

Signature Date

_____ _____

Signature Date

EVALUATION OF ENVIRONMENTAL IMPACTS:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   a) Earlier Analysis Used. Identify and state where they are available for review.

   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

   c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The explanation of each issue should identify:

a) the significance criteria or threshold, if any, used to evaluate each question; and

b) the mitigation measure identified, if any, to reduce the impact to less than significance

SAMPLE QUESTION

Issues:

	Potentially Significant Impact	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
I. AESTHETICS. Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☐
II. AGRICULTURE AND FORESTRY RESOURCES. In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				

	Potentially Significant Impact	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☐
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☐
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☐
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☐
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☐
III. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☐
IV. BIOLOGICAL RESOURCES: Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☐

	Potentially Significant Impact	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
V. CULTURAL RESOURCES. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	☐	☐	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☐	☐	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☐
VI. GEOLOGY AND SOILS. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☐
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☐
ii) Strong seismic ground shaking?	☐	☐	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☐
iv) Landslides?	☐	☐	☐	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☐
VII. GREENHOUSE GAS EMISSIONS. Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☐	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☐
VIII. HAZARDS AND HAZARDOUS MATERIALS. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☐
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☐
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☐
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☐
IX. HYDROLOGY AND WATER QUALITY. Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☐

	Potentially Significant Impact	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☐
f) Otherwise substantially degrade water quality?	☐	☐	☐	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☐
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☐
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☐
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☐
X. LAND USE AND PLANNING. Would the project:				
a) Physically divide an established community?	☐	☐	☐	☐
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☐
XI. MINERAL RESOURCES. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☐
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☐
XII. NOISE -- Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☐
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. POPULATION AND HOUSING. Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☐
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☐
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☐
XIV. PUBLIC SERVICES.				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	☐	☐	☐	☐
Fire protection?	☐	☐	☐	☐
Police protection?	☐	☐	☐	☐
Schools?	☐	☐	☐	☐
Parks?	☐	☐	☐	☐
Other public facilities?	☐	☐	☐	☐
XV. RECREATION.				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☐

	Potentially Significant Impact	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☐
XVI. TRANSPORTATION/TRAFFIC. Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☐
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☐
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☐
e) Result in inadequate emergency access?	☐	☐	☐	☐
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. UTILITIES AND SERVICE SYSTEMS. Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☐
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☐
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☐
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☐
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☐
XVIII. MANDATORY FINDINGS OF SIGNIFICANCE.				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number o restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☐

Note: Authority cited: Sections 21083 and 21083.05, Public Resources Code. Reference: Section 65088.4, Gov. Code; Sections 21080(c), 21080.1, 21080.3, 21083, 21083.05, 21083.3, 21093, 21094, 21095, and 21151, Public Resources Code; *Sundstrom v. County of Mendocino*,(1988) 202 Cal.App.3d 296; *Leonoff v. Monterey Board of Supervisors,* (1990) 222 Cal.App.3d 1337; *Eureka Citizens for Responsible Govt. v. City of Eureka* (2007) 147 Cal.App.4th 357; *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th at 1109; *San Franciscans Upholding the Downtown Plan v. City and County of San Francisco* (2002) 102 Cal.App.4th 656.

Revised 2009

ATTACHMENT C:
DUBLIN CROSSING MMRP EXCERPT

Project Impacts	Level of Significance Without Mitigation	Mitigation Measures	Resulting Level of Significance
2035 cumulative no project conditions to an unacceptable LOS E under 2035 cumulative plus project conditions. The City of Dublin level of service standard for this intersection is LOS D.		impact at the intersection of Dougherty Road and Scarlett Drive would require converting the eastbound all-movement lane to a shared through-right lane and adding a new 60-foot eastbound left turn lane. In addition, the eastbound and westbound legs should be converted from split phasing to protected phasing. This improvement would require widening the west approach of the intersection by approximately 12 feet into the existing pork chop island. Further improvements at this intersection have already been identified by the City's Traffic Impact Fee Program as part of the Scarlett Drive extension to Dublin Boulevard. Implementation of the identified mitigation at this location should be coordinated with the City's planned TIF improvements. Because the impact is caused by both the proposed project and future land use growth, the mitigation for this impact is for the project to make a fair share monetary contribution toward these improvements. The timing of these improvements will be determined in the project's mitigation monitoring program.	
Impact 3.12-3: Scarlett Drive and Dublin Boulevard. During the PM peak hour, the study intersection of Scarlett Drive and Dublin Boulevard would operate at an unacceptable LOS F under both 2035 cumulative no project conditions and 2035 cumulative plus project conditions. The City of Dublin level of service standard for this intersection is LOS	Potentially Significant	MM 3.12-3: ***Construction of a Grade Separated Crossing at the Intersection of Scarlett Drive and Dublin Boulevard.*** To mitigate the impacts at the intersection of Scarlett Drive and Dublin Boulevard due to higher rate of pedestrians/bicyclists crossings at Dublin Boulevard, a grade separated crossing shall be utilized. The grade separated crossing would eliminate the need for at-grade pedestrian actuations at the traffic signal, which would allow more green time to be allocated to through traffic	Less than Significant

Project Impacts	Level of Significance Without Mitigation	Mitigation Measures	Resulting Level of Significance
D.		on Dublin Boulevard. Although this project has not been environmentally cleared, nor has engineering or right of way analysis been completed with regards to the feasibility of this improvement, the City is aggressively pursuing this project to improve pedestrian and bicycle mobility along the Iron Horse Trail. The City also plans to include a grade separated crossing at this location in its update to the TIF program to secure project funding. Because the impact is caused by future land use growth in the region as well as this proposed project, the mitigation for this impact is for the project to make a fair share monetary contribution toward these improvements. The timing of these improvements will be determined in the Mitigation Monitoring and Reporting Program and developer obligations will be outlined in the Developer Agreement. In the event that the grade separated crossing project cannot be constructed by year 2035, an alternative mitigation would be to eliminate the crosswalk on the east leg of the Scarlett Drive and Dublin Boulevard intersection. This would require pedestrians and bikes from the Iron Horse Trail to cross three crosswalks rather than one. Because of the effects of the alternative mitigation on pedestrian and bike mobility, the grade separated crossing is the City's preferred mitigation at this location.	
Impact 3.12-4: During the PM peak hour, the study intersection of Iron Horse Parkway and Dublin Boulevard would degrade from LOS	Potentially Significant	MM 3.12-4: *Addition of a Northbound Left-turn lane on Iron Horse Parkway at the Intersection of Iron Horse Parkway and Dublin Boulevard.* To mitigate the impact at the intersection of Iron Horse	Less than Significant

Prepared for:

DUBLIN
CALIFORNIA

March 2017

FEHR & PEERS

WC14-3178