Solano Transportation Authority

SMART and SolanoExpress Station Feasibility Study

Final Feasibility Study | January 2021

STA Solano Transportation Authority
ARUP
CAMBRIDGE SYSTEMATICS
VIA
AREA WEST ENVIRONMENTAL, INC.

Solano Transportation Authority

SMART and SolanoExpress Station Feasibility Study

Final Feasibility Study | January 2021

Sponsor
Solano Transportation Authority

Board Members
Ron Rowlett, Chair, Mayor of Vacaville
Robert McConnell, Vice-Chair, Mayor of Vallejo
Steve Young, Mayor of Benicia
Steve Bird, Mayor of Dixon
Harry Price, Mayor of Fairfield
Ronald Kott, Mayor of Rio Vista
Lori Wilson, Mayor of Suisun City
Jim Spering, Solano County Supervisor

Staff
Daryl Halls, Executive Director
Janet Adams, Deputy Executive Director
Robert Guerrero, Director of Planning (Project Principal)
Kathrina Gregana, Planning Assistant (Project Manager)
Triana Crighton, Assistant Planner

Consultant Team
Arup, Oakland California
Will Baumgardner, Principal-in-Charge
Anthony Bruzzone, Project Manager
Audrey Shiramizu, Deputy Project Manager
Emma Burkhardt, Engineer
Senna Phillips, Transportation Planner

Subconsultants
VIA Architecture
Cambridge Systematics
AreaWest Environmental

Funding
California Department of Transportation
Funded through grant by CalSTA

PDT Members
Shannon Simonds, Caltrans
Jake Freedman, Caltrans
Joel Cox, Capitol Corridor
Ryan Panganiban, City of Fairfield
Brian Miller, City of Fairfield
Matthew Medill, City of Suisun City
Nick Lozano, City of Suisun City
John Kearns, City of Suisun City
Libby Payan, SMART
Jason Riley, County of Solano

Cover Image: Wikicommons

Solano Transportation Authority

SMART and SolanoExpress Station Feasibility Study

Final Feasibility Study | January 2021

Executive Summary **4**

1. Introduction **8**

1.1 Purpose 10

1.2 Background 10

1.3 Design Requirements/Design Criteria 13

2. Existing Conditions **16**

2.1 Intercity/Regional Bus Services 17

2.2 Summary of Rail Services 19

2.3 “Big-Data” Outcomes 19

2.4 Park and Ride Facilities 32

3. Potential Futures **34**

3.1 Growth (population & employment) 35

3.2 Rail Corridor Changes 37

4. Potential SMART Station Locations **39**

4.1 Capitol Corridor Connection 41

4.2 I-80/I-680 Connection 53

5. Planning-Level Cost Estimates **61**

5.1 Introduction 63

5.2 Cost Estimate – Range 63

5.3 Suisun-Fairfield Station 64

5.4 Cordelia/I-80 & I-680 Alternatives 65

5.5 Items excluded from the Estimate 68

5.6 Notes and Qualifications 68

6. Conclusion and Next Steps **69**

7. Appendix **73**

Appendix A 75

Appendix B 86

Appendix C 102

Appendix D 113

Appendix E 118

Executive Summary

Source: Wikicommons

Executive Summary

Note

This report uses data and trends generated prior to the coronavirus pandemic. It is unknown at this time whether previous trends will resume after the state's economic cessations are lifted.

Executive Summary

This report identifies the best locations and design considerations for potential SMART Rail Station sites in Solano County. This follows the 2018 State Rail Plan that identifies a "Solano County Hub" to link Capitol Corridor, future SMART trains and regional buses and a May 2019 study issued by SMART: "Passenger Rail Service: Novato to Suisun City." The SMART report found implementing passenger service on the UPRR and SMART corridor between the existing Suisun-Fairfield Station (where it connects with Capitol Corridor) and the Novato-Hamilton station on the existing SMART corridor feasible. The study identified improvements to existing trackway and new infrastructure necessary for service implementation

This study investigated seven station locations along the UPRR/SMART corridor within Solano County, narrowing those sites to one recommended site for the SMART-Capitol Corridor connection, and four potential sites in Cordelia (a district in the City of Fairfield). The sites were selected based on the ability to adhere to design criteria, meet environmental aspirations, advance land use plans, and provide great passenger experience.

The recommended SMART-Capitol Corridor station site is the current location of the Suisun-Fairfield Amtrak Station. To meet current design and safety standards, this station is proposed for major upgrading to separate passengers from active railroad tracks, upgrade and improve station platforms, provide additional automobile parking, incorporate bus transfer facilities and provide a useful and attractive connection to downtown Fairfield, allowing for easy movement of people and commerce between the Suisun City and Fairfield downtowns.

These improvements create the infrastructure proposed under the State Rail Plan for the "Solano County Hub." Under the plan, by 2040 six Capitol Corridor trains an hour in each direction will serve this station, linking it to Sacramento every 30 minutes and Oakland and directly to San Francisco (via a new conventional rail tube) every 15 minutes. Passengers would be in Oakland in about 50 minutes, San Francisco in about an hour, and Sacramento in about 35 minutes. In addition, SMART service would connect at this location, along with express buses to central Contra Costa.

The cost for these Suisun-Fairfield improvements could range from $97 million to more than $200 million as designs are conceptual and costs include contingencies. Further studies are suggested to provide more detailed designs that lead to more focused cost estimates.

In the Cordelia area, the City of Fairfield requested STA provide a range of station options that could be considered in the update of the City's General

Plan. The General Plan process will select the recommended site from the options developed in this study. All options are designed for SMART and SolanoExpress buses and all assume delivery of the I-80/I-680/Highway 12 interchange project. The four viable options are:

- Red Top Road at Highway 12
- Red Top Road at I-80
- Cordelia Road/Lopes Road
- W Cordelia Road/I-80/I-680

The Study provides a list of capital improvements necessary to develop stations at these locations, along with an assessment of the merits of each site and a conceptual project cost.

The structure of this report details the following:

1. Introduction
2. Existing Conditions
3. Potential Futures
4. Potential SMART Station Locations
5. Planning-Level Cost Estimates
6. Next Steps

Additional study details can be found in previous working papers and memorandums, including:

- Case Studies and Program Guidance (dated January 14, 2020)
- Existing Conditions (dated March 5, 2020)
- I-680/I-80 Alternatives (dated March 5, 2020)

1. Introduction

Source: Wikicommons

1. Introduction

1.1 Purpose

This study investigates potential rail station locations in Solano County that can host:

- Capitol Corridor Intercity Trains
- SMART Trains (potentially operating from Suisun-Fairfield to Napa/Vallejo or Novato)
- Express Buses

The most attractive station locations can host several of these modes at one location, as well as incorporate supportive land uses, good local transit connections and potential park and ride options. The State Rail Plan identifies a "Solano County Hub" where Capitol Corridor trains connect with bus and rail services to Marin, Napa and Contra Costa Counties. This study recommends the location of that hub.

1.2 Background

The State Rail Plan and the forthcoming Plan Bay Area 2050 positions Solano County to identify and ultimately deliver policy and plans for new and expanded regional and intercity rail services in the county. CalSTA requested STA study this as part of a TIRCP grant linking rail and bus. Stations are key components of an overall regional rail transit program and Solano County would benefit economically and socially from advancement of the State Rail Program, including its vision for a Solano County Hub.

In addition to the State Rail Plan background, in May 2019 the Sonoma Marin Area Rail Transit District (SMART) issued "Passenger Rail Service: Novato to Suisun City." The SMART report found implementing passenger service on the UPRR and SMART corridor between the existing Suisun-Fairfield Station (where it connects with Capitol Corridor) and the Novato-Hamilton station on the existing SMART corridor feasible. The study identified improvements to existing trackway and new infrastructure necessary for service implementation.

This study builds upon those previous planning efforts and identifies land use, housing, operational needs and infrastructure requirements as important considerations to station site selection.

Operational considerations are key to successful rail services. The Solano County Hub station must be served by both intercity and regional trains. The additional second station must serve SMART and buses. These services have different passenger demand and infrastructure requirements. In addition, existing stations will likely require alteration but remain in service during construction. This study examined other regions that have delivered rail transit stations and infrastructure to provide "lessons learned" for STA and local officials.

Three bus and rail projects were studied. The criteria for investigating these three examples were relevance to Solano County – either in the mode selected or studied, or relevance due to similar population and land use characteristics. The three case studies are San Diego COASTER, San Rafael Transit Center, and the Downtown Seattle Transit Tunnel.

Key takeaways from these three case studies are:

Modern stations require separation of passengers and trains where intercity trains operate. A key example is the Oceanside Transit Center in San Diego County where Amtrak intercity trains operate with commuter rail (also operating on the intercity rail network) along with regional rail services (using diesel multiple-units and operating on a little used branch line). Oceanside is the north San Diego County rail hub and provides extensive

bus connections throughout northern San Diego County and is served by passenger trains serving Downtown San Diego, the Los Angeles Basin and north to Ventura, Santa Barbara, and San Luis Obispo. The facility has five intercity/regional bus berths and up to 15 berths for local buses. The station has four rail platforms, and complete separation of trains and passengers. The station is in downtown Oceanside, within half-mile of the central business district.

Renovating existing stations often requires a phased approach. The San Rafael Transit Center provides an example of a traditional bus transfer station transitioning to bus and rail service, with the addition of SMART. SMART trains serve San Rafael in both directions, while more than 9,000 bus passengers use the station daily. As SMART was constructed, several interim arrangements were required; the final plan includes property acquisition and improved bus flow, along with shorter transfers between buses and SMART.

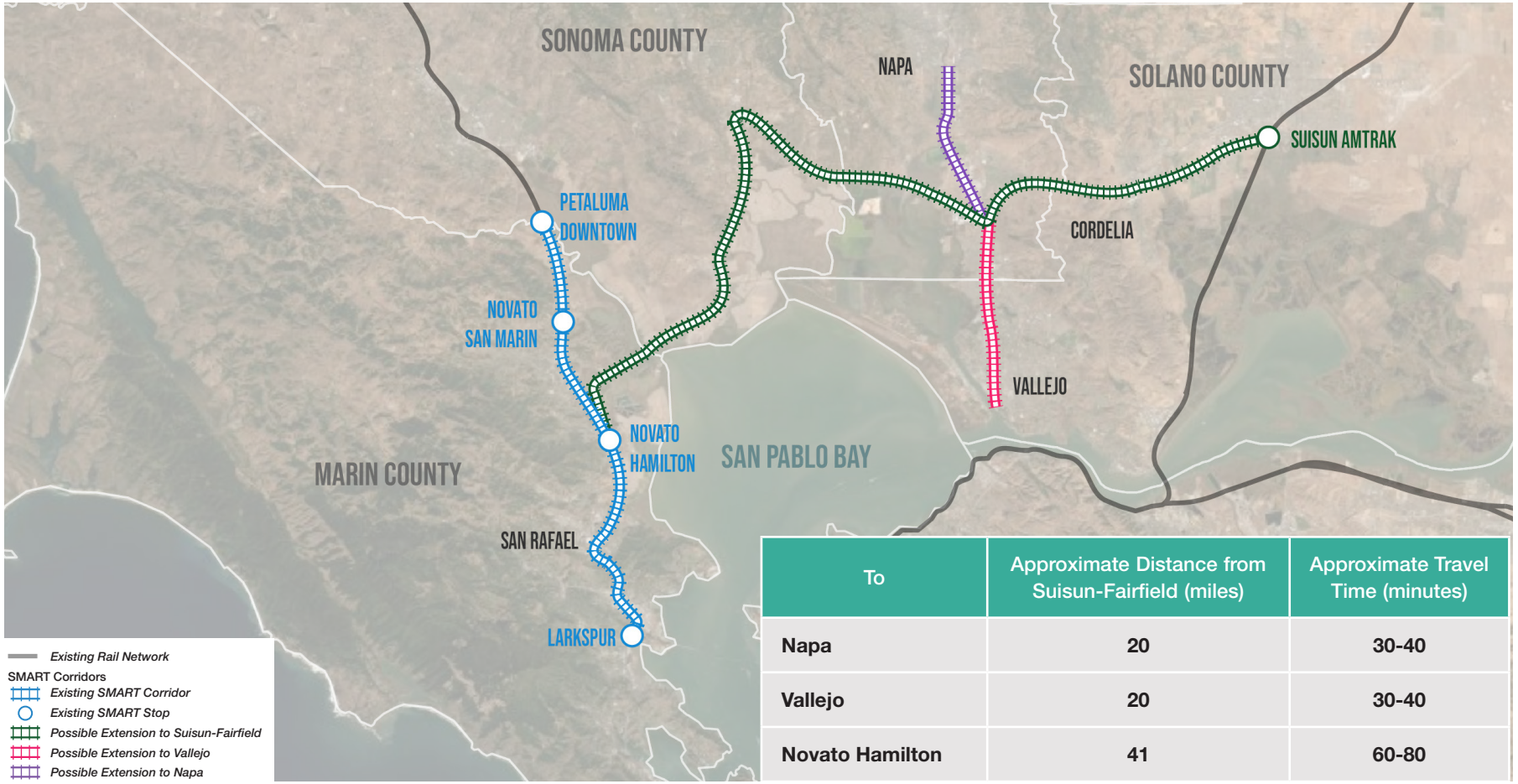
Finally, conversion of modes requires careful analysis to avoid wasted assets and additional expense. The downtown Seattle Transit Tunnel – originally opened in 1990 – was constructed for seamless conversion to light rail and incorporated high quality stations and track embedded in the pavement. Unfortunately, rail-ready measures in the original tunnel were mostly unusable: the original tracks in the tunnel could not be used for rail service and needed replacement, requiring complete closure of the tunnel for two years. The end-of-the-tunnel Convention Place station was also deemed too shallow to support a light rail extension, effectively making the station unusable for light rail service. Renovations to provide for both bus and LRT tunnel operations began in 2004, closing all service in the tunnel between 2005 and 2007. These renovations cost almost $100 million. Bus service in the tunnel ended in 2019 as anticipated light rail volumes effectively required the entire capacity of the transit tunnel. This mode change was always anticipated.

In addition to these case studies (and cautionary examples), Transit Cooperative Research Program (TCRP) Research Report 201, titled "Understanding Changes in Demographics, Preferences, and Markets for Public Transportation" (2018) provides practical (but empirically tested) findings that can lead to successful transit services. These findings include:

1. Transit level of service – service frequency – has a larger impact on ridership than demographics. More service results in more riders, regardless of income or age.
2. Demographic factors do have some influence in predicting future markets for transit.
3. Location (where people live and how that affects their transit choices) is critical for predicting the future markets for transit.
4. Market-based preferences are critical for predicting the future markets for transit.
5. Age, preferences, and location together can explain expected changes for the future.
6. Transportation network companies (TNCs) will offer more competition to transit.

Of these findings, service frequency increases and location and land use attributes are directly relevant to Solano County – both keyed to elements of the State Rail Plan. TCRP 201 noted the highest rate of transit ridership increase in midsized metropolitan areas (populations between 500,000 and 3 million people). Solano County has about 450,000 residents. The study suggests that because dense, urban areas like San Francisco already have high transit ridership, areas with smaller population and less density (such as Solano County) have higher potential for increased ridership – that is, because transit infrastructure may be less robust, and ridership is generally lower, the potential for growth and opportunities in less built-out areas are greater than areas with more built-out systems. Coupled with this understanding, the report also found that improving transit service has a larger impact on transit ridership than any demographics that may favor transit ridership.

1. Introduction



To	Approximate Distance from Suisun-Fairfield (miles)	Approximate Travel Time (minutes)
Napa	20	30-40
Vallejo	20	30-40
Novato Hamilton	41	60-80

Figure 1: Proposed SMART Route from Novato to the Suisun-Fairfield Station

This has key implications for a midsize area like Solano County. Planning for existing and future demographics is important, but providing reliable, accessible, and frequent service to key destinations will ultimately determine transit success. The State Rail Plan – which recommends a Solano County Hub where services meet – proposes to substantially increases Capitol Corridor service to operate frequently to the Bay Area, extend farther into the Sierra foothills, and connect to Marin and Napa Counties.

1.3 Design Requirements/Design Criteria

New and improved rail service – when well designed, coordinated with bus service (as detailed in the State Rail Plan), can complement, support and stimulate multiple benefits including:

- Public improvements for existing neighborhoods
- New private investment around stations
- Additional mixed-use development
- Better mobility for all residents.

These outcomes are not automatic. Good planning and deliberate action are essential to make each focused station (and station area) a success.

As part of this study, STA considered and acknowledged Best Practices guidance for both the station area and the station.

The suggested guidance includes technical criteria and standards used by planners and engineers in design, as well as policy guidance that seeks to maximize the benefits derived from transit investments. While the technical criteria have limited flexibility, implementation of the policy guidance requires additional analysis and public input, with active leadership by local jurisdictions, the expert opinions of agency staff, and the recommendations of planning and development professionals.

Station Area Guidance – As part of a station investment decision, best practices includes a Station Area Development process to establish desired public outcomes and define a vision integrating transit into the community. Positive public outcomes include successfully meeting:

- Passenger accommodations and Safety Needs
- Community Considerations
- Environmental Considerations
- Equipment and Materials Standardization
- Reasonable Project Design Life
- Efficient and Effective Operations
- Right-of-Way Access Considerations

As part of next steps to deliver the Solano County Hub (and other SMART and SolanoExpress stations), a series of Station Area Guiding Principles will focus design and policy discussions. They should include:

- **Integration and Connection with the Community** – Planning and zoning should implement the final station area vision, but the station planning should support and integrate the visions of the neighborhood plan and city's comprehensive plan.
- **Accessibility and Safety for all Users** – Access to stations and the areas around them should be safe with active pedestrian environments; provide a robust network of clearly defined, simple and well-lit route options to and from a station.

1. Introduction

- **Customer Comfort and Accommodation** – Provide intuitive and easily understood signage and wayfinding; Transit stops and/or transfer wayfinding signage should be immediately visible; Future passenger accommodations, advance fare systems, transit information, wayfinding and making connections.
- **Incorporation of Solano's Values of Environmental, Social Responsibility and Sustainable Development** – Provide opportunities for new development; develop mixed-income housing and encourage every price point to live around transit. Incorporate best practices related to development:
  - Incorporate landscaping for amenity and environment;
  - Integrate stormwater management;
  - Select sustainable materials and green construction practices
  - Use energy wisely;
  - Design for resiliency
- **Total Life Cycle Objectives** – The introduction of transit into under-served neighborhoods creates land value due to proximity to the station and better access for residents. Policy tools and public resources can capture that value for public benefit leading to initial capital contributions and an on-going revenue stream for operations and maintenance. The design of the station and the nearby amenities should use materials and designs that reduce the overall operating costs. These include the use of stormwater best practices, energy efficiency and passive design elements.

Station Design Criteria – The design criteria provide direction on station and station area functional areas, features, and elements for designers of any STA funded transit improvement on a railway or within the Caltrans right-of-way. They reference the SMART District's standards for planning, design, and construction of the SMART District's facilities. They are also based on best industry standards and accepted practices for Commuter/Class 4 railroads and equals or exceeds regulatory requirements, as well as Capitol Corridor and Union Pacific Railroad design standards. Finally, for bus stations within a freeway right-of-way, Caltrans Highway Design Manual Sections 108, 303, 504 and 905 provide a standard.

The criteria are also used to assist designers in incorporating design elements that ensure facilities will provide the lowest overall cost of ownership consistent with STA's desired quality, functional and performance standards. They encourage the incorporation of past proven principles and existing system approaches while also allowing for trial application of innovative thinking and technologies that may prove to further minimize total life cycle cost while improving passenger experience and levels of service.

Source: Arup

2. Existing Conditions

This section outlines the existing services and usage in the study area. This includes a review of location-based service (LBS) data findings.

SolanoExpress Bus at Walnut Creek BART Station

2.1 Intercity/Regional Bus Services

SolanoExpress operates a robust network of intercity/regional buses that connects Solano County to BART stations in the East Bay and Sacramento and Davis to the east. STA continues to increase service and add amenities to the service. There are four services currently operating. The service descriptions reflect pre-COVID-19 service.

Vallejo/Benicia – Central Contra Costa

Yellow Line: The Yellow Line operates between downtown Vallejo and Walnut Creek BART via I-680 and Benicia. About 23 trips in each direction are provided, weekdays, with 30-minute service frequencies for most of the day and hourly service from about 10:00am to 10:00pm. The last trip from Walnut Creek BART to Vallejo and Benicia leaves at 9:40pm. Travel time from Curtola Park and Ride to Walnut Creek is about 40 minutes, and about 30 minutes from Benicia.

I-680 Corridor

Blue Line: The Blue Line operates between downtown Sacramento and Pleasant Hill BART via I-80 in Sacramento/Davis, Vacaville and Fairfield then via I-680 to Pleasant Hill BART. Almost 25 trips in each direction serve Pleasant Hill, and about half that serve Davis and Sacramento. Service frequencies vary between 30 and 60 minutes, with the last trip leaving Sacramento at 5:40pm and the last trip leaving Pleasant Hill at about 7:35pm.

Suisun-Fairfield Station

Green Line Express: The Green line operates as a peak period express between the Suisun-Fairfield Station and El Cerrito del Norte BART via I-80. A key stop is the Fairfield Transportation Center. About 25 trips in each direction are provided, weekdays only. Of those 25 trips, eight peak period, peak direction trips extend from Fairfield Transportation Center to the Suisun-Fairfield Station.

Red Line: The Red Line operates between the Suisun-Fairfield Station and El Cerrito del Norte BART via I-80 and downtown Vallejo (including the ferry terminal), serves Six Flags, Solano College, and Fairfield Transportation Center. Between Vallejo and El Cerrito del Norte service operates every 15 to 20 minutes throughout the day, with the last trip leaving El Cerrito at about 11:20pm. Every third to fourth trip extends to the Fairfield Transportation Center providing hourly service, and in the peak periods those trips also extend to the Suisun-Fairfield station. On Saturdays service operates every 30 minutes between Vallejo and El Cerrito, with four trips in each direction serving the Suisun-Fairfield Station. A more limited schedule operates on Sunday between Vallejo and El Cerrito.

Additional Regional and Intercity Services

In addition, Napa VINE operates Route 21 from the Suisun-Fairfield Station to Napa Valley College

2. Existing Conditions

and downtown Napa throughout the week. From Suisun-Fairfield, 13 trips in each direction are provided weekdays, operating about hourly.

Greyhound operates intercity bus service with a limited number of departures at the Suisun-Fairfield Station. These buses operate in interstate service, with destinations in the Bay Area as well as to Reno and eastern and northern locations via Sacramento.

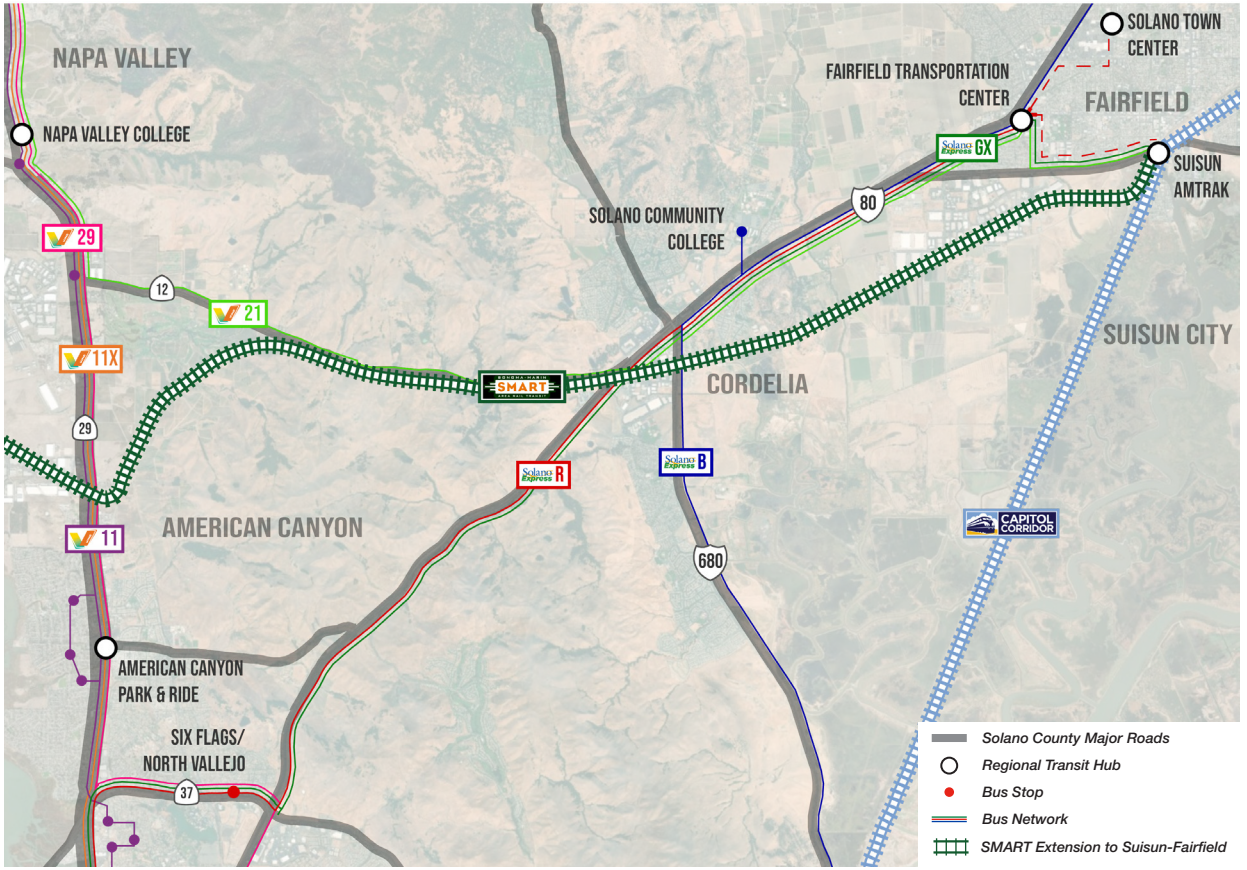


Figure 2: Study Area Existing Conditions, with Proposed SMART Corridor to Suisun-Fairfield

2.2 Summary of Rail Services

Capitol Corridor is the primary rail service in Solano County. Fifteen trains per day in both the eastbound and westbound directions stop at both Suisun-Fairfield and Fairfield-Vacaville/Hannigan stations.

The greatest frequency of trains occurs in the westbound direction during the AM commute period and in the eastbound direction during the PM commute period.

Average daily ridership (boardings and alightings) at Suisun-Fairfield Station is about 400; average daily ridership at Fairfield-Vacaville/ Hannigan is about 200.

2.3 "Big-Data" Outcomes

Perspectives from Location-Based Service (LBS) Data

Purpose

STA identified the emerging "Big Data" field as potentially providing a robust, real-time snapshot of travel within, to and from Solano County at a level of detail and accuracy far better than previous information. This information allows STA to prioritize limited funding to the corridors with the most travel, identify potential modal projects, and support development of travel hub locations.

Methodology

Cambridge Systematics (CS) provided origin-destination trip tables from location-based services (LBS) data under a license agreement. The data is indeed big. The trip tables exceed 278,000 rows and identify almost 1.25 million daily people trips.

The LBS datasets expand to match the total population and employment of the region providing good indicators of travel. Because LBS data offers a much richer sample size than traditional travel surveys and because the data are current, they offer a more reasonable framework to inform travel pattern analyses, to understand how populations move through the transportation systems, and to analyze how travel patterns have changed over time owing to changes in land use.

The data specifications, including study area, time of day, days of week, and travel purposes are listed below.

Data Specifications:

1. Time period: 2018, Q3 and Q4, (calendar year)
2. Geography: Census Tracts inside Solano County and larger geographies (51) for rest of the study area. Figure 3 shows suggested geographic extent.
3. Types of trips:

- Commute vs. non-commute
- Weekday vs. weekend
- Solano County resident vs. non-resident
- Approximate trip length distributions by origin, destination, time of day, day of week

4. Time of Day

- Early AM 3:00 AM - 7:00 AM
- AM Peak 7:00 AM - 10:00 AM
- Mid-day (base) 10:00 AM - 1:30 PM
- Mid-day (school) 1:30 PM - 4:00 PM
- PM Peak 4.00 PM - 7:00 PM
- Evening 7:00 PM - 10:00 PM
- Late Night 10:00 PM - 3.00 AM

2. Existing Conditions

Figure 3: LBS Data, STA Zones in Solano County

5. Day of the week

- Weekday (Monday – Friday)
- Saturday
- Sunday

6. Travel purpose

- Home-based Regular: Trips starting or ending at the user's home. The corresponding origin or destination is regular (i.e. work, school, college, etc.)
- Home-based Other: Trips starting or ending at the user's home. The corresponding origin or destination is classified as other (i.e. shopping trip, errand, service, meal, recreation, etc.)
- Non-home Based: Other trips that do not fall into Home-Based Regular or Home-Based Other.

The intent of the study is to provide discussion on where and how regional transit services – intercity rail, regional rail and regional/intercity bus – should operate and where stops should be located. While purely local travel is incorporated in the data, a first step culled out trips within zones to reduce data "clutter" and focus analysis efforts on longer trips. This reduced the file by about 3,000 rows.

Findings

The data analysis was divided into four groupings (plus miscellaneous), along with typical weekday travel:

Travel Market	Weekday Volume	
Between Cities in Solano County	240,000	19%
From Solano County to Other Counties (Solano Residents)	250,000	20%
From Other Counties to Solano County (Non-Solano Residents)	150,000	12%
Within Individual Solano County Cities	500,000	40%
Miscellaneous	110,000	9%
TOTAL	**1,250,000**	

Table 1: Travel Markets and Weekday Volumes

2. Existing Conditions

Local Travel between Cities within Solano County

About 240,000 weekday trips within Solano County are made by Solano residents. About 92,000 (39%) of these trips are made in the peak periods. The highest share of trips (33%) are to Fairfield. Vacaville has the second highest share (20%) followed by Vallejo (15%).

Note that about 500,000 local trips (i.e. trips made within a city) are made by Solano residents. The totals in the tables and graphics do not include local trips, as this report is focused on interregional travel.

Table 2 and Figure 4 detail the findings of the local travel between cities within Solano County.

Origin	To/From	Share of Trips
Benicia	Cordelia	1%
	Dixon	1%
	Fairfield	17%
	Rio Vista	<1%
	Suisun City	3%
	Vacaville	6%
	Vallejo	72%
Cordelia	Benicia	2%
	Dixon	2%
	Fairfield	69%
	Rio Vista	1%
	Suisun City	11%
	Vacaville	10%
	Vallejo	6%
Dixon	Benicia	2%
	Cordelia	3%
	Fairfield	23%
	Rio Vista	4%
	Suisun City	1%
	Vacaville	64%
	Vallejo	3%
Fairfield	Benicia	5%
	Cordelia	14%
	Dixon	3%
	Rio Vista	1%
	Suisun City	22%
	Vacaville	39%
	Vallejo	15%

Table 2: Detailed Shares of Local Travel Between Cities within Solano County

Origin	To/From	Share of Trips
Rio Vista	Benicia	2%
	Cordelia	5%
	Dixon	13%
	Fairfield	43%
	Suisun City	11%
	Vacaville	22%
	Vallejo	5%
Suisun City	Benicia	3%
	Cordelia	7%
	Dixon	1%
	Fairfield	70%
	Rio Vista	2%
	Vacaville	10%
	Vallejo	7%

Origin	To/From	Share of Trips
Vacaville	Benicia	3%
	Cordelia	4%
	Dixon	14%
	Fairfield	65%
	Rio Vista	1%
	Suisun City	5%
	Vallejo	8%
Vallejo	Benicia	48%
	Cordelia	3%
	Dixon	1%
	Fairfield	33%
	Rio Vista	0%
	Suisun City	5%
	Vacaville	11%

2. Existing Conditions

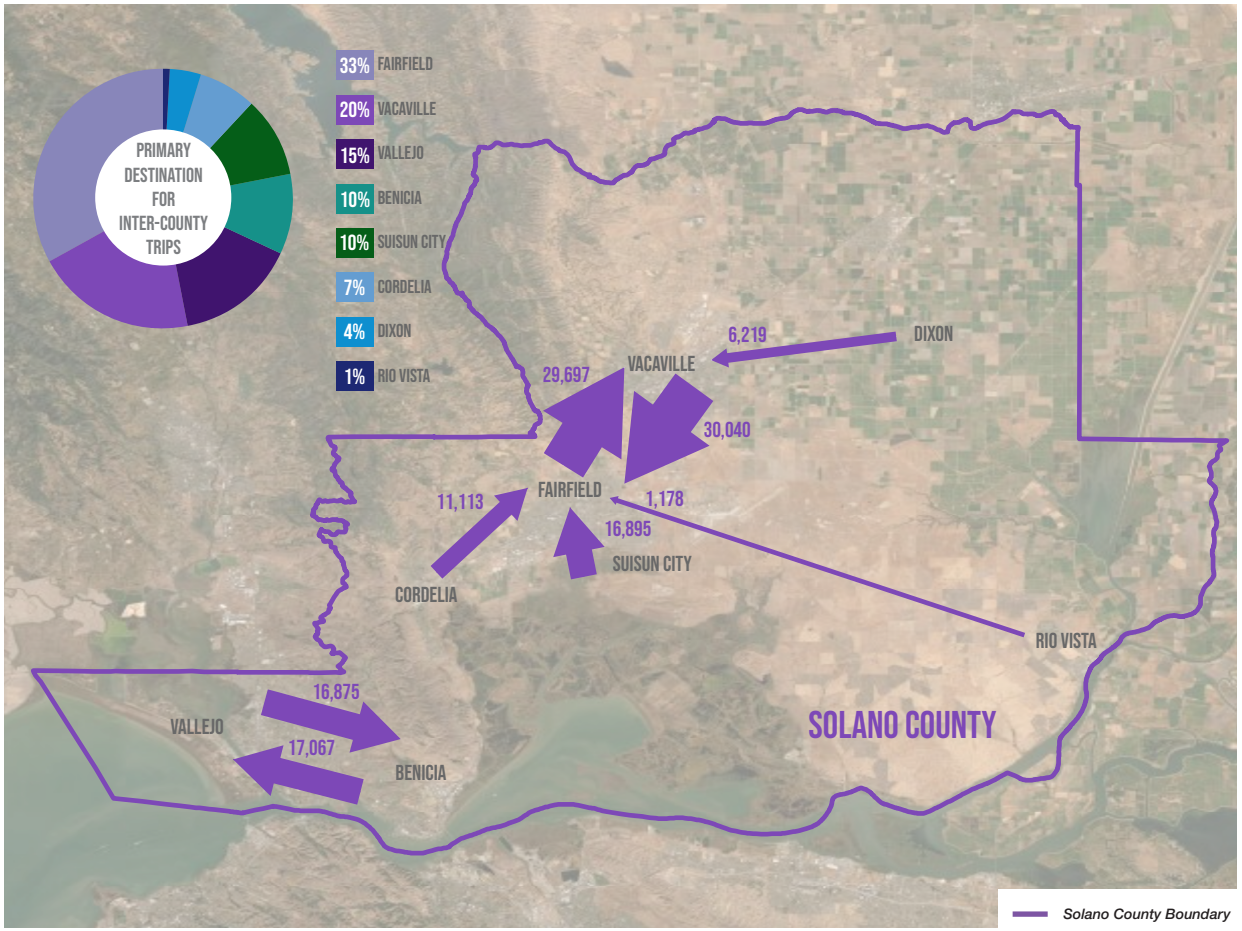


Figure 4: Local Travel between Cities within Solano County

Travel from Solano County to Other Counties by Solano Residents

About 250,000 weekday trips to and from the county are made by Solano residents. About 100,000 (42%) of these trips are made in the peak periods. The predominant travel markets are to the East Bay, with the I-80 and I-680 corridors together accounting for almost half of all out-of-county trips. Marin/Sonoma each have about a 10% share of trips, as does Sacramento and San Francisco. Davis has about 5% of these trips.

Figure 5 details the findings. See Appendix E for detailed travel findings.

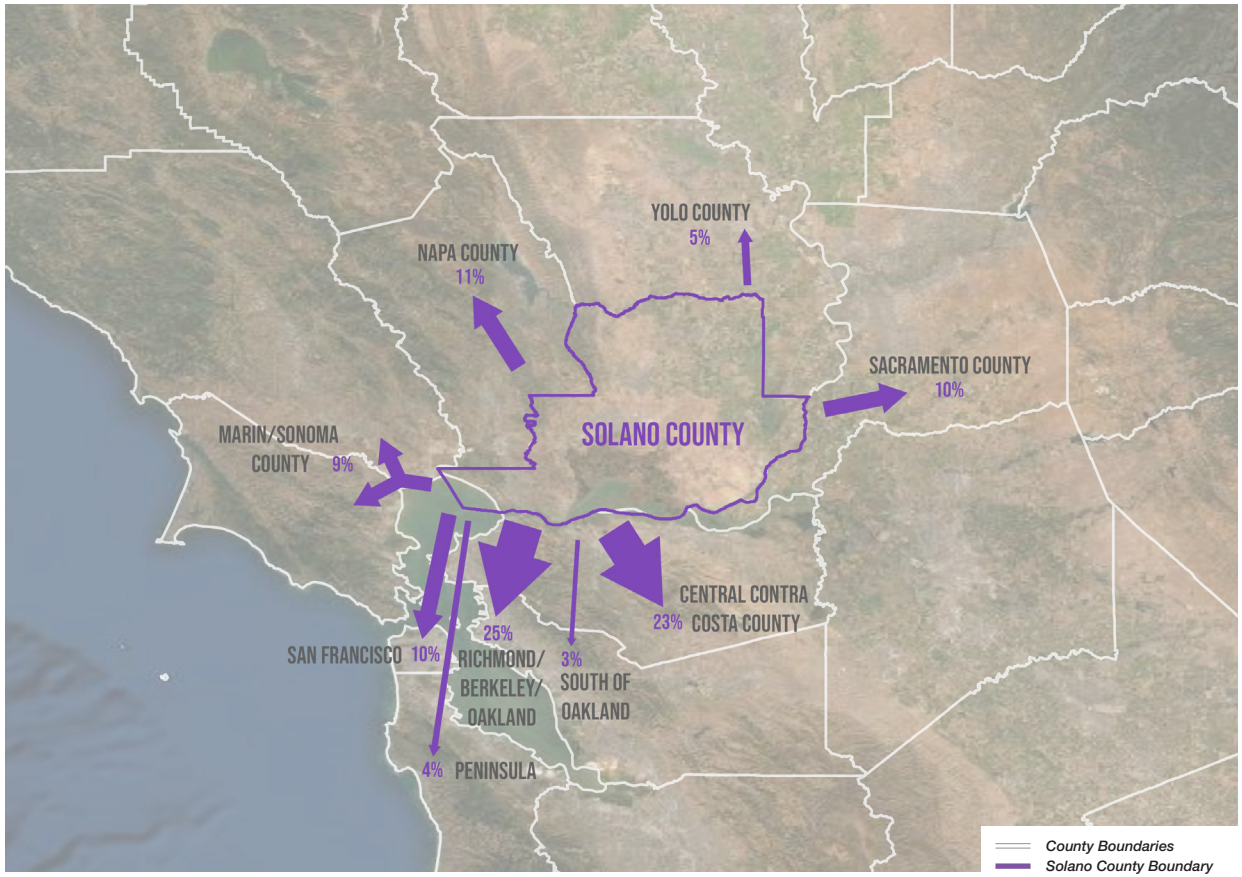


Figure 5: Travel from Solano County to Other Counties by Solano Residents

2. Existing Conditions

SMART Analysis

The trip tables identify Napa as having a relatively large market share of 11% from all of Solano County. Further analysis identifies these trips as originating from within Solano as follows:

To/From	Vallejo-Benicia	Remaining Solano
American Canyon (25,000)	**16,000**	**9,000**
Napa (27,000)	**9,000**	**18,000**
TOTAL	**25,000**	**27,000**

Table 3: Solano Resident Trips to Napa and American Canyon Trips

Likewise, travel to the I-80 Corridor and the I-680 Corridor can also be categorized as between Vallejo-Benicia and the regional destinations, as follows:

To/From	Vallejo-Benicia	Remaining Solano
I-80 (Richmond/Berkeley/ Oakland) (62,000)	**25,000**	**37,000**
I-680 (Concord/Pleasant Hill/WC) (56,000)	**23,000**	**33,000**
TOTAL	**48,000**	**70,000**

Table 4: I-80 and I-680 Corridor Trips

Travel from Other Counties to Solano County by Non-Solano Residents

About 150,000 weekday trips into and then out of the county are made by non-Solano residents. About 70,000 (46%) of these trips are made in the peak periods. The predominant travel markets are from Sacramento and Yolo Counties, with Sacramento representing about 22% of trips into Solano, and Yolo about 20% (between 30,000 to 32,000 total trips from each county into and returning from Solano). The next largest concentration of trips is to and from the East Bay (Richmond, Berkeley, Oakland). North Bay and Napa non-resident trips shares are nearly identical to Solano resident trips – about 8% to and from the North Bay and Marin, and about 11% to and from Napa.

Figure 6 details the findings. See Appendix E for detailed travel findings.

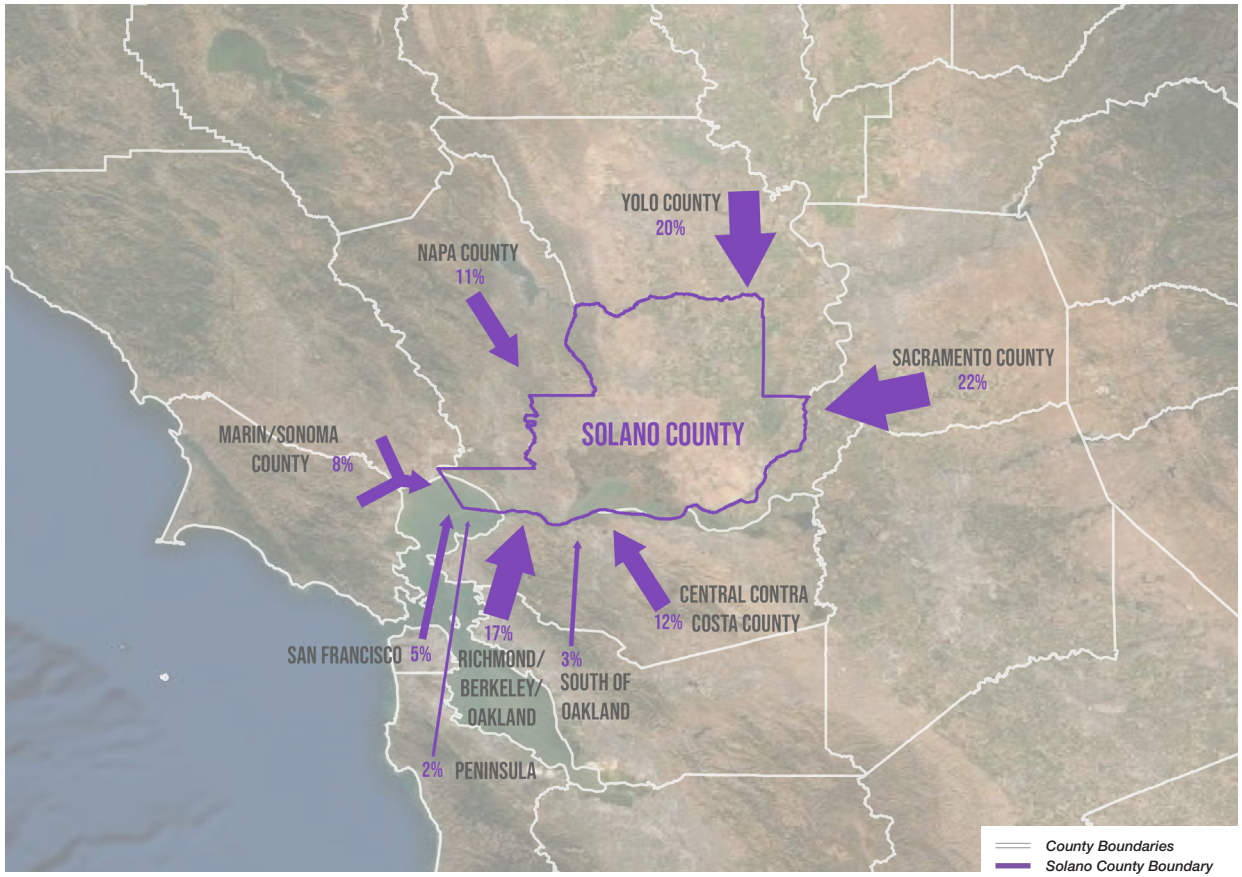


Figure 6: Travel from Other Counties to Solano County by Non-Solano Residents

2. Existing Conditions

SMART Analysis

The trip tables identify Napa as the origin for a relatively large market share of 11% into all of Solano County. Further analysis identifies these trips as destined to Solano as follows:

To/From	Napa	American Canyon
Vallejo-Benicia	**7,600**	**14,000**
Remaining Solano	**8,800**	**4,250**
TOTAL	**16,400**	**18,250**

Table 5: Napa and American Canyon Trips to Solano County

Likewise, travel from Sacramento and Yolo into Solano can be identified as destined primarily for the following locations:

To/From	Sacramento	Yolo
Dixon	**5,400**	**10,600**
Vacaville	**11,400**	**11,200**
Fairfield	**8,600**	**5,300**
Vallejo	**4,200**	**1,100**
Benicia	**1,250**	**350**
Rio Vista	**2,400**	**300**

Table 6: Sacramento and Yolo County Trips to Solano County

Note that about two-third of all Benicia trips are to the Benicia Industrial Park.

A more detailed breakdown of trips to other major destinations from Sacramento and Yolo is below.

To/From	Sacramento	Yolo
Genentech/Kaiser	**3,300**	**3,700**
Travis AFB	**1,100**	**700**
Vacaville Correctional Facilities (DOCR)	**1,450**	**330**

Table 7: Sacramento and Yolo County Trips to Major Destinations in Solano County

Travel from the East Bay into can be identified as destined primarily for the following locations:

To/From	East Bay (Rich/ Berk/Oak)	Central CCC
Dixon	**600**	**500**
Vacaville	**3,000**	**1,800**
Fairfield	**6,000**	**5,000**
Vallejo	**11,200**	**5,200**
Benicia	**3,000**	**4,800**

Table 8: East Bay Trips to Solano County

Note that about two-third of all Benicia trips are to the Benicia Industrial Park

2. Existing Conditions

Major Corridors and Hubs

Based on the Big Data provided by Cambridge Systematics, major hubs – centers of activity – within Solano County include the following:

Hub	Intracounty Travel
Fairfield-Suisun	**43%**
Vacaville	**20%**
Vallejo	**15%**

Table 9: Major Hubs

Vacaville is a hub for travel by out-of-county residents and the Benicia Industrial Park accounts for most of the intra and intercounty travel into Benicia.

Major Corridors are noted in Table 10.

Corridor	Travel from Solano (Solano Residents)	Travel to Solano (non-residents)
Fairfield-Suisun to Central CCC	**33,000**	**7,300**
Fairfield-Suisun to East Bay (Rich/ Oak)	**37,000**	**9,600**
Vallejo/Benicia to Central CCC	**23,000**	**10,000**
Vallejo/Benicia to East Bay (Rich/ Oak)	**25,000**	**14,200**
Vallejo to American Canyon/Napa	**25,000**	**21,600**
Fairfield/Suisun/Vacaville to Marin/ Sonoma	**27,000**	**13,050**
I-80 East Gateway (Davis/ Sacramento)	**35,300**	**62,800**

Table 10: Major Corridors

Combing the most traveled corridors with their hubs into one table provides the following summary:

	Corridor	Corridor Hubs	Weekday Travel			
			Travel from Solano (Solano Residents)	Travel to Solano (non-residents)	IntraCounty Travel	TOTAL CORRIDOR TRAVEL
1	I-80 East Gateway (Davis/Sacramento)	Fairfield/Vacaville	35,300	62,800	35,000	133,100
2	Fairfield-Suisun to East Bay (Rich/Oak)	Fairfield	37,000	9,600	14,000	60,600
3	Vallejo/Benicia to East Bay (Rich/Oak)	Vallejo	25,000	14,200	9,000	48,200
4	Vallejo to American Canyon/Napa	Vallejo	25,000	21,600	N/A	46,600
5	Fairfield-Suisun to Central CCC	Fairfield	33,000	7,300	5,000	45,300
6	Vallejo/Benicia to Central CCC	Benicia	23,000	10,000	9,000	42,000
7	Fairfield/Suisun/Vacaville to Marin/Sonoma	Fairfield	27,000	13,050	N/A	40,050

Table 11: Summary of Major Hubs and Corridors

2.4 Park and Ride Facilities

Park and ride facilities are considered an important component of attractive and useful suburban rail stations. STA is currently conducting the Solano County Transit Parking Demand Study (DKS Associates). This study includes analysis of park and ride lots throughout the county. Only the Suisun-Fairfield station park and ride is included in the Transit Parking Demand Study and also this study. All the surveyed park and ride facilities are noted in the table below, with the addition of Red Top Road, which is another potential SMART/Solano Express site. Note that at this time, there may be potential of adding more parking at the lot by the new STA office (located at the northwest corner of Main and Suisun Streets). See Table 12 for a summary of Park and Ride lots.

		Lot	Number of Spaces	Occupancy Count and Notes
In *Transit Parking Demand Study*	Potential SMART/ Solano Express Site	Suisun-Fairfield Downtown	325	65% Occupancy (March 2020)
	Not Potential SMART/Solano Express Site	Fairfield-Vacaville Hannigan Station	187	75-80% Occupancy (May 2019)
		Dixon Park-and-Ride	89	25% Occupancy (May 2019)
		Fairfield Transportation Center	630	80-100% Occupancy (several sites, May 2019)
		Vallejo Ferry Terminal*	1,512	70-85% Occupancy (count by Kimley-Horn)
		SR-37/Fairgrounds		No occupancy count
Not in *Transit Parking Demand Study*	Potential SMART/ Solano Express Site	Red Top Road	214	No occupancy count

Table 12: Park and Ride Summary

**Includes lots: Parking Garage, A1, A2, B, F (https://vallejoferryschedule.com/parking.html)*

Occupancy and counts source: DKS, STA

Source: Arup

3. Potential Futures

3.1 Growth (population & employment)

In the last regional plan (Plan Bay Area 2040), Solano County was forecast to grow about 13% over 30 years, a historically low rate for the county.

MTC released a new regional plan – Plan Bay Area 2050 – in Summer 2020. The new plan anticipates higher employment but lower population growth than the 2040 plan, although it also assumes more housing units than the 2040 plan.

Total regional population is forecast at 10.3 million residents, an increase of about 2.4 million residents from 2020. Regional employment is forecast at 5.4 million jobs, an increase of about 1.3 million jobs from 2020.

Each county is allocated a share of this growth. For Solano County, 3% of both the employment and population increases are assumed. Tables 13 and 14 calculate the impact for Solano County.

Plan Bay Area 2050's *Projected Household and Job Growth by Superdistrict* allocates growth within Solano County. North Solano County cities (Fairfield, Suisun City, Vacaville and Dixon) are forecast to have a household increase of 41%. If that share is also assigned to Fairfield and Suisun City, together the cities will house about 60,000 new residents.

Plan Bay Area 2050 also seeks to place 43% of new growth within one-half mile of transit. About 450 acres of downtown Suisun City and Fairfield are within one-half mile of the Suisun-Fairfield Station. The downtowns of Fairfield and Suisun could contribute to the anticipated county population increase and to meeting Plan Bay Area's transit adjacency goals. In addition, the population concentrations of the two cities support the State Rail Plan criteria for a Solano County Hub.

	REGIONAL			
	2020	2050	30 Year Increase	Solano County Share
Regional Population	**7,930,000**	**10,330,000**	**2,400,000**	**3%**
Regional Employment	**4,080,000**	**5,410,000**	**1,330,000**	**3%**

Table 13: Regional Employment and Population Change

3. Potential Futures

	SOLANO COUNTY			
	2020	2050	30 Year Increase	Increase from 2020
Population	**440,250**	**512,250**	**72,000**	**16.4%**
Employment	**150,000**	**189,900**	**39,900**	**26.6%**

Table 14: Solano County Employment and Population Change

	2020	North County Forecast	2050 Anticipated Population	2050 Growth
Fairfield Population	**116,981**	**41%**	**164,943**	**47,962**
Suisun City Population	**29,119**	**41%**	**41,058**	**11,939**
TOTAL	**146,099**		**206,000**	**59,900**

Table 15: Fairfield and Suisun City Population Change

3.2 Rail Corridor Changes

Fairfield and Suisun City already host significant regional transportation infrastructure, including the Capitol Corridor and Interstates 80, 680, and State Route 12. Looking forward, regional and state plans substantially improve transit services and rail infrastructure. This level of service and future investment suggests Fairfield and Suisun City can successfully house additional residents in sustainable and attractive communities.

Especially important is the State Rail Plan, which Caltrans published in 2018. The plan identifies a series of phased improvements to the statewide rail network. These improvements include both service and rail infrastructure.

For Solano County, Capitol Corridor service increases in the first phase, leading to transit levels of service in the final phase. In addition, a "Solano County Hub" is identified where the Bay Area-Sacramento services connect with bus or rail services to Napa and Marin, along with bus services to Contra Costa County. In the mid-term plan (2027), service operates every 30 minutes between Sacramento and the Bay Area in the peak periods, and then hourly at other times.

The 2040 vision – only 20 years distant – suggests the Solano County Hub is a vital link in the State and regional network. By this time, Capitol Corridor service operates between Roseville, Sacramento and directly to San Francisco (via a new Transbay Tube) every 30 minutes, with supplemental service from the Solano County Hub operating every 30 minutes to San Francisco and to San Jose via the East Bay every 30 minutes.

In total, six trains an hour in each direction would serve the Solano County Hub, with all trains delivering passengers to downtown Oakland in about 50 minutes and four of the trains delivering passengers to downtown San Francisco in about one hour. The total capacity of these trains will be about 4,000 passengers an hour in each direction, about the same capacity as two freeways lanes in each direction. In addition, rail service to Marin and Napa would also be available.

The Solano County Hub location will be the most connected place in Solano County and its access will enable the local governments to consider the station location for significant adjacent land use density with housing and jobs in the downtown Priority Development Areas (PDAs).

3. Potential Futures

Initiative	Impact	Delivery	Document
Capitol Corridor Service	• 15 Trains Each Direction	In Operation	N/A
Capitol Corridor Service Expansion	• 30-minute peak service; 60-minute off peak; • Trains extend to Roseville	2027	State Rail Plan
Capitol Corridor Service Expansion	• Long-line 30-minute service from Sacramento to Oakland and SF via Solano County Hub • 30-minute service to Oakland and SF (starting at Solano County Hub) • 30-minute service to Oakland and San Jose (starting at Solano County Hub) • Direct Capitol Corridor service to downtown SF via new tube	2040	State Rail Plan
SolanoExpress Expansion	• Additional service to central Contra Costa County from Solano County Hub	2025-2040	STA State Rail Plan
SMART Expansion	• Initial Bus Service from Napa to Suisun-Fairfield Station	Existing – Napa VINE 21	State Rail Plan
SMART Expansion	• Express Bus Service linking SMART to Suisun-Fairfield Station	2027	State Rail Plan
SMART Expansion	• SMART Rail Service from Novato and Napa to Suisun Fairfield. Provide hourly rail service to both Napa and Marin.	2040	State Rail Plan

Table 16: State Rail Plan Initiatives

4. Potential SMART Station Locations

Source: Wikimmons

Alignment near Cordelia Road looking toward I-680

4.1 Capitol Corridor Connection

Locations Studied

This study prioritizes station locations that serve multiple transit modes effectively (including intercity rail – Capitol Corridor, regional rail – SMART, and express buses – SolanoExpress) and support regional land use needs and local development aspirations. At least one station must connect to the Capitol Corridor. All sites must have limited environmental impact on their surroundings. The station sites must also be able to meet adopted design criteria and other technical requirements.

Applying these requirements, two general locations were identified for potential station sites – along the Suisun-Fairfield City Line, adjacent to Highway 12, and in the Cordelia area where I-680, I-80, Highway 12 and the SMART alignment all converge.

Two Capitol Corridor connections sites were identified:

- Suisun-Fairfield Train Depot
- Cordelia Wye Junction

Four sites were identified with connections to I-680/I-80.

- Red Top Road at Highway 12
- Red Top Road at I-80
- Cordelia Road/Lopes Road
- W Cordelia Road/I-80/I-680

Two locations exist for the proposed Solano County Hub (the connection between SMART and Capitol Corridor). The incumbent location is the Suisun-Fairfield Train Depot; the other location, about one-half mile south, is the junction where the UPRR mainline branches and connects with the proposed SMART alignment using the UPRR/California Northern right-of-way to Novato/Vallejo and Napa.

Both locations were studied for fatal flaws and compatibility with local plans and expectations. The best site was then further studied to provide compliance with the design standards and passenger amenity requirements.

Cordelia Wye Junction

Existing Conditions

The Cordelia Wye Junction is in western Suisun City at the UPRR/California Northern Railroad Wye. The surrounding area is primarily agricultural, government/miscellaneous (including the UPRR right-of-way), and marsh land. This site is not currently served by existing rail service. There is very limited FAST bus route service. Figure 7 shows the site location.

Out of all locations, this location has the most biological constraints on or near the site, including containing and adjacent to critical habitat (Contra

4. Potential SMART Station Locations

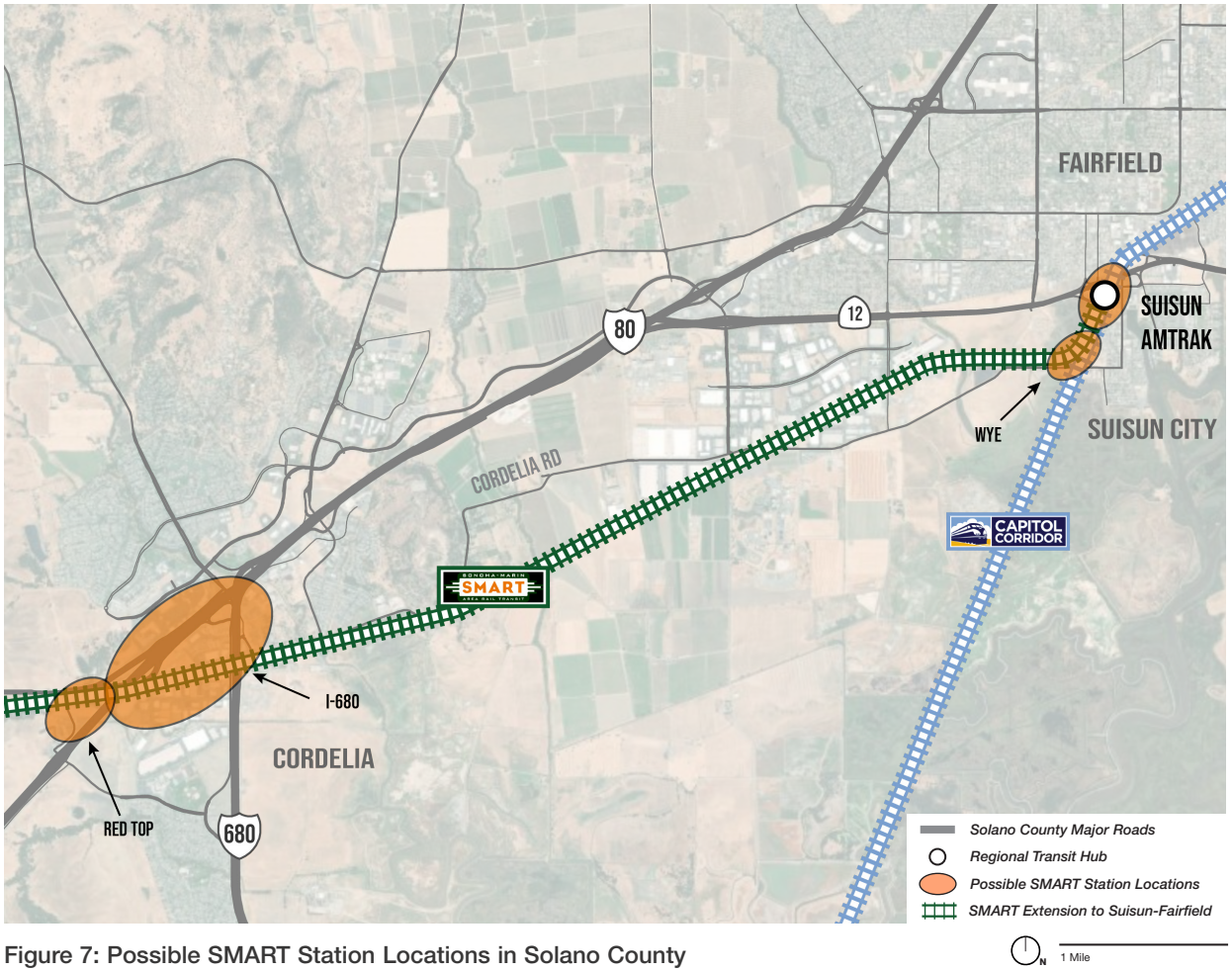


Figure 7: Possible SMART Station Locations in Solano County

Costa goldfields – and endangered flower – was a significant constraint). Because of these constraints, only a preliminary conceptual design was reviewed.

Conceptual Design

Preliminary station development at this location included realigning the existing railway to the north, constructing a station platform on the northern portion of the location, and providing parking adjacent to the wye.

Recommendation

The Cordelia Wye Junction site environmental risk creates development constraints, as it will intrude on the habitat of several endangered species, including the Contra Costa goldfields. It is also at the edge of Suisun City, and not convenient to Fairfield, leading to poor land use opportunities and transit connections. For these reasons, this site was removed from consideration.

Suisun-Fairfield Train Depot

Existing Conditions

The Suisun-Fairfield Train Depot is an existing Capitol Corridor train station. The station also serves local destinations. Several bus operators serve the station, including: SolanoExpress, Fairfield and Suisun Transit (FAST), Napa Valley Transportation Authority's The Vine, Rio Vista Delta Breeze, and Greyhound.

The existing train depot is historic but substandard. Existing amenities include:

- Bus stops
- Taxi landing zone
- Bike lockers and rack
- Central County Bikeway
- Parking
- Park & Ride
- Transportation Information Depot
- Restrooms
- Bottles and cans recycling bins
- Indoor and outdoor seating

The major station deficiencies include:

- Inadequate passenger platforms (width and geometry)
- At-grade passenger crossing of active tracks
- Non-ADA pedestrian ramp
- Connections to both Suisun City and Fairfield

Conceptual Design

As part of this study, a conceptual design for an expanded Suisun-Fairfield Station was developed to:

- Incorporate the required design criteria for passenger amenities and safety
- Better connect downtown Suisun City and Fairfield, and
- Accommodate the extension of SMART into the station via a separate grade-separated center platform with tunnels connecting SMART passengers to other station facilities including the Capitol Corridor platform.

Figure 8 shows a conceptual site plan. Figure 9 shows a conceptual rendering of elements at the SMART platform.

4. Potential SMART Station Locations

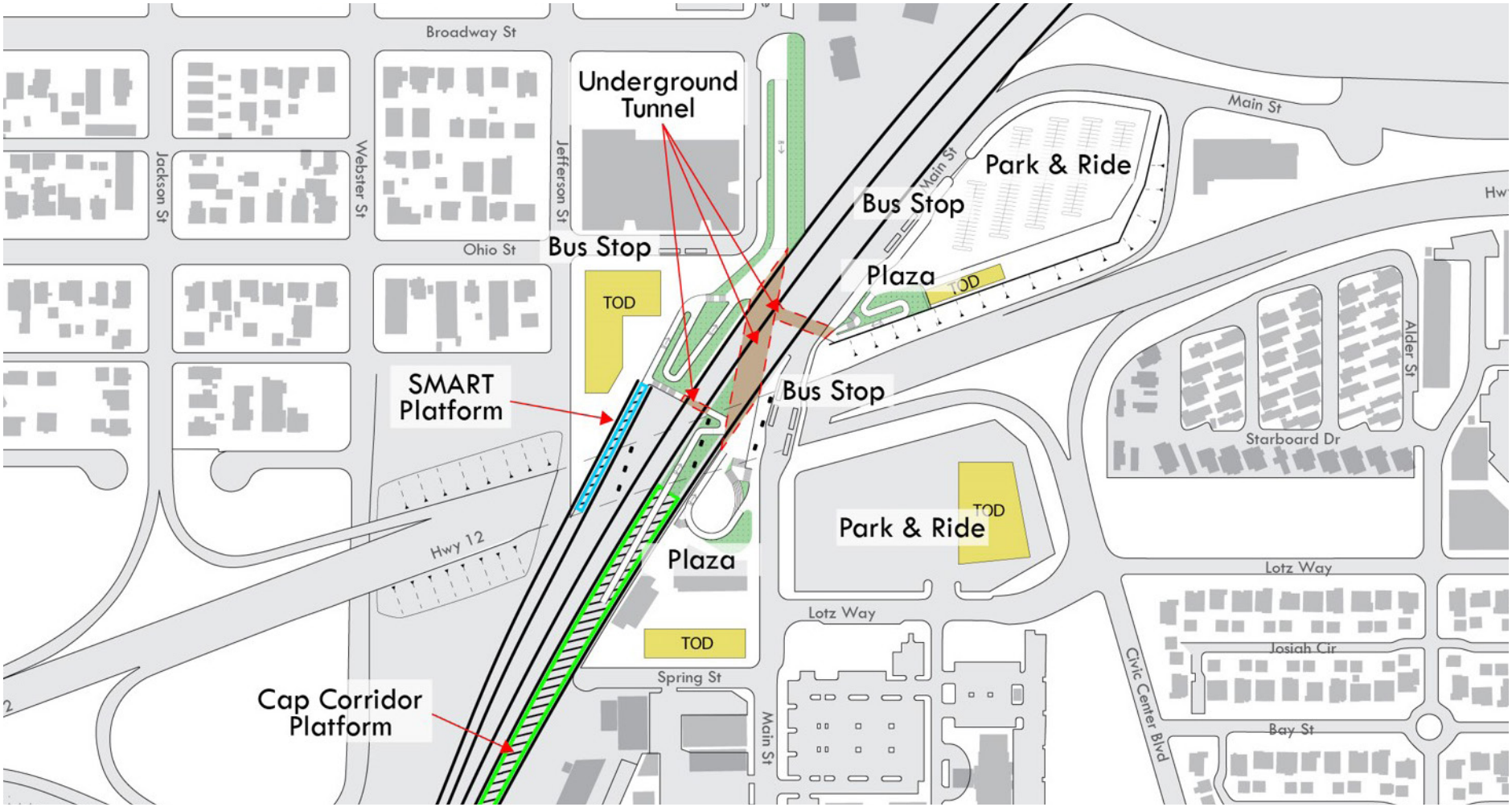


Figure 8: Plan view, Suisun-Fairfield Station Improvements

Smart Station Platform

- Canopy structure
- Wind screen panels and seating
- Ramp
- Safety rail
- Information and advertisement panel
- Pole mounted lighting
- Waste/recycle receptacles
- Ticket vending machine (TVM)
- Card reader
- Bike storage lockers
- Pedestrian gate arm
- Tactile track

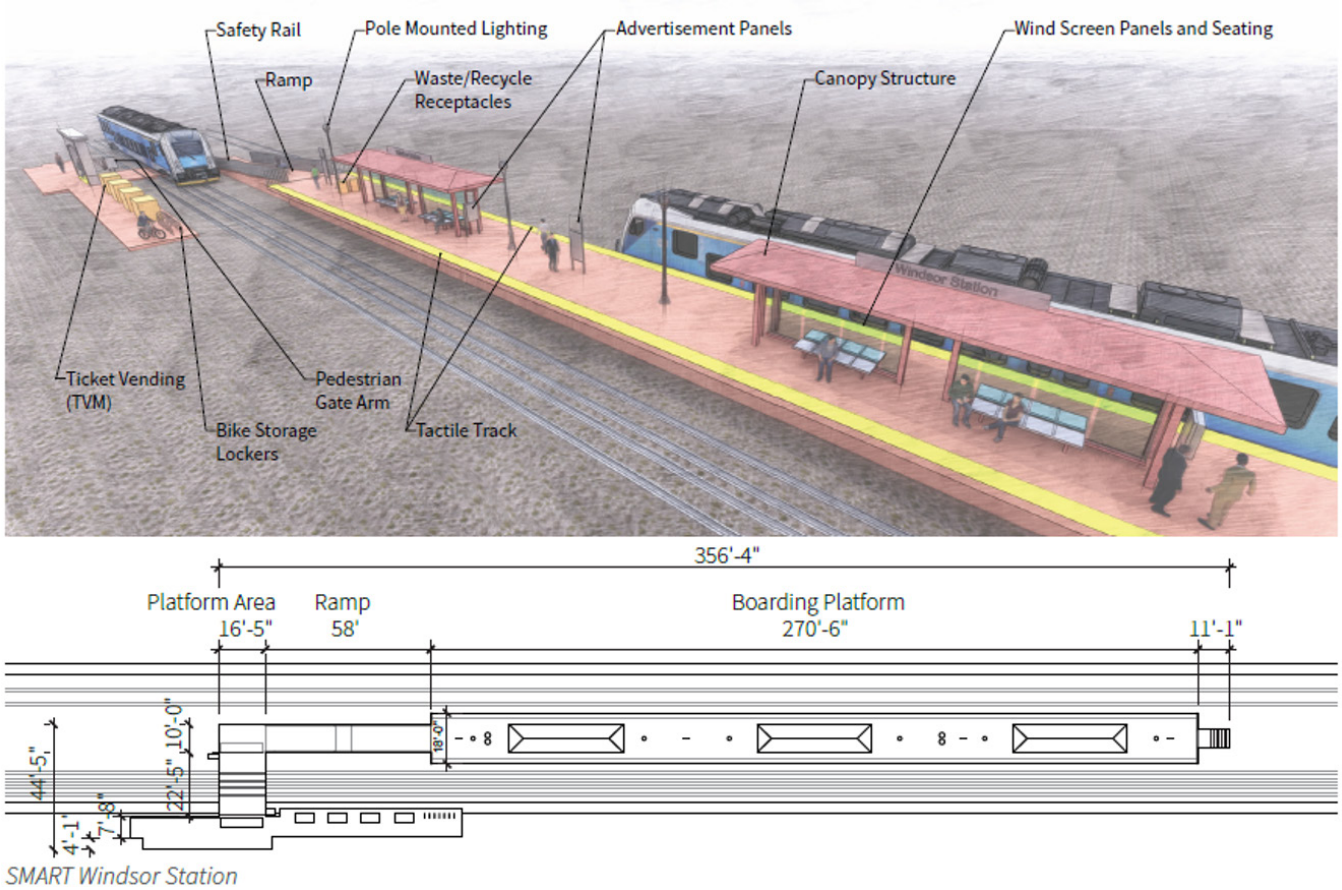


Figure 9: Generic SMART Station Amenities

4. Potential SMART Station Locations

The conceptual design includes the following elements.

Platforms

- SMART and Capitol Corridor platforms partially underneath Highway 12

Access

- Below-grade pedestrian tunnels:
  - Provides wide, primarily open passages with 15-18-foot ceiling heights (similar to the Richmond BART Intermodal station)
  - Central plaza area leading into the passages
  - North-south tunnel traveling between Ohio Street in Fairfield to the existing plaza area south of Highway 12 in Suisun City
  - Tunnel providing access to and between platforms
- Ramp access and stairs to provide more direct access to parking and platforms

Parking

- Additional 300 at-grade car parking spaces north of Highway 12 and south of Main Street to initially double-parking capacity, and provide a location for futured structured parking

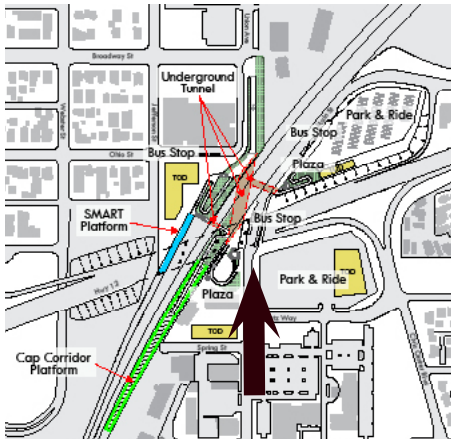
Bus

Bus transfer facility located on the Fairfield side of the station adjacent to the PG&E substation, replacing the existing bus facility in Suisun (which must be moved to provide a third UPRR track). Bus stops increase from three to four in the new facility. Access for most local services is slightly improved with better proximity to more service in Fairfield and equal access for regional buses.

Relocated building station

The existing Suisun-Fairfield Train Depot building will need to be relocated further south to accommodate the tracks.

The following figures provide conceptual renderings of the station.



Reimagine existing plaza with new design

Preserve existing retail

Preserve Station building and create station plaza opportunity to improve visibility

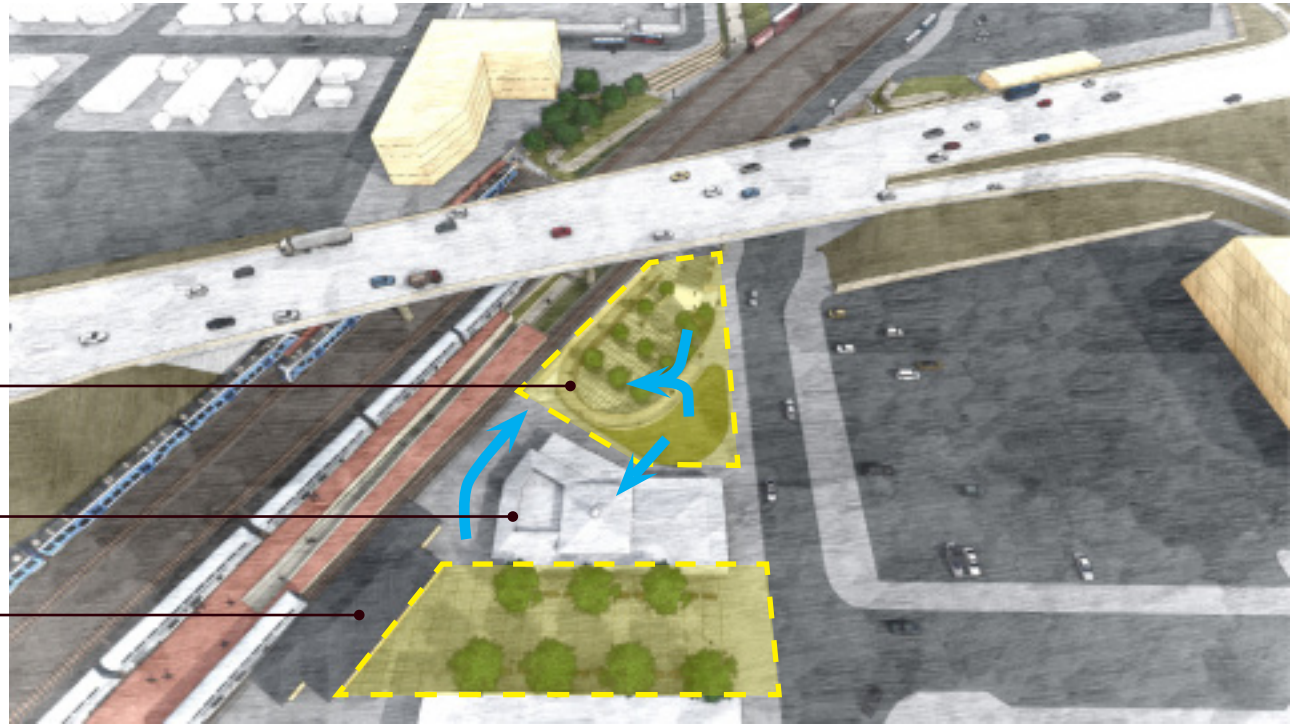
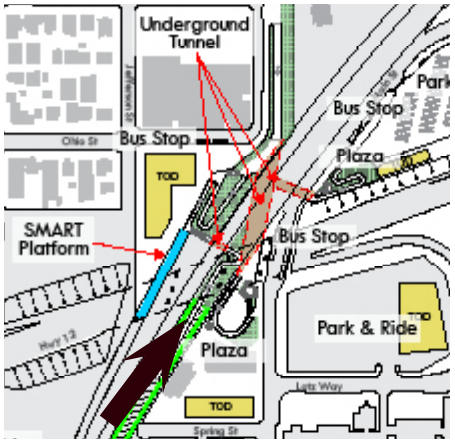


Figure 10: Suisun-Fairfield Station, Aerial View Looking North

4. Potential SMART Station Locations



Preserve and relocate Suisun Station

Capitol Corridor platform

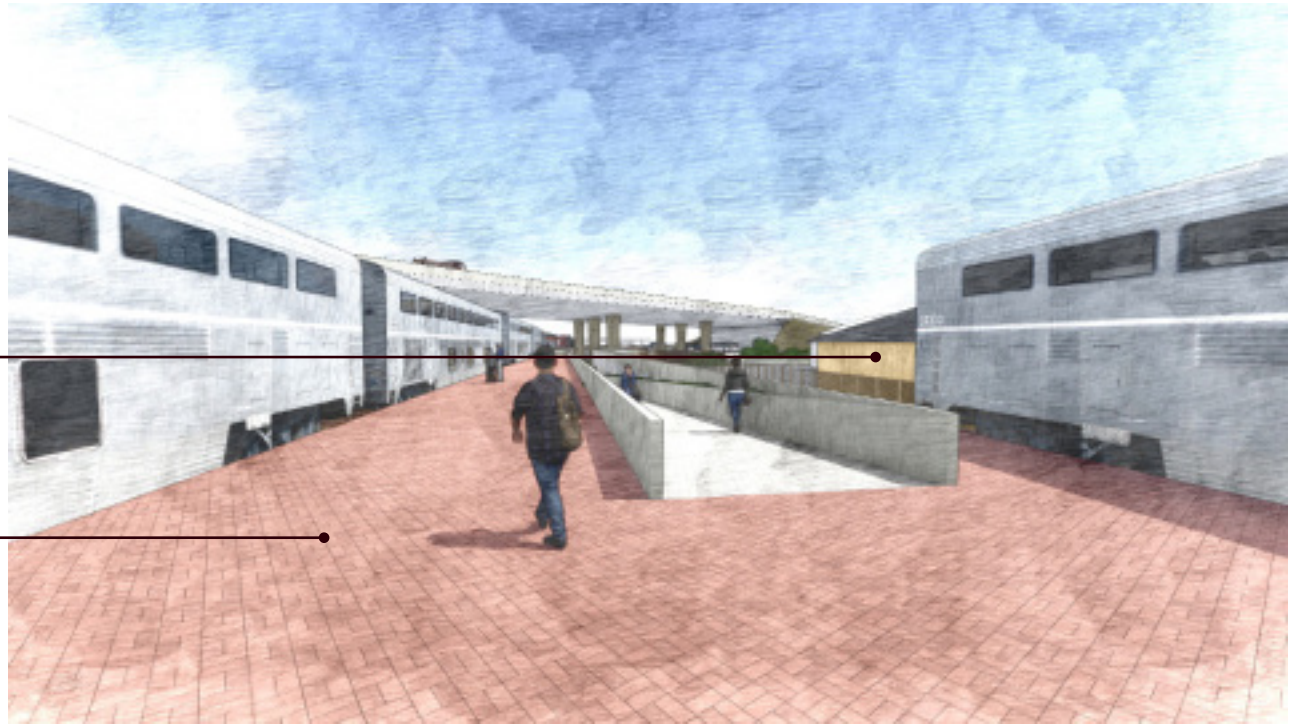
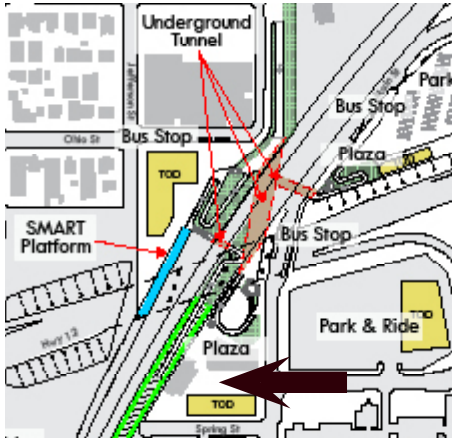


Figure 11: Suisun-Fairfield Station, Platform View



Public realm activation opportunity associated with possible development

Preserve and relocate Suisun Station

Existing Retail

Opportunity for high visible corridor to station

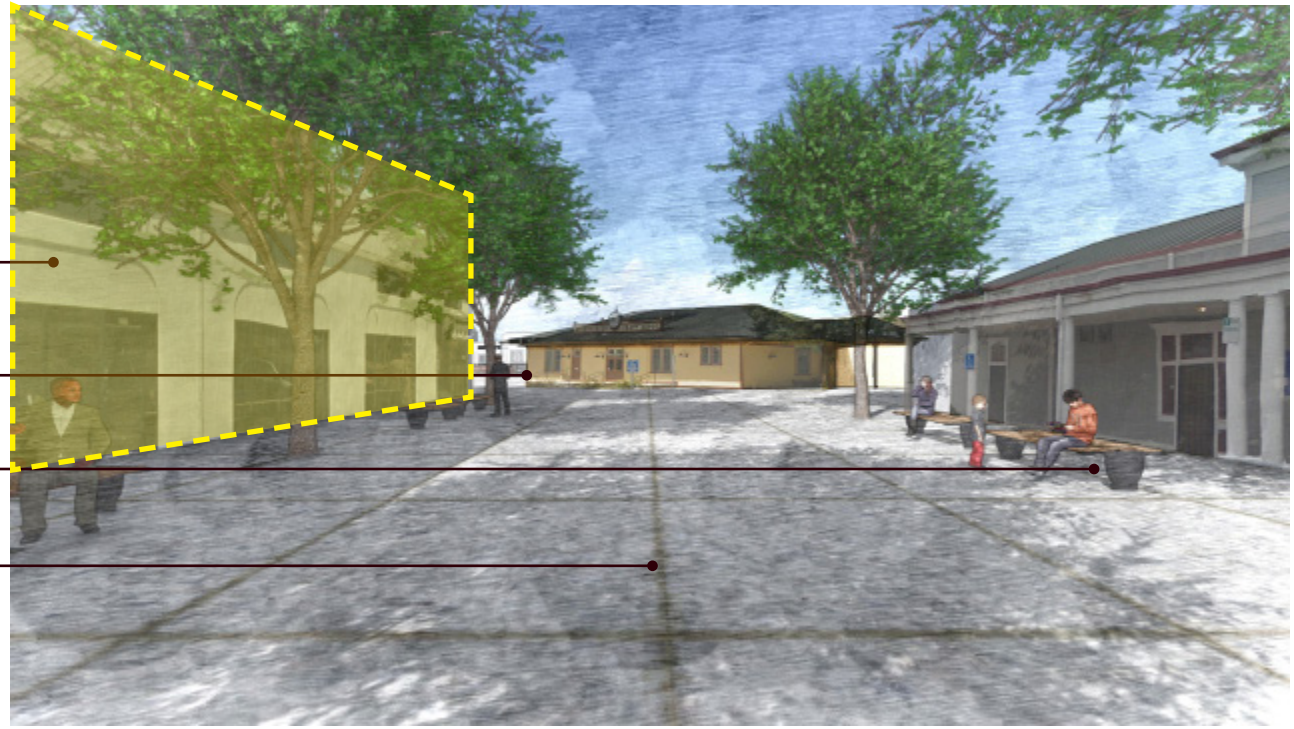
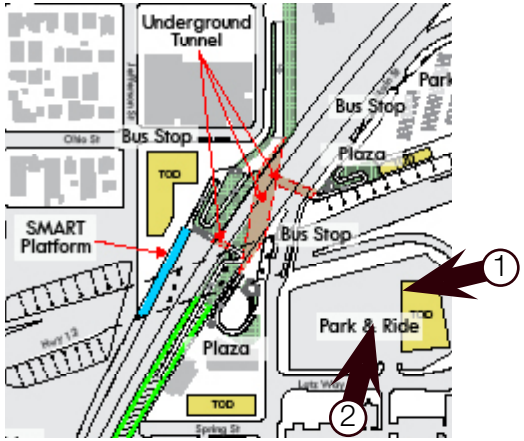
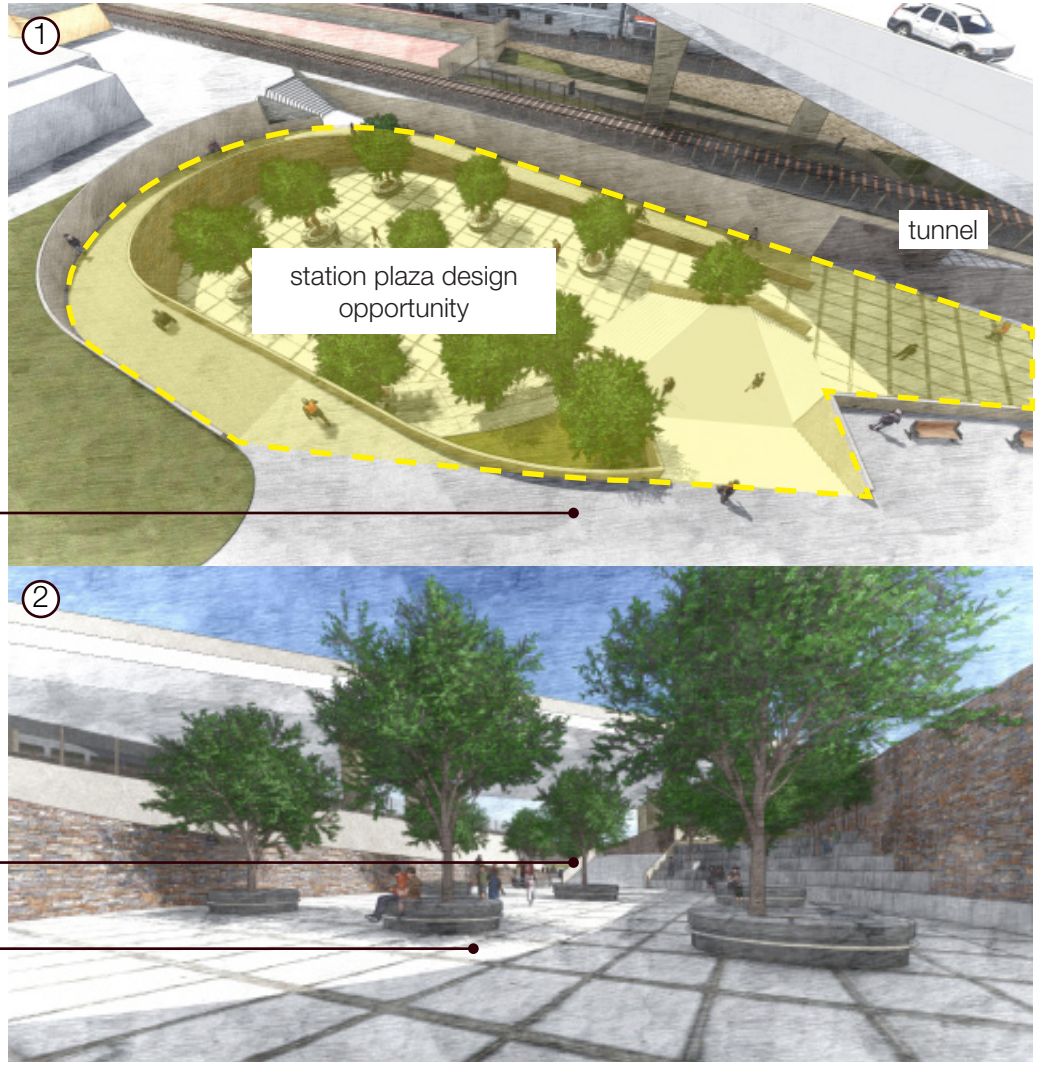


Figure 12: Suisun-Fairfield Station, Plaza

4. Potential SMART Station Locations



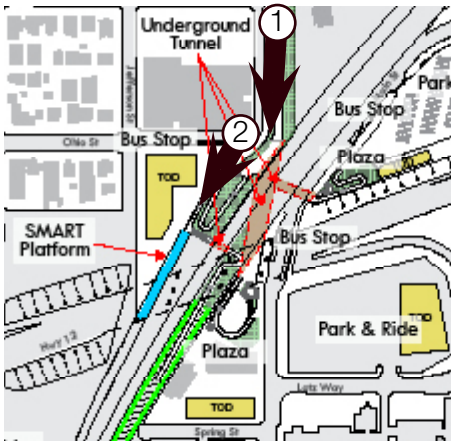


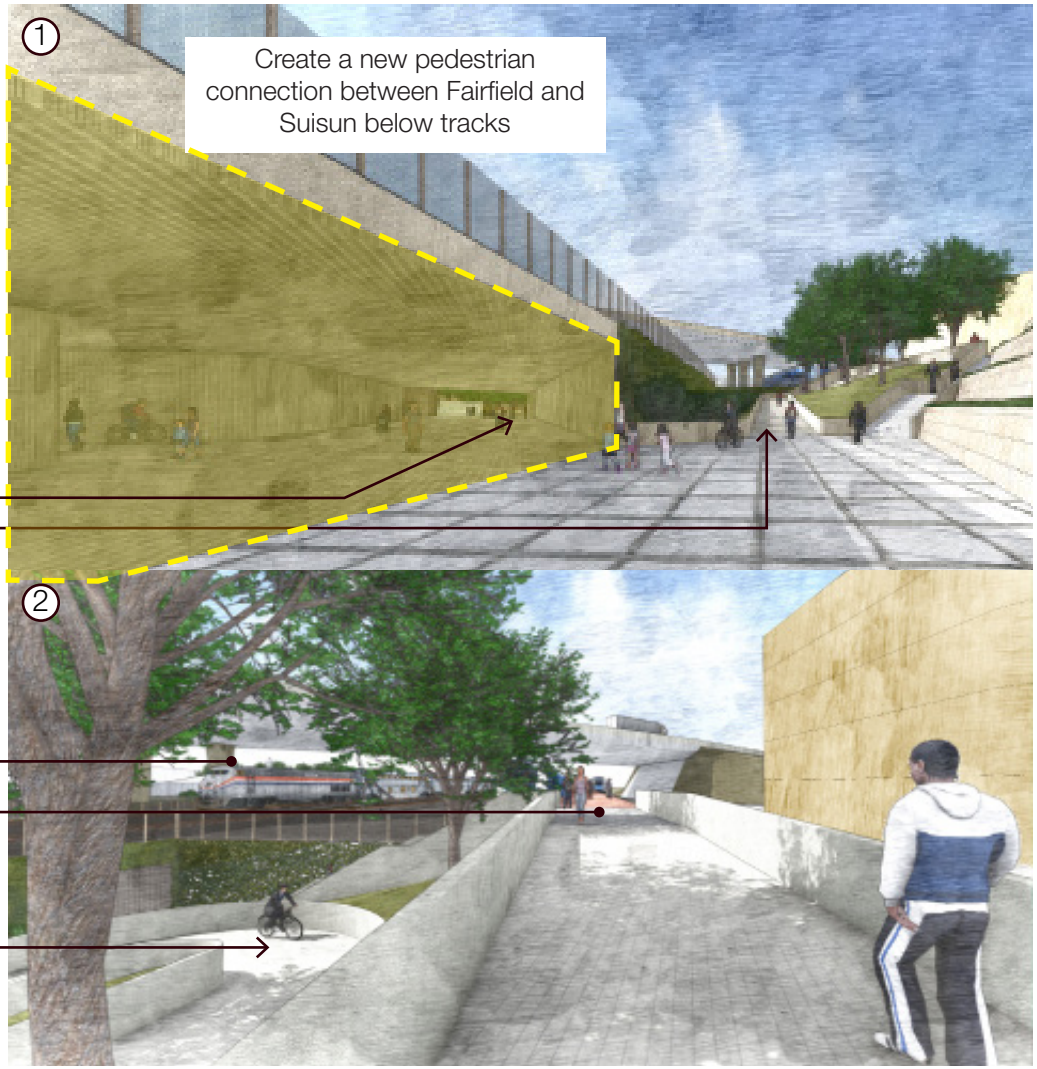
High visibility access opportunity, ramp and stairs

Opportunity to introduce patron amenity and activation in plaza

Reimagine existing plaza

Figure 13: Suisun-Fairfield Station, Plaza Opportunity





To Capitol Corridor Platform

To SMART Platform

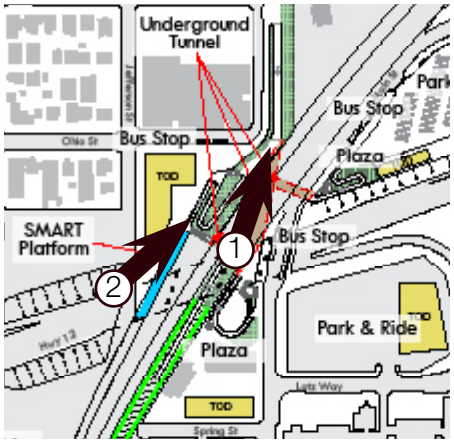
SMART Platform

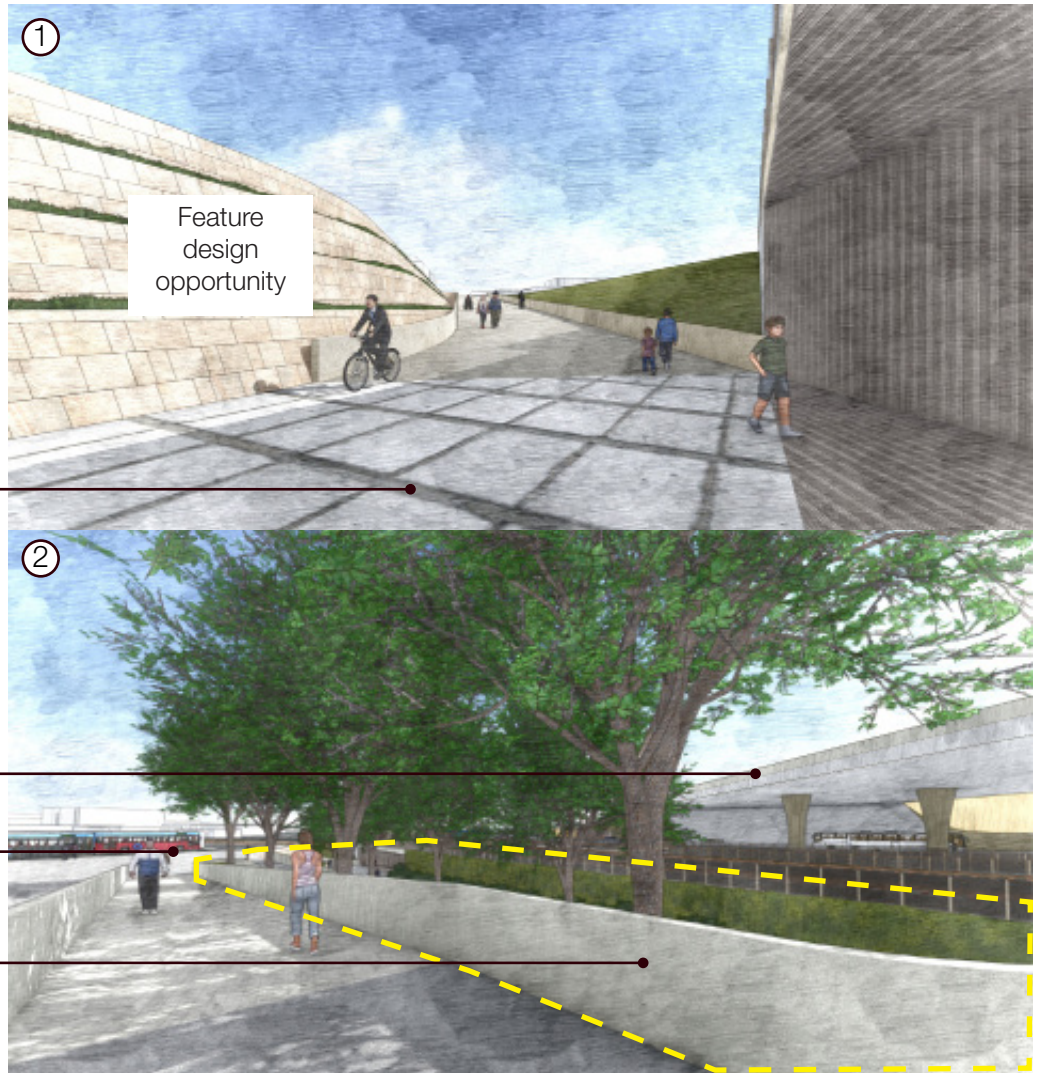
Tunnel to Capitol Corridor Platform

Design new stair and ramps to underground crossing

Figure 14: Suisun-Fairfield Station, Pedestrian Tunnel

4. Potential SMART Station Locations





Eliminate blind spots, design for safety

SMART Platform

Approach to tunnel to Capitol Corridor Platform

Greening and design opportunity

Figure 15: Suisun-Fairfield Station, Pedestrian Access

4.2 I-80/I-680 Connection

There are four potential locations for the I-680/I-80 SMART connection. All locations assume delivery of the new I-80/I-680/SR-12 interchange project and further assume the proposed bus and train stations could be delivered as an element of the overall I-80/I-680 highway project. At the request of the City of Fairfield, these sites are identified for further study as part of the Fairfield General Plan Update.

Existing Conditions

The potential SMART/bus locations stretch from Red Top Road in the west to the current I-80/I-680 interchange to the east – an area of about 325 acres. Land uses vary throughout this large area. While SolanoExpress services operate on both I-80 and I-680, and Napa VINE operates on Highway 12, the only intercity/regional bus stop near the study area is at Solano Community College. The UPRR/California Northern Railroad operates through Jameson Canyon adjunct to Highway 12 but has no stops or stations. The City of Fairfield operates a 214-space park and ride lot at Red Top Road, however no transit operators serve the facility.

Several trip attractions are near the interchange, including a large shopping center and Solano Community College, however the west side of the study area near Red Top Road is more isolated.

The four conceptual SMART-SolanoExpress Station locations are:

- Red Top Road (new alignment) at Highway 12
- Red Top Road at I-80
- Cordelia Road/Lopes Road
- W Cordelia Road/I-80/I-680

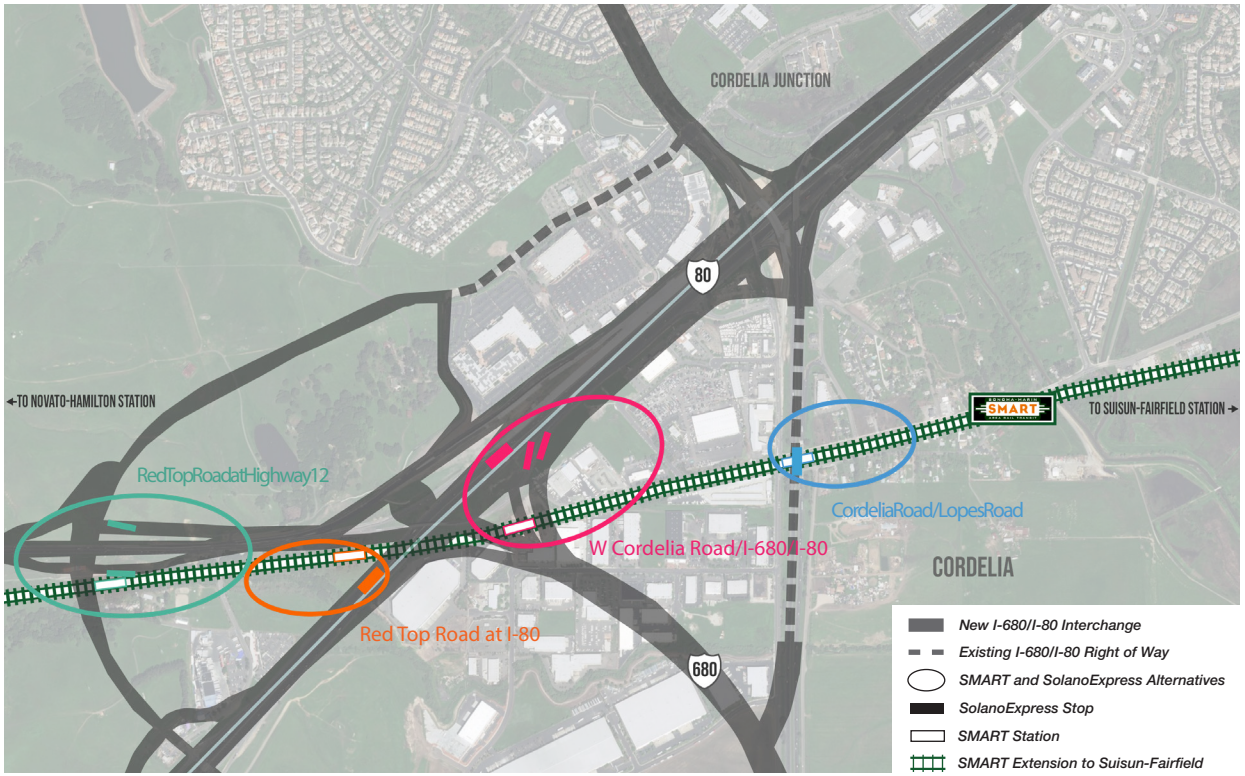


Figure 16: SMART Station and SolanoExpress Stop Alternatives, I-680/I-80 Interchange

4. Potential SMART Station Locations

Conceptual Designs

Red Top Road at Highway 12

This option includes two bus platforms on the Highway 12 on- and off-ramps east of Red Top Road. This bus station could be used for a variety of bus movements on both the north (off-ramp) and south (on-ramp) platforms. The SMART platform is located south of the bus stations. Underground not required for this option. See the Appendix for more detailed station access.

Platforms

- Both bus platforms would be side platforms on the right side (when facing the flow of traffic) of each ramp
- Both bus platforms are above-grade
- SMART platform would be located on the adjacent UPRR/California Northern corridor (which is at-grade in this location)
- The UPRR/California Northern trackway would be widened for the 17' wide SMART platform, plus a passing track

Access and Transit Services

- Ramps would be provided from the parking lot and the SMART platform at-grade to Red Top Road on an elevated bridge structure over Highway 12 and the train tracks
- Sidewalks on Red Top Road would connect with sidewalks on the Highway 12 on- and off-ramps for pedestrian access to buses
- This alternative allows for buses on Highway 12 to use the platforms, but buses operating westbound on I-80 are unable to use the platform, due to upstream highway geometry. As a result, only Napa-Solano buses could use this facility.

Parking

- Car parking lot would be located between the Highway 12 on-ramp, Highway 12, and Red Top Road

Pros & Cons

Pros

- Access to buses on Hwy 12
- Minimal impact to proposed interchange design required
- Less vehicle traffic and lower vehicle speeds on ramps

Cons

- No access for westbound I-80 buses
- Potential environmental considerations related to bridging over the creek adjacent to the railroad right-of-way
- Steep grade on bus platforms

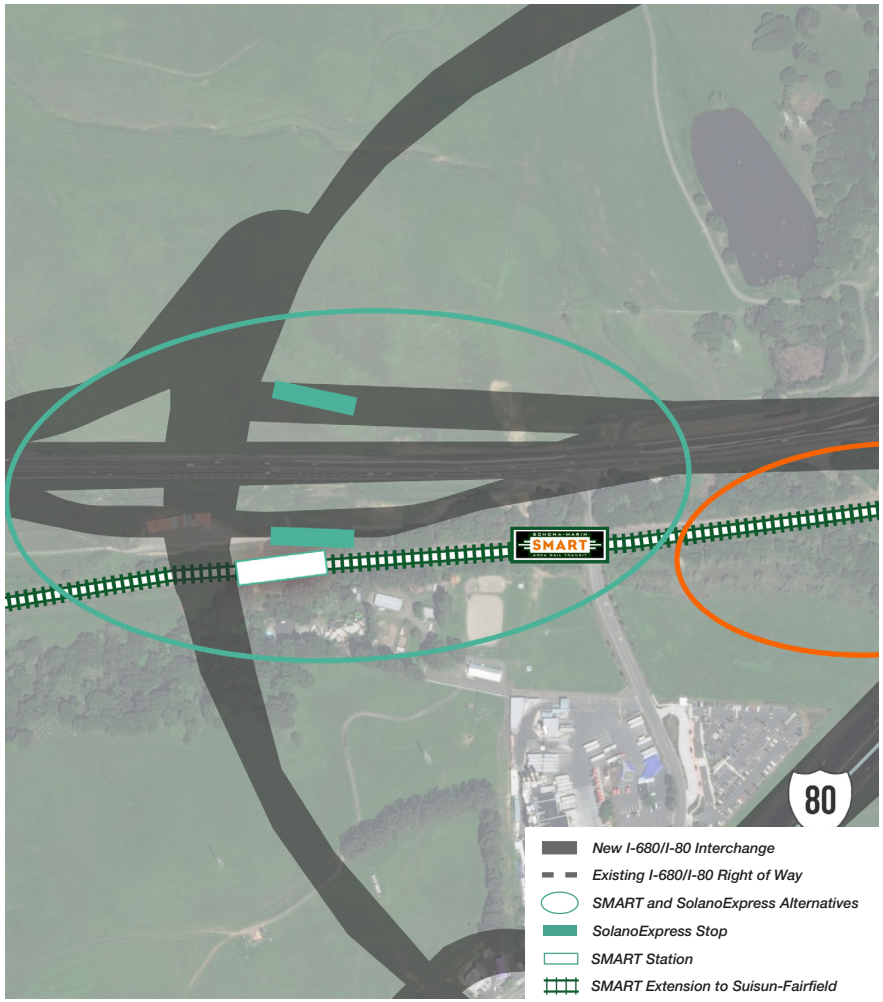


Figure 17: Red Top Road at Highway 12
Conceptual Design

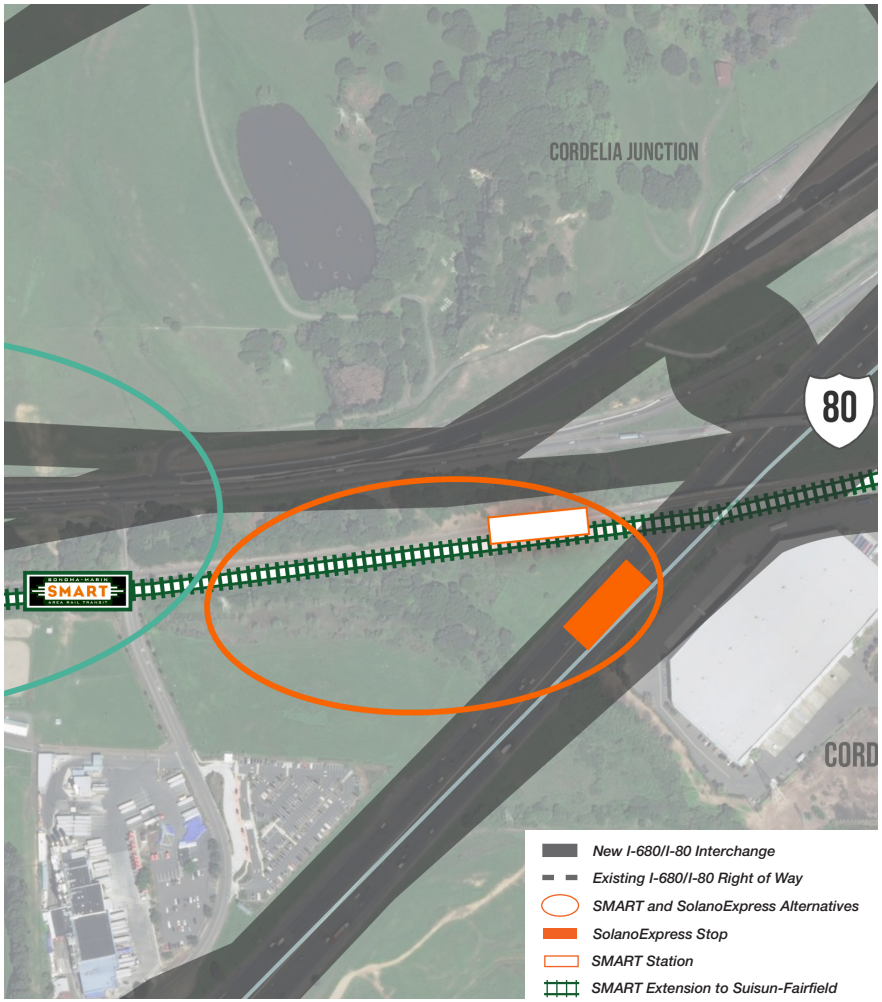


Figure 18: Red Top Road at I-80
Conceptual Design

4. Potential SMART Station Locations

Red Top Road at I-80

Figure 17 shows a conceptual rendering of the station layout.

This option includes a bus station in the median of I-80. The SMART platform is located on the UPRR/ California Northern ROW west of I-80.

Platforms

- The bus station is at-grade, consistent with I-80
- The current interchange project does not have enough room in the median for the 80' wide bus stop; the design would need to be modified to accommodate the bus station
- SMART platform location is less than 300' horizontal distance to the bus platform

Access and Transit Service

- Grade-separated pedestrian access would be provided over the freeway to the bus platform and over the creek to the SMART platform
- Separate sets of ramps and stairs would be provided for full grade separation of buses/trains and pedestrians
- This alternative allows for buses on Interstate 80 and Highway 12 to use the platforms, but other buses would be unable to use the facility.

Parking

- The current Red Top Road park and ride would be expanded to the northeast (north of I-80) and also provide access to the SMART Station.

Pros & Cons

Pros

- Both platforms are at-grade
- Proximity to parking

Cons

- No access to I-680 buses
- Additional ROW required for parking that would not already be acquired for the interchange project
- Potential environmental considerations related to bridging over the creek adjacent to the railroad right-of-way

Cordelia Road/Lopes Road

Figure 18 shows a conceptual rendering of the station layout.

The option includes one center bus platform on the existing I-680 bridge over UPRR. The SMART platform is directly below the bridge. The project could also retain the existing I-680 southbound to I-80 northbound ramp for the exclusive use of buses.

Platforms

- This assumes converting the I-680 bridge to a local road, with a bus-only lane on this roadway with the platform in the median between the northbound and southbound bus lanes
- SMART platform is located directly below the bridge
- The UPRR/California Northern tracks would be widened for the 17' wide SMART platform, plus a passing siding

Access

- Grade-separated pedestrian access would be provided to the bus platforms
- Ramps and stairs would start at-grade and travel up to the elevated platform level on structure
- A simple pedestrian connection to the platform would be constructed from Cordelia Road to access the single side SMART platform
- This alternative allows for buses on Interstate 680 to use the platforms, but other buses (i.e., I-80 and Highway 12 buses) would be unable to use the facility.

Parking

- Automobile parking lot would be located in the parcels southwest of the platforms.

Pros & Cons

Pros

- Reuses existing infrastructure to provide significant transit benefit and passenger amenities.
- Potential exclusive use of existing I-80E ramp
- Short transfer walk and proximity to parking, providing greater accessibility
- Can be implemented after I-680 interchange project reducing risk for that project

Cons

- Significantly longer path for buses, including additional delays for cutting across lanes between on/off ramps and the I-80 HOV lanes
- Potential construction staging and maintenance challenges with rail at grade and buses on the aerial structure.
- Additional ROW required for parking that would not already be acquired for the interchange project

4. Potential SMART Station Locations

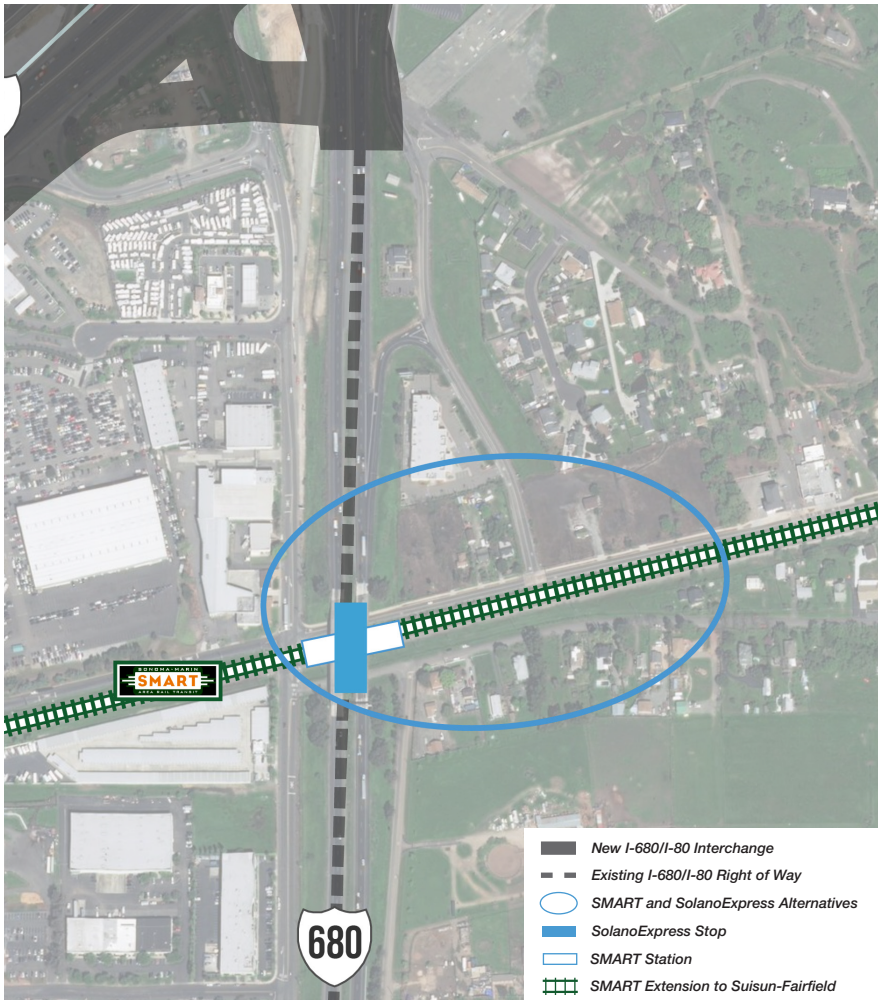


Figure 19: Cordelia Road/Lopes Road Conceptual Design

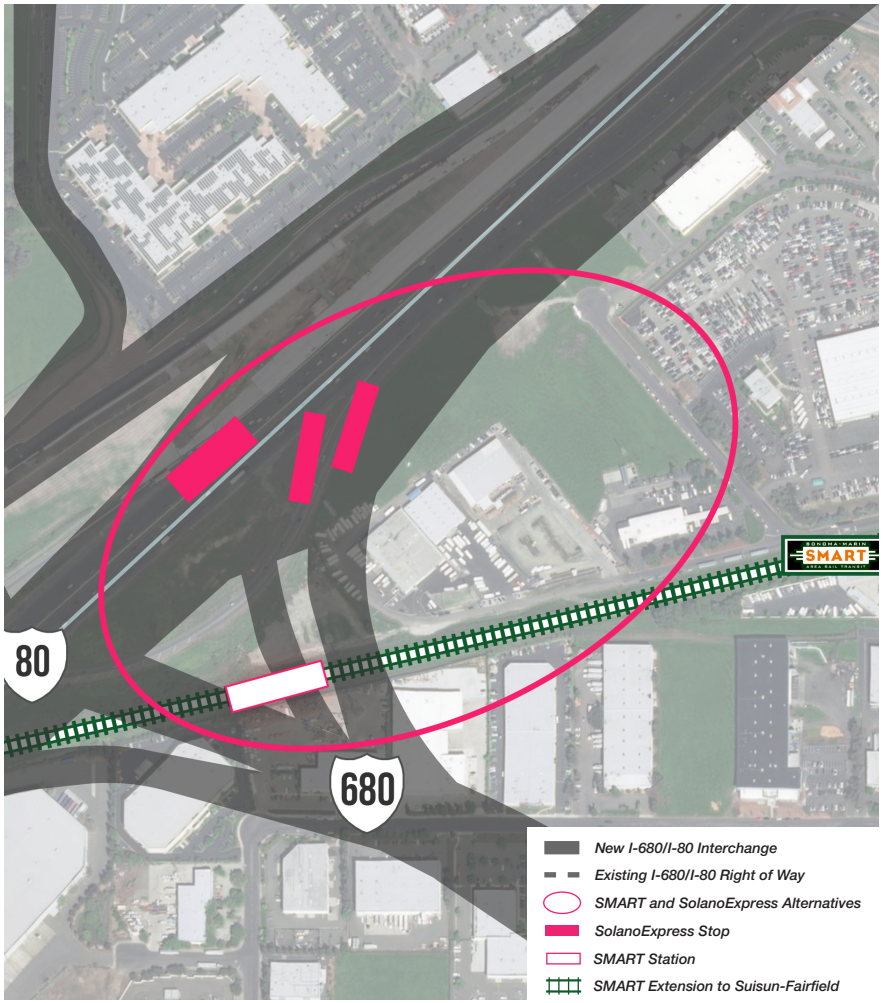


Figure 20: W Cordelia Road/I-80/I-680 Conceptual Design

W Cordelia Road/I-80/I-680

The option includes two bus stations on both I-80 and I-680. The SMART platform is directly south of the bus platforms.

Platforms

- The I-80 bus station is a center platform located in the median of the proposed I-80 freeway (at-grade)
- The proposed median for the interchange project would need to be modified by shifting the eastbound I-80 lanes south to accommodate the bus station
- The proposed I-680 bus station includes two side platforms on either side of the Route 80/680 HOV connector
- SMART platform is south of the bus platforms

Access

- Grade-separated pedestrian access would be provided under the freeway to the bus platforms
- Ramps and stairs would be provided under the eastbound at-grade I-80 lanes and back up to bus platform-level between the eastbound and westbound lanes
- Ramps and stairs would connect at ground-level and travel up to the elevated platform-level to access the I-680 connector platforms
- A simple pedestrian connection to the platform would be constructed from Cordelia Road to access the single side SMART platform
- This alternative allows for all buses operating on Interstate 80/680 and Highway 12 to use the platforms, although I-680 buses would have a station separate from the other services.

Parking

- Automobile parking would be located between the bus and train platforms under the I-680 structures.

Pros & Cons

Pros

- Access to buses on both I-80 & I-680
- Proximity to parking and use of property that would be under the freeway structures

Cons

- Long pedestrian path between bus and train platforms with up to 700’ horizontal distance, not including ramps down and up
- Complex pedestrian routes from bus to train plaforms
- Multiple modifications to Caltrans proposed interchange design are required
- Large amount of new construction, with four platforms in total

Summary

In summary, there are four viable station layout options at the I-680/I-80/SR-12 Interchange. W Cordelia Road provides access to both I-680 and I-80 bus services; Cordelia Road/Lopes Road provides access to I-680 only; and Red Top Road at I-80 provides access to I-80 only; and Red Top Road at Highway 12 can only be used by buses on Highway 12. All four alternatives take advantage of the opportunity to coordinate with the ongoing I-680/I-80/SR-12 Interchange project, as they involve modifications to the full build-out design. The presence of four key design parameters for each option is summarized in the table below.

	Access to buses on I-80	Access to buses on I-680	Proximity to parking	Minimal distance between bus & train platforms
W Cordelia Road/I-80/I-680	✓	✓	✓	✗
Cordelia Road/Lopes Road	✗	✓	✓	✓
Red Top Road at I-80	✓	✗	✓	✗
Red Top Road at Highway 12	✗	✗	✓	✗

Table 17: Alternatives Summarized by Four Key Design Parameters

5. Planning-Level Cost Estimates

Source: Arup

5.1 Introduction

For purposes of providing planning-level cost estimates, a detailed cost estimate for the Suisun-Fairfield Station was developed, as this study provides a firm recommendation on that site.

For the second location, the City of Fairfield requested a high-level review and description of several options. As a result, the cost estimate for those sites is essentially a unit cost for a SMART Station, one or two (depending on the alternative) freeway bus stations, and automobile parking.

5.2 Cost Estimate – Range

The cost estimate is classified as a Class 5 rough order of magnitude estimate according to Arup's estimate classification matrix (Level 5), which was developed from the Association for the Advancement of Cost Engineering (AACE) best practices.

The accuracy range of this estimate has been determined to be -30% and +50%. The accuracy range is a gauge of likely bid prices if the project was issued to tender at this current stage.

Pricing shown reflects probable construction costs obtainable for replacement works on the date of this statement of cost estimate. This estimate is a determination of fair market value for the construction of this project. It is not a prediction of low bid. Pricing assumes competitive bidding for every portion of the construction work for all subcontractors that is to mean 4 to 5 bids. If fewer bids are received, bid results can be expected to be higher.

Estimate Level	Estimate Description	Design Phase	Level of Completion	Methodology	Accuracy Range
5	Rough Order of Magnitude	Planning, Schematic Design	0% to 5%	Parametric Models, Capacity Factored, Historical Costs	L: -20% to -50% H: +30% to +100%
4	Concept Feasibility	Planning, Schematic Design	1% to 15%	Equipment Factored, Parametric Models	L: -15% to -30% H: +20% to +50%
3	Budget Authorization	Planning, Schematic Design, Design Documents	10% to 40%	Unit Costs, Assemblies	L: -10% to -20% H: +10% to +40%
2	Budget Control Estimate	Preliminary Design, Engineering, Design Documents, Construction Documents	30% to 70%	Detailed Unit Cost, Detailed Take-Off	L: -5% to -15% H: +5% to +30%
1	Bid	Detailed Design Engineering, Construction Documents	50% to 100%	Detailed Unit Cost, Detailed Take-Off, Productivities, Subcontractor Quotes	L: -2% to -5% H: +3% to +15%

Table 18: AACE International Cost Estimate Classification Matrix

5. Planning-Level Cost Estimates

5.3 Suisun-Fairfield Station

As scoped in Section 4, the Suisun-Fairfield Station is envisioned for multiple uses:

- Providing grade separated access to the Capitol Corridor Platforms
- Conforming the station, trackway and platforms to current design standards
- Providing access to a future SMART platform
- Increasing the parking supply, and
- Creating an attractive and usable pedestrian and bicycle connection between downtown Suisun City and downtown Fairfield

The estimated range to deliver this program is between $97 million to about $208 million, with the most likely cost at about $140 million.

This estimate is all-inclusive and includes design costs, other owner's costs (such as program cost, construction management, permits, etc.), direct contractor costs, contractor profit, and contractor and owner contingency. The total direct construction cost is estimated at about $72 million and includes the tunnel and the plaza (about $50 million), trackway reconstruction (about $20 million), and parking and other miscellaneous items of about $2 million.

Table 18 details the items below. A full estimate is included in the appendix.

Scope of Work	Unit	Total Cost
Ped. & Bike Tunnel	LS	$44,077,700
Structure	**LS**	**$37,534,500**
Interiors	**LS**	**$913,200**
Services	**LS**	**$5,630,000**
Rail	LS	$20,642,000
Track & Rail Accessories	**LS**	**$17,292,000**
Platforms	**LS**	**$3,350,000**
Existing Building Station	LS	$241,000
Relocate existing station	**LS**	**$241,000**
Plaza	LS	$5,825,600
Sinking Plaza for tunnel	**LS**	**$5,825,600**
Parking At Grade	LS	$1,325,000
Parking	**LS**	**$1,325,000**
Total Direct Cost	**LS**	**$72,100,000**
General Conditions/ Indirect	%	$7,210,000
MOT	%	$2,163,000
Mobilization/ Demobilization	%	$1,442,000
Subtotal		*$82,915,000*
Contractor Fees (Overhead and profit)	%	$8,291,500
Subtotal		*$91,206,500*
Contractor's Contingency	%	$13,680,975
Total Construction Price		**$104,887,000**
Design Fees	%	$8,390,960
PM/CM	%	$5,244,350
Permits, Licenses, Fees	%	$2,097,740
Total Construction Price + Soft Costs		**$120,620,000**
Owner's Contingency	%	$18,093,000
Total Project Price		**$138,713,000**
Expected Low Range - Estimate Level 5	-30%	$97,099,100
Expected High Range - Estimate Level 5	50%	$208,069,500

Table 19: Suisun-Fairfield Cost Estimate

Including the cost of providing the SMART platform will add another $5-$10 million.

5.4 Cordelia/I-80 & I-680 Alternatives

This report provides several options for regional transit access – for both existing regional bus service and future SMART rail service – without recommendation as the City of Fairfield intends to consider the Cordelia options in its General Plan update. As a result, the cost estimate for the Cordelia options are provided as unit costs, with a cost for the SMART Rail Station, and then separate costs for in-line freeway bus stations. The bus station alternatives assume the bus stations will be delivered as an integral part of the I-80/I-680/SR12 realignment and are the estimates for only the additional transit infrastructure necessary, excluding cost for freeway realignment which is happening regardless of the bus station addition.

SMART Station Cost

The Stand-Alone SMART station will also cost about $6-$13 million (similar to the same scope as the SMART platforms at Suisun-Fairfield), with the most likely cost at about $8.6 million. Trackwork (other than a freight bypass track) is not included in this estimate.

Scope of Work	Unit	Total Cost
Rail	LS	$4,450,841
Track & Rail Accessories	**LS**	**$4,450,841**
Total Direct Cost	**LS**	**$4,500,000**
General Conditions/ Indirect	%	$450,000
MOT	%	$135,000
Mobilization/ Demobilization	%	$90,000
Subtotal		*$5,175,000*
Contractor Fees (Overhead and profit)	%	$517,500
Subtotal		*$5,692,500*
Contractor's Contingency	%	$853,875
Total Construction Price		**$6,546,000**
Design Fees	%	$523,680
PM/CM	%	$327,300
Permits, Licenses, Fees	%	$130,920
Total Construction Price + Soft Costs		**$7,528,000**
Owner's Contingency	%	$1,129,200
Total Project Price		**$8,657,000**
Expected Low Range - Estimate Level 5	-30%	$6,059,900
Expected High Range - Estimate Level 5	50%	$12,985,500

Table 20: SMART Station Unit Cost

5. Planning-Level Cost Estimates

Freeway Bus Station – Center Platform

The Stand-Alone cost for a center platform freeway bus station as described in Section 5 is about $38-$82 million, with the most likely cost at about $55 million (the direct construction cost is about $28 million). Parking, assumed to be under freeway structures, will cost about $1 million.

Scope of Work	Unit	Total Cost
Bus Station at Highway	LS	$29,070,000
Platforms	**LS**	**$28,000,000**
Parking at Grade	**LS**	**$1,070,000**
Total Direct Cost	**LS**	**$29,100,000**
General Conditions/ Indirect	%	$2,910,000
Mobilization/ Demobilization	%	$582,000
Subtotal		*$32,592,000*
Contractor Fees (Overhead and profit)	%	$3,259,200
Subtotal		*$35,851,200*
Contractor's Contingency	%	$5,377,680
Total Construction Price		$41,229,000
Design Fees	%	$3,298,320
PM/CM	%	$2,061,450
Permits, Licenses, Fees	%	$824,580

Scope of Work	Unit	Total Cost
Total Construction Price + Soft Costs		$47,413,000
Owner's Contingency	%	$7,111,950
Total Project Price		$54,525,000
Expected Low Range - Estimate Level 5	-30%	$38,167,500
Expected High Range - Estimate Level 5	50%	$81,787,500

Table 21: Freeway Bus Station – Center Platform Unit Cost

Freeway Bus Station – Side Platforms

The Stand-Alone cost for a side-platform freeway bus station as described in Section 5 is about $45-$96 million, with the most likely cost at about $64 million (the direction construction cost is about $33 million). Parking, assumed to be under freeway structures, will cost about $1million.

Red Top Road at Highway 12

The cost to construct the ramp bus stops for the Red Top Road at Highway 12 alternative are significantly less than those estimated for the in-line stops. The Red Top/Highway 12 stops are minor modifications to proposed freeway ramps. The extent of the work involves a pull-out, and extension of the sidewalks, as well as passenger shelters. This work is likely within the contingency of the overall I-80/I-680 project. The automobile parking, however, should be considered to cost about the same as the other options.

Scope of Work	Unit	Total Cost
Bus Station at Highway	LS	$34,070,000
Platforms	**LS**	**$33,000,000**
Parking at Grade	**LS**	**$1,070,000**
Total Direct Cost	**LS**	**$34,100,000**
General Conditions/ Indirect	%	$3,410,000
Mobilization/ Demobilization	%	$682,000
Subtotal		*$38,192,000*
Contractor Fees (Overhead and profit)	%	$3,819,200
Subtotal		*$42,011,200*
Contractor's Contingency	%	$6,301,680
Total Construction Price		$48,313,000
Design Fees	%	$3,865,040
PM/CM	%	$2,415,650
Permits, Licenses, Fees	%	$966,260

Scope of Work	Unit	Total Cost
Total Construction Price + Soft Costs		$55,560,000
Owner's Contingency	%	$8,334,000
Total Project Price		$63,894,000
Expected Low Range - Estimate Level 5	-30%	$44,725,800
Expected High Range - Estimate Level 5	50%	$95,841,000

Table 22: Freeway Bus Station – Side Platforms Unit Cost

5.5 Items excluded from the Estimate

The following items are excluded from the estimate:

- Other owner's costs, which include consultant fees, liability, surveys and site investigation fees
- Risk-based contingency analysis
- The costs or impacts of latent environmental issues that result in litigations or development delays
- Local taxes and duties
- Right of way and or land acquisition costs
- Removal and disposal of hazardous materials, unless stated in the estimate
- Pedestrian only tunnel from Suisun-Fairfield Station to proposed parking lot north of Highway 12
- SMART track relocation and new track outside of the station areas (i.e., trackway improvements necessary to the extension to Marin)
- For Suisun-Fairfield station: actual cost of new SMART platforms
- Additional storage track for the Capital Corridor north of Suisun-Fairfield station

The following items may affect the estimate:

- Modifications to the scope of work included in the estimate
- Restrictive technical specifications or excessive contract conditions
- Any other non-competitive projects schedule
- Additional loss of productivity
- Future market conditions

5.6 Notes and Qualifications

Base Year Values

The values are in US dollars from the first quarter of the year 2020. Direct unit costs are formed by material, equipment and labor. Such costs are obtained from benchmarks from industry projects, Arup past projects and data bases such as RS Means and Caltrans.

Costs May Vary

This opinion of cost estimate of construction is made based on the experience, qualifications, and best judgment of the professional consultant familiar with the construction industry. Arup cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from this or subsequent cost estimates.

6. Conclusion and Next Steps


DANGER WARNING
PASSENGERS SHOULD
REMAIN ON STATION
SIDE OF YELLOW LIN
UNTIL TRAIN STOPS
STAY BEHIND YELLOW LINE

Source: Arup

Alignment near Cordelia

Summary

This study assesses the feasibility of locating a Solano County Hub connecting all modes – intercity rail (Capitol Corridor), regional rail (SMART), regional buses (SolanoExpress), local transit as well as automobiles, TNCs and active modes – at one central location in Solano County. This report recommends recognizing the existing Suisun-Fairfield station as that Hub.

Under the State Rail Plan, westbound trains leave every 10 minutes, while eastbound trains leave every 30 minutes with service to Davis, Sacramento and Roseville. In the westbound direction, hourly capacity will be about 4,000 passengers an hour, and San Francisco could be about a 60-minute trip and Sacramento in about 35 minutes.

As the most connected place in Solano County, the development of this station presents an important development opportunity for both Suisun City and Fairfield. Both cities have identified station-adjacent Priority Development Areas. The investment in the station, as a result, becomes a catalyst for appropriate and regionally significant development – infill in established urban centers. A key design consideration and important element of the project reconnects the two cities' downtowns for the first time since the Highway 12 bypass opened in 1984. What was once one connected downtown, separated only by the railroad, will again become connected through the expansive pedestrian tunnel. Commerce and people will seamlessly flow between the two centers, benefiting both cities.

An additional location that serves future SMART service and existing SolanoExpress buses can be provided at several sites in Cordelia. Each has advantages and disadvantages, as are summarized in this study.

To achieve the promise of the Solano County Hub and the development of a secondary station in Cordelia, clear planning paths are available that will position the county, the cities and STA to successfully deliver each project.

Appendix

Previous studies and a full detailed cost estimated, along with a breakdown of overheads and other items, are included in the appendix of this report.

Next Steps for Solano County Hub/Suisun-Fairfield Station

The Solano County Hub at Suisun-Fairfield presents an immediate opportunity to memorialize the county's position to the state. As part of this assurance, the following specific actions should be taken:

- Agreement among Fairfield and Suisun City, as well as Capitol Corridor, as to the Hub location, general design requirements, and development aspirations;
- Active participation in the State Rail Plan process (and the planned updates);
- Agreement to prioritize the delivery of the Solano County Hub in existing programming documents and identify potential funding sources;
- Development of a coordinated station area plan that includes both downtown Suisun City and downtown Fairfield. This can be two coordinated specific plans, an update to the Suisun City downtown specific plan (circa 1999) and the current Fairfield General Plan update or a combined station area study that covers both cities (Oakland and Emeryville engaged in a similar joint effort for the 40th Street area about 30 years ago);
- Development of a detailed 5-10% station design to provide better architecture and engineering assessments and plans, leading to more robust cost estimates and phasing schemes;
- Identifying and acquiring rights-of-way, if necessary; coordinating with Union Pacific Railroad on right-of-way requirements and railroad design improvements.

Adopting this detailed approach will indicate countywide support and excitement for delivering the Solano County Hub, an important prerequisite for regional, state and federal funding. While costs are considerable, the benefits of the Solano County Hub to Capitol Corridor, SMART, SolanoExpress and to the two cities are significant. The Hub is a key piece of the state's transportation and land use strategy, enabling local commerce, assisting in meeting regional housing needs and delivering a seamless statewide transportation function.

Next Steps for Cordelia Station

For the Cordelia location, clear alignment with the programmed I-80/680 interchange project coordinated with the City of Fairfield's current General Plan update is an appropriate path forward. Once the city identifies a preferred Cordelia station location, elements of that proposal can be incorporated into the interchange designs.

Fairfield-Suisun Station Alignment

7. Appendix


RAFAEL
TAG ON
TAG OFF
STAND BACK

Appendix A

Literature Review/State of the Practice and STA Transit Station Program Guidance (abridged from original memorandum)

Purpose

This memo identifies best practices and provides guidance for bus and rail design synergy at stops and stations. This synergy reinforces the attractiveness of each mode, reinforces their individual strengths and are mutually supportive.

Part 1 provides general guidance through relevant case studies focused on service coordination, station siting, land use coordination and TCRP reports that identify critical demographic and location variables influencing public transit use.

Part 2 establishes a framework for transit station architectural programing and develops countywide guidance on transit station design standards and criteria. This guidance includes public and private improvement strategies that maximize community benefits for each station area.

The intent of this research and guidance is to provide standards and criteria that are useful and relevant to Solano County and for use by the Solano Transportation Authority (STA) directly, or through funding requirements for projects delivered by others.

General Guidance

Introduction

To provide design and operational examples that influence future Solano County design guidance, three late 20th Century bus and rail projects were studied. The criteria for investigating these three examples were relevant to Solano County – either in the mode selected or studied, or relevance due to similar population and land use characteristics. The three case studies are San Diego COASTER, San Rafael Transit Center, and the Downtown Seattle Transit Tunnel.

The end of this section summarizes TCRP Report 201 (detailing demographic and service conditions that influence transit acceptance) and provides guidance and implications for to transit operators.

San Diego COASTER Commuter Rail

San Diego COASTER service – and the Oceanside Transportation Center – provide multiple examples relevant to Solano County. COASTER's service area is like Solano County – suburban with a population of about 800,000, with no cities having more than 20% of the overall population. In addition – like Solano County's Travis Air Force Base – Camp Pendleton Marine is a major fixture in the area. While the commuter rail was not originally built to evolve from bus service to rail, the system features extensive regional transit connections and key features to allow better coordination between rail and bus services.

Because of the counties' similarities, many of San Diego Counties' policy goals, recommended transit-oriented development, and fare integration policies are also relevant for Solano County. Examples are described below.

COASTER links north San Diego County with downtown San Diego serving eight stations between Oceanside and San Diego. Service is catered toward peak period commuters, with more than 20 trains running on weekdays and additional service on weekends.

A key intermodal hub is the Oceanside Transportation Center, where Amtrak, commuter trains and the SPRINTER (a SMART-type service) and local buses all converge.

Transit connections

COASTER connects extensively with other local and regional transit services.

Oceanside Connections:

1. SPRINTER (diesel light rail)
2. BREEZE buses (throughout North County)
3. Greyhound (& San Diego)

7. Appendix

4. Metrolink (LA/Ventura/Riverside/San Bernardino commuter rail system)
5. Riverside Transit buses
6. Amtrak Pacific Surfliner (& Solana Beach, and the downtown San Diego Santa Fe Depot)

Other Connections:

7. San Diego Metropolitan Transit System (MTS – the transit provider in the City of San Diego and most of the county) buses in Old Town and Santa Fe Depot
8. San Diego Trolley in Old Town and Santa Fe Depot
9. Sorrento Valley Connection Shuttles

MTS shuttles are available Monday-Friday to take riders from six Sorrento Valley COASTER station and companies in the area.

10. Carlsbad Connector (app-based, on-demand shuttle service running to and from the Carlsbad Poinsettia COASTER station)

Station upgrades at the Oceanside Transit Center (OTC, or Oceanside)

Oceanside serves more than 1.2 million intercity, suburban, and commuter transit (bus and rail) passengers annually. The station is one of the busiest transit centers in the San Diego area. Beside the rail components, the station includes a 1,200 parking space garage, five intercity bus berths, eight urban bus sawtooth boarding locations, and five bus drop-off berths.

To expand and enhance regional service, the San Diego Association of Governments (SANDAG) and NCTD are expanding and improving the OTC. Improvements include:

- Adding a third rail track in the center of the right of way
- Building a 1,000-foot-long boarding platform to the south
- Adding a new passenger walkway to the southern end of the station
- Modifying existing boarding platforms
- New crossovers to improve operations
- Station improvements: new shelters, seating, real-time electronic signs, and level boarding to accommodate more users

COASTER and SPRINTER trains will use the new third track, allowing for more COASTER passenger boarding while Amtrak, Metrolink, and freight trains use the two existing tracks.

Land use connection

The MTS is actively integrating transit planning and land use development to increase transit ridership and encourage transit-oriented, dense development. The MTS 2018 study, "Designing for Transit: A Manual for Integrating Public Transportation and Land Development in the San Diego Metropolitan Area" notes that the environment and the quality of service offered contribute to the success of transit. This includes building appropriate densities for transit and building around appropriate land uses.

San Diego County is a mostly suburban area, akin to Solano County. The table below are recommendations from the 2018 study for transit-oriented land use density which may be advisable for Solano County, and specifically Suisun City and Fairfield when considering new SMART passenger service.

The MTS study also provides guidance for types of land uses in commercial and industrial areas, which may be applicable to Solano County.

In commercial and retail areas, the type of use is more important than density. For example, siting neighborhood retail and services near transit are convenient and lend itself to transit-oriented development. Additionally, large retail facilities (like shopping malls) can draw transit ridership. Community retail (large discount stores and supermarkets) tend to be auto-oriented and less conducive for transit.

Industrial areas (typically warehouses, manufacturing, and distribution facilities) are

generally less compatible with high transit ridership, especially if the facilities are isolated from other services and amenities. However, facilities with large numbers of employees may ride transit if the facilities are located within safe walking distance of transit hubs, or if a shuttle service can carry employees to a transit center within reasonable distance, such as the Suisun train depot given its proximity to the Solano County Government building, Fairfield City Hall, and other government buildings.

Fare integration

It should also be noted that not only do the San Diego systems coordinate spatially and through schedule coordination, but they also coordinate through fare policy. There is a regional Compass Card, which works on all San Diego County systems. In 2018 the MTS Board of Directors approved a 10-year contract with INIT, a German technology company, to allow riders to pay for trips directly with their smartphone. The service is account-based and would eventually rollout with the NCTD (COASTER service provider), providing one region-wide payment method. INIT already serves Portland, Oregon, where riders can seamlessly transfer throughout the region. If a rider transfers from a mode with a lower fare to a mode with a higher fare, tapping their card only deducts the difference. The MTS will also opt in for fare capping, eliminating the need for riders to select different types of transit passes. That is, a rider can swipe or tap their transit card any number of times during a trip, and their account will not deduct more than the cost of a day pass in a day or a monthly pass during a calendar month.

Upgrading the system and streamlining fare payment has potential benefits including projected increase in ridership (in part due to better connections between regional transit), better measurement of operational performance, and the economic benefits from these improvements. Some of these features may be included in the next generation of Clipper, or in a statewide transit media.

TABLE 3-1 RECOMMENDED TRANSIT-ORIENTED LAND USE DENSITY

	Within 1/2-mile of LRT Stations or Bus Transit Centers	Within 1/4-mile of Bus Stops
Residential		
Urban Centers	45 units/acre* average density 30 units/acre minimum density	30 units/acre* average density 18 units/acre minimum density
Urban Areas	25 units/acre average density 18 units/acre minimum density	12 units/acre average density 7 units/acre minimum density
Suburban Areas	18 units/acre average density 12 units/acre minimum density	7 units/acre* average density 5 units/acre minimum density
Commercial: Office		
Urban Centers	1.00 FAR minimum**	0.50 FAR minimum
Urban and Suburban Areas	1.00 FAR minimum	0.35 FAR minimum

*Figures shown are net residential densities; gross densities are about 20% lower (e.g., 45 units/acre net= 36 units/acre gross).

**These are minimum FARs (floor area ratios); higher FARs are encouraged, but the maximums should be those specified in community or general plans.

Source: "Designing for Transit: A Manual for Integrating Public Transportation and Land Development in the San Diego Metropolitan Area", MTS 2018

San Rafael Transit Center

The San Rafael Transit Center (SRTC), also known as the C. Paul Bettini Transportation Center, is an example of how a predominantly bus-serving station is evolving for new rail service. The new SMART service terminates one block to the north and was

recently extended through SRTC to Larkspur. As such, the facility provides an example of conversion from bus-only to bus and rail and highlights the challenges in doing so.

This is a specific example of conversion from bus-only to SMART service, which is directly relevant for eventual SMART service to Solano County. The SRTC example will implement several changes, including re-designating bus platforms, temporary bus locations, and pedestrian improvements – akin to the expected changes at the existing Suisun station.

The transit center is the main passenger transit terminal in Marin County. Open since 1991, about 9,000 people use the station daily. Passengers can connect to San Francisco, Contra Costa, and Sonoma Counties and the San Francisco and Oakland International Airports through various transit services at this station, including:

- Golden Gate Transit
- Marin Transit
- Marin Airporter
- Airport Express
- Sonoma County Transit
- Greyhound

The transit center also accommodates ride-hailing and taxi service, Golden Gate Transit customer service, retail, and bicycle parking.

With the SMART to Larkspur rail extension nearly in service, the Golden Gate Bridge Highway and Transportation District (the District) plans to redesign and reconstruct SRTC to accommodate the geometric changes resulting from the new SMART alignment and to meet current and future demand.

In the interim, the existing transit center is undergoing extensive improvements in preparation for SMART to Larkspur service. The extension requires double-track railway and two side platforms for SMART service. Because the extension bisects the existing transit center, existing bus routes in and out of the center are significantly impacted. This also impacts pedestrian boarding, access, and safety.

The District has and will implement several changes, including:

- Re-designating bus platform assignments
- Temporary bus pick-up locations
- Restricted pedestrian access crossing platforms (to prevent pedestrians from crossing SMART tracks)
- Street improvements on nearby streets (e.g. Cijos Street) to accommodate rerouted bus traffic

Additionally, in the interim SMART and Golden Transit are offering SMART passengers free bus service from the SRTC to the Larkspur Ferry terminal.

The SRTC example emphasizes the need for the additional safety measures that come with rail service and provides precedence for coordinating existing service during interim or construction periods.

Downtown Seattle Transit Tunnel

The Downtown Seattle Transit Tunnel (DSTT), also known as the Metro Bus Tunnel, is a 1.3-mile-long pair of transit tunnels that serves the Sound Transit Red Line through downtown Seattle. The tunnels, originally designed to accommodate bus service prior to light rail, provides for STA a concrete example of how design for bus and eventual rail service must include key design factors in the initial bus designs. This is crucial as STA considers various station locations and amenities for each station.

Owned by King County Metro and shared with Sound Transit, the tunnels were initially designed to accommodate bus service in the near term and light rail in the future. From 1990 to 2005, dual-mode buses (manufactured by Breda) ran exclusively in the tunnel (using electric trolley bus infrastructure underground and transitioning to diesel bus

operation on surface streets). King County Metro ran up to twenty routes through the tunnel.

The original tunnel design included light rail tracks, larger tunnel diameters and longer station platforms than normally required for bus operations in anticipation of future light rail service. In 1996, voters approved the Sound Transit regional plan, which included approval to implement a regional bus system and begin building and operating a light rail system. By 1999 Sound Transit was sharing the tunnel with King County Metro buses and anticipated having a period of mixed bus-light rail service in the near future. However, despite initial "future-proof" designs, Sound Transit discovered that the rail-ready measures in the original tunnel were mostly unusable: the original tracks in the tunnel could not be used for rail service and needed replacement, requiring complete closure of the tunnel for two years. The end-of-the-tunnel Convention Place station was also deemed too shallow to support a light rail extension, effectively making the station unusable for light rail service.

In 2002, to support renovation, Sound Transit and King County Council signed a joint-operations agreement, designating King County Metro as owners of the tunnel and Sound Transit responsible for paying a portion of the renovations fee and operations cost.

Renovations to provide for both bus and LRT tunnel operations began in 2004, closing all service in the tunnel between 2005 and 2007. Station and tunnel improvements included:

- Lowered roadway by eight inches to allow for level boarding (per ADA)
- Added strobe lights to bus mirrors – the lowered platform resulted in mirrors closer to head levels, resulting in safety hazards
- Increased accessibility – new tactile path from station entrance to ticket vending machines and station platform
- Upgraded electrical and mechanical systems
- New emergency systems, including ventilation and fire sprinklers
- New communications system for a joint-operations center, allowing for signaling and overheard catenary systems to allow for joint operations
- New Pine Street stub tunnel to allow trains to stop and reverse direction
- Upgraded lighting and signage – consistent signage with regional transportation signs and new electronic real-time transit signs.

Total construction costs were $94 million.

Bus service in the tunnel continued until March 2019 when (as a result of scheduled additional LRT service) seven bus lines were routed to surface streets. Sound Transit plans to initiate the additional LRT service in 2023 with the new Blue Line.

The Downtown Seattle Transit Tunnel example suggests that "future-proofing" transit facilities requires thoughtfulness and careful design, informed by realistic design criteria. The original design, although intended to be rail-ready, was short-sighted. The lessons from Seattle suggest that as STA considers stations and facilities for incremental development of bus to rail, key design factors must be included in the initial bus designs.

TCRP 201: Understanding Changes in Demographics, Preferences, and Markets for Public Transportation

The Transit Cooperative Research Program (TCRP) recently issued TCRP Research Report 201, titled "Understanding Changes in Demographics, Preferences, and Markets for Public Transportation" (2018). The researchers found key findings that are relevant to every transit agency and municipality, including STA and Solano County:

1. Transit level of service – service frequency – has a larger impact on ridership than demographics. More service results in more riders, regardless of income or age.
2. Demographic factors do have some influence in predicting future markets for transit.

7. Appendix

3. Location (where people live and how that affects their transit choices) is critical for predicting the future markets for transit.
4. Market-based preferences are critical for predicting the future markets for transit.
5. Age, preferences, and location together can explain expected changes for the future.
6. Transportation network companies (TNCs) will offer more competition to transit.

Some of the key findings and their applicability to STA and the county are detailed below.

Transit level of service

Improving transit service has a larger impact on transit ridership than having demographics that favor transit ridership. The study noted that transit's success is largely impacted by those designing the transit routes and services.

This has key implications for a midsize area like Solano County. Planning for existing and future demographics is important, but providing reliable, accessible, and frequent service to key destinations will ultimately determine transit success. Above all else, Solano County and STA need to increase service levels and in turn plan for and design for high levels of service.

Shifts in age

By 2030, there will be 22 million more millennials than baby boomers (making millennials the largest group). Millennials exhibit patterns of transit use that are positive: they are more likely to live in dense, walkable cities, are less dependent on cars than their parents, and are more open to sharing vehicles. However, the study notes that as millennials age, their transit usage will decline due to changes in lifestyle and preferences. This includes the increasing presence of children and the desire to find less dense, more suburban housing.

The study suggests several opportunities to meet the market for millennials:

- Service changes
  - For commuting services in lower-density settings, bus/bus rapid transit can benefit with large parking areas
  - For nonpeak services, private and shared transportation network companies (TNCs) may benefit suburban trip patterns and still allow decreased car ownership. This may be applicable to shorter-distance trips that connect to passenger rail, including first- and last-mile trips to and from stations.
- Technology and communication
  - Onboard Wi-Fi should be enhanced
  - Advanced wayfinding and real time transit information must be visible and reliable
  - Transit information must be available on smartphones

Race and ethnicity

As the nation diversifies, the increase of nonwhite populations continues to impact transit ridership. The study shows that nonwhite populations have higher rates of transit use than whites, and that recent immigrants are less likely to have a car upon arrival. Solano County is a racially diverse county with a majority nonwhite population and will likely be impacted as the Bay Area and the county grows.

The study suggests outreach that is applicable and relevant for racially and ethnically diverse riders. This includes marketing messages showing and welcoming the diversity of users that constitute transit ridership.

Location

The study had key findings relevant to suburban areas like Solano County. Research found the highest rate of transit ridership increase in midsized metropolitan areas (populations between 500,000 and 3 million people). Solano County is home to approximately 445,000 people. The study

suggests that because dense, urban areas like San Francisco already have high transit ridership, areas with smaller population and less density (like Solano County) have higher potential for increased ridership.

Station Programming Best Practices

Introduction

As noted in San Diego and Marin Counties, the introduction of rail service when coordinated with and synergistic with bus service, creates multiple benefits if designed well:

- Public improvements for existing neighborhoods
- New private investment around stations
- Additional mixed-use development
- Better mobility for all residents.

These positive outcomes are not automatic. Good planning and deliberate action are essential to make each station area along the line a success.

The suggested guidance is overarching and includes technical criteria and standards used by planners and engineers in design, as well as policy guidance that seeks to maximize the benefits derived from transit investments. While the technical criteria have limited flexibility, implementation of the policy guidance requires additional analysis and public input, with active leadership by local jurisdictions, the expert opinions of agency staff, and the recommendations of planning and development professionals.

The Programming Best Practices are incorporated from the list of references in this document and span urban and suburban jurisdictions.

Organizing Framework

These guidelines should be considered part of a larger framework of policies, principles and guidelines to achieve successful Station Area outcomes and transit operational safety and efficiency. The encompassing framework should incorporate:

Public Policies: Supportive public policies for station areas should incorporate best practices and craft an effective regulatory approach that encourages joint development, shared mobility, complete streets, and strategic parking policies. Policies should encourage focusing public investments to boost market/real estate dynamics that benefit the Station Areas, including joint development opportunities that can be conducted in conjunction with STA's property or interests. Zoning and codes should be in place that support the framework for a station area long term development vision. Public provision of streetscape improvements, utilities, and other infrastructure investments should be considered that provide incentives to develop around transit.

Guiding Principles: The Station Area Development process relies on guiding principles throughout the visioning, planning and design. They should establish clear desired outcomes and define a coherent vision for how transit fits into the community. Planning considerations are defined as follows:

- Accommodations and Safety
- Community Considerations
- Environmental Considerations
- Standardization of Equipment and Materials
- Design Life of Projects
- Operations
- Right-of-Way Access Considerations

Design Guidelines: The design guidelines provide direction on station and station area functional areas, features, and elements for designers of any STA funded transit improvement on a railway or within the Caltrans right-of-way and are based on the standards both STA aspirations and the guidelines of the owners of transportation infrastructure. The guidelines are also used to assist designers in incorporating design elements that ensure facilities will provide the lowest overall cost of ownership consistent with STA's desired quality, functional and performance standards.

7. Appendix

Station Area Policies

Transit Station Programming

The Station Area encompasses the facilities that make up a station location as well as connections with the surrounding environs. The Station Area provides essential facilities for the community and passenger connectivity, including stations, train and bus platforms, park and ride, commercial and service areas, and bike/pedestrian connections. They are designed to accommodate multiple modes of people accessing the stations and projected ridership levels with space reserved to expand in the future.

Guiding Principles

The following Principles guide the planning and design of Transit Station Areas and Station Area Elements.

- Integrated and Connected with their Community
- Accessible and Safe for all users
- Provide Customer Comfort and Accommodation
- Facilitate future passenger accommodation specifically for advances in fare systems, transit information, wayfinding and making connections.
- Incorporate STA's values of environmental, social responsibility and sustainable development
- Designed for their Total Life Cycle

Envision transit integrated into the community

- Integrate with neighborhood plans and the city's comprehensive plan. Station areas should support and integrate the visions of the neighborhood plan and city's comprehensive plan.
- Implement additional planning where needed to fully articulate a vision. Focused planning around specific stations to clearly outline an initiative for a station area. Provide developers and other interested parties a detailed framework to follow to ensure their projects adhere to the vision, thus increasing the likelihood of approval.
- Enact planning and zoning to implement the final station area vision. Certainty suggested advancing zoning changes during the planning and visioning process, rather than after, to ensure that the desired outcome is feasible.

Implement Transit-Supportive Land Uses

- Provide opportunities for new development. Develop mixed-income housing and encourage every price point to live around transit. Make retail strategy market-driven, not transit-driven. Retail development should be viable on its own and complemented by transit, rather than dependent on it, for success.
- Be Smart about Parking Requirements. Implement smart, transit-oriented parking strategies that create value and improve quality-of-life for residents by encouraging transit use, walking, and bicycling. Parking requirements for properties near stations should lower for neighborhoods with access to transit than in neighborhoods without.

Capture the Value of Transit

- Focus on Value Capture. The introduction of transit into under-served neighborhood creates value due to proximity to the station and changing travel behaviors of local residents. Utilize policy tools and public resources to capture that value for public benefit.

Make Great Connections

- Public transit riders begin and end their journey as pedestrians. Access to stations and the areas around them should be safe and active pedestrian environments; provide a robust network of clearly defined and simple route options to and from a station. These routes should be appealing, convenient, and safe and should directly link to adjacent shopping, services, homes, attractions, and local streets.
- Integrate new, shared modes of transportation. Shared mobility options provide first/last mile mobility while reducing the demand for the single occupant vehicle. Car sharing, bike sharing, ride sourcing, and alternative transit services are example of shared modes of transportation that can offer significant benefits to residents and

commuters along the corridor.

- Streets and sidewalks should be well lit. Well-lit environments deter vandalism and increase people's sense of security. Station area and sidewalk lighting should follow Crime Prevention Through Environmental Design (CPTED) at intensities and heights that are oriented to the size and speed of pedestrians, that is, on the "human scale."
- Safe Pedestrian crossings should be provided separating pedestrians, bicyclists and traffic as much as possible. UPRR design standards require grade separation of new pedestrian crossings on active freight and commuter rail lines. In the limited circumstances where track crossing at grade are allowed, clearly marked railroad track crossings should provide safe access across the tracks. Busy streets nearby should have marked and signalized pedestrian crossings.
- Sidewalks and bike lanes should connect neighborhood to the station. Sidewalks or pedestrian routes are how all transit riders eventually get to and from the station. A well-developed sidewalk network, with high quality pedestrian treatments, that connects the station to the neighborhood and nearby services is integral.
- All pedestrian routes that arrive at the station should continue past the station property edge to the platform entrance. To serve all riders, sidewalks need to be designed based on the physical needs of wheelchair users and visually impaired in order to have consistent, equitable, and reliable access.
- Bike lanes, multi-use paths, or low traffic streets should provide bike access to the station. Bicycle routes to the station should be attractive and convenient to all riders and include wide bicycle lanes, multi-use paths, or wide curb lanes in addition to good signage and traffic signals. Bicycle parking should be located in secure, well-lit locations with convenient access to the station and bikeways.
- Provide intuitive and easily understood signage and Wayfinding: Transit stops and/or transfer wayfinding signage should be immediately visible upon exiting the platform.

Involve Stakeholders

- Stakeholder participation is crucial to ensure that Station Area development occurs in a manner consistent with the community's goals. Stakeholders that should be involved in the planning process include citizens, landowners, developers, local businesses, the transit agency, local elected officials, and local government departments.
- There is excellent national research and experience on best practices for station area design. Ideal characteristics, by definition, are not always achievable and must be balanced with constraints and other considerations.

Make Stations Sustainable and Resilient

- Incorporate Landscaping for amenity and environment
- Integrate stormwater management
- Select sustainable materials
- Use energy wisely
- Use Green Construction Practices
- Design for Resiliency

Station Design Criteria and Standards

The design guidelines provide direction on station and station area functional areas, features, and elements for designers of any STA funded transit improvement on a railway or within the Caltrans right-of-way. They reference the SMART District's standards for planning, design, and construction of the SMART District's facilities. They are also based on best industry standards and accepted practices for Commuter/Class 4 railroads and equals or exceeds regulatory requirements, as well as Capitol Corridor and Union Pacific Railroad design standards. Finally, for bus stations within a freeway right-of-way, Caltrans Highway Design Manual Sections 108, 303, 504 and 905 provide a standard.

The guidelines are also used to assist designers in incorporating design elements that ensure facilities will provide the lowest overall cost of ownership

7. Appendix

consistent with STA's desired quality, functional and performance standards. They encourage the incorporation of past proven principles and existing system approaches while also allowing for trial application of innovative thinking and technologies that may prove to further minimize total life cycle cost while improving passenger experience and levels of service.

Design Guidelines

Station design guidelines provide a framework to make informed decisions regarding lot layout, services, amenities, and green infrastructure. They incorporate requirements for ADA parking and accessibility, drop-off and pick-up areas, bus loading/unloading, and other important requirements.

Guidance within the operating right-of-way is prescriptive, however guidance for amenities outside of the operating right-of-way is not prescriptive, but are intended to streamline information from agencies, such as STA, Caltrans and local jurisdictions. The Guidelines distinguish lots based on their services, amenities, and surrounding environments.

Within the Operating Right-of-Way: Features and Amenities (Prescriptive)

Bus and Train Platforms and Stops

Platform locations are determined based on the transit mode, operations efficiencies, and available property.

Caltrans Facilities: Bus platforms are either at-grade or elevated in the freeway right of way. Bus platforms may be center or side platform and in the median or on freeway ramps. California examples include dedicated bus stations within the freeway operating right-of-way on I-110 in Los Angeles, and off-line stations adjunct to I-10. All designs must adhere to the Caltrans Highway Design Manual. Platforms are designed to accommodate projected ridership levels, with space reserved to expand them in the future, but the minimum dimension length are as follows:

Caltrans Facility Median Freeway Bus Station Dimensions:

Length: 250 feet

Transition: 1,200 feet

Horizontal alignment: 80 feet (includes platforms and bus roadway; does not include HOV bypass)

Spacing: 2 miles (not less than)

The design standards require grade-separate passenger access to either a center or side platform. Caltrans does not incorporate minimum platform widths, but in practice median freeway bus stations have widths similar to SMART criteria.

Each platform should incorporate a dedicated set of ramps, stairs (and if necessary elevators) to provide connections between the transit platforms and the adjacent transit plazas. The platforms support essential passenger amenities, including Ticket Vending Machines (TVMs), wayfinding, seating, and weather protection.

Note that all freeway median stations (bus or rail) will require noise mitigation as observations have recorded readings of 78 to 87 dB.

SMART Stations:

Generally, the stations shall be based on one of three configurations:

- Center platform
- Dual side platforms
- Single side platform

Within the operating right-of-way, facilities and standards include:

Entry Areas

The Entry Area is typically approached from a pedestrian crosswalk and consists of an Access Ramp with tactile pavers, a Gateway and Safety Railings.

Waiting Area (on platform)

The Waiting Area provides amenities for passenger safety and comfort while waiting for transit to arrive. This includes overhead weather and wind protection, seating, leaning rails, platform lighting, surveillance equipment, communication equipment, and security lighting The waiting area also includes a Designated Waiting Area (DWA) differentiated by a darker paving pattern.

SMART Platform and Station Dimensions

Length: 270 feet

Width:

Single 15 feet

Center 17 feet

Platform Height: 4 feet

Vertical clearance: 24.5 ft

Horizontal alignment: [platform width + passenger rail trackway + UPRR freight bypass on 20-foot centerline clearance]

Special Considerations: Gauntlet track required in one-direction

Outside the SMART Operating Right-of-Way

Circulation & Ticketing Area

The Circulation & Ticketing Area includes Wayfinding and Information Panels, Fare Information, the Ticket Vending Machines (TVMs) for ticket purchasing, and weather protection. The Circulation & Ticketing Area provides adequate space for customers to circulate to and from the Platform

Capitol Corridor

UPRR and Capitol Corridor Guidance design requirements include the following:

Capitol Corridor Platform and Station Dimensions

Length: 800 feet (minimum)

Width:

Center 20 feet (minimum)

Height: 8 inches

Vertical clearance: 24.5 ft (minimum)

Horizontal alignment: [platform width + 2 passenger rail trackway + UPRR freight bypass on 20-foot centerline clearance]

The design standards essentially require grade-separate passenger access to a center platform.

Platform Design Aspirations Common to All Owners

- Each Platform should maintain elements of consistency, beginning with their general configurations, platform elements and quality of materials
- Retain the cultural uniqueness and identity of the stations
- Implement standards but not standardization
- Upgrade platforms to meet current accessibility and code criteria
- Prioritize safety and security, durability and maintainability
- Focus on sustainable design and methods
- Incorporate the best of platform elements, especially as they relate to durability, meaningful design detail, and total life cycle economic benefit
- Incorporate both elements of continuity and distinction
- Facilitate future passenger accommodations specifically for advances in fare systems, transit information, wayfinding and making connections

7. Appendix

All Station Facilities and Elements

- All aspects of the stations must be compliant with the Americans with Disabilities Act and California Title 24.
- Design of station area lighting shall be adequate for normal operations, provide for Crime Prevention Through Environmental Design (CPTED) security considerations in station areas during all hours, and avoid lighting impacts to adjacent properties.
- All visible concrete surfaces (other than horizontal walking surfaces) should have graffiti- resistant coatings.

Appendix B

Existing Conditions (abridged from original memorandum)

Purpose

This report describes the existing conditions of the potential SMART station locations. This includes site characteristics, land uses, trip attractions, and access to and near the site. This also includes a comprehensive biological conditions review. The report is designed to identify and understand the potential issues and constraints with building a new station on each location. This report also recommends site selection criteria to determine site selection.

The structure of this memo is below.

1. The five potential station locations are described
2. Existing Conditions Review: land uses, trip attractions, and access for each location are described
3. Biological Conditions Review: The results of Area West Environmental, Inc.'s (AWE) review are summarized
4. Site selection criteria
5. Summary of findings
6. References
7. Appendix A: Regulatory setting
8. Appendix B: Regulatory compliance and further study

Potential Station Locations

The objectives of the SMART-Solano Express Study prioritizes station locations that can serve adjacent, appropriate land uses effectively, allow use by other transit services (either as short-term uses or as long-term connections), and have limited environmental impact on their surroundings. The station sites must also be able to meet adopted design criteria and other technical requirements.

Applying these requirements, two general locations were identified for potential station sites – along the Suisun-Fairfield City Line, adjacent to Highway 12, and in the Cordelia area where I-680, I-80, Highway 12 and the SMART alignment all converge. Two sites were identified at the Suisun-Fairfield location, and three sites were identified in Cordelia.

Suisun-Fairfield Sites:

1. Suisun-Fairfield Train Depot
2. Cordelia Wye Junction

Cordelia Sites:

3. South of I-80 (Two Sites)
4. Red Top

The following sections describe the station locations and potential preliminary station development.

In Cordelia, in addition to Red Top, two potential locations south of I-80 were identified, both of which anticipate significant changes to the I-80/I-680/SR-12 interchange. The interchange project is a multi-year, multi-phase project. Features include widening the major freeways on the I-80 corridor, a realignment of I-680, an improved direct connector between I-80 and SR-12, construction of new interchange overcrossings, new on- and off-ramps, bike and pedestrian safety improvements, and extension of some local streets leading to I-80 and SR-12. Phase I construction was completed in 2016, and Phase II construction is expected to begin summer 2020. One potential station location would use the existing I-680 alignment, and the other potential station location would use the new I-680 facility.

For the purposes of this memo, these stations have similar potential environmental impacts and there is no separate analysis of either "south-of-I-80 option". The study does assess the potential impacts for the Red Top site, as it is relatively undeveloped. The City of Fairfield is assessing the Cordelia area as part of its General Plan update, and that process has significant impacts on the land use appropriateness of the three Cordelia sites. As a result, this study limits land use assessments of the Cordelia sites.

At each station, current design standards will be met and are assumed in the analysis. These standards include upgrading of existing or new stations to meet current requirements and can include full grade separation of passengers and trackways, minimum platform width, length and slope, track geometry, and other identified design requirements. For bus services, adherence to Caltrans and local standards is assumed.

Suisun-Fairfield Sites

As part of the study process, a connection between SMART and Capitol Corridor was mandated. There are two locations for this connection – one at the current Suisun-Fairfield Train Depot, and the other at the Wye where the UPRR mainline branches and connects with the SMART alignment which would use the UPRR/California Northern right-of-way to Novato/Vallejo and Napa.

Suisun-Fairfield Train Depot

The Suisun-Fairfield Train Depot location is in western Suisun City and southern Fairfield, at the existing Suisun City Train Depot. This location encompasses about 40 acres, centered on the railroad but with adjoining land uses on both sides of the tracks.

Preliminary station development at this location would include moving the existing Amtrak and Capital Corridor station to the south, realigning the northern portion of the existing track, developing a station platform on the western side of the track, and providing a tunnel underneath the existing track to provide pedestrian access.

Cordelia Wye Junction

The Cordelia Wye location is in western Suisun City, at the UPRR/California Norther Railroad Wye. This location encompasses about 30 acres and generally surrounds the existing wye and Cordelia Street.

Preliminary station development at this location would include realigning the existing railway to the north, constructing a station platform on the northern portion of the location, and providing parking adjacent to the wye.

Cordelia Sites

As noted, three sites are identified in Cordelia – two alternatives for the realigned I-680 (south of I-80) and Red Top.

South of I-80 (Two Sites)

The two south of I-80 options are in Cordelia (western Fairfield), near the I-80/I-680 interchange. This location encompasses about 70 acres and is bisected by West Cordelia Road and by the UPRR/California Northern Southern Pacific Railroad and bounded generally by Interstate 80 to the west,

7. Appendix

Lopes Road to the east, and Fulton Drive to the South.

One potential site uses the existing I-680 alignment (which will become a local road upon project completion) with a rail station at the rail-alignment (Cordelia Road and Lopes Road) with bus services using the elevated freeway structure. Preliminary station development at this location would include constructing a bus station platform on the existing I-680 corridor with passenger access, new rail platforms and a parking lot.

The second site moves the SMART station to the west, near the current termination of Cordelia Road. At this location, the new I-680 ramps are on the structure above, allowing for parking lot development under the Caltrans structure. Preliminary station development at this location would include constructing a bus station platform on the new I-680 connector and on I-80, adjacent to the existing railway, along with rail station platforms and other facilities. Planned improvements of the interchange will occur in this location, which will limit available space for the station but also create opportunities for rail-bus interchange.

Red Top

The Red Top location is in western Fairfield, north of the existing Red Top Park and Ride. This location encompasses about 25 acres and is bounded by Red Top Road to the west, State Route 12 to the north, Interstate 80 to the east, and the Red Top Park and Ride to the South. This location is bisected by the Union Pacific/California Northern Railroad, which is adjacent to an unnamed creek.

Preliminary station development at this location would include constructing a parking lot north of the existing Red Top Park and Ride, providing a pedestrian bridge to cross an intermittent stream, and developing a station platform along the existing railway. In addition, a bus station on I-80 would be developed, but a station using I-680 is not feasible from this location.

Existing Conditions Review

To review the existing conditions of each of the potential station locations, we reviewed land uses, trip attractions, and access within the vicinity of each of the sites. A review of each item is described below.

The biological conditions review is in the following section.

Land use

Suisun-Fairfield Sites

Suisun-Fairfield Train Depot

The Suisun-Fairfield Train Depot is surrounded by residential, government/miscellaneous (including Union Pacific right-of-way), and agricultural land uses. Almost all downtown Fairfield and downtown Suisun City are within a half mile (10-minute walk) of the station. There is also manufacturing, retail, office, and vacant land near the site.

At the December 3, 2019 project team meeting with the cities of Fairfield and Suisun, Fairfield representatives mentioned that Solano County may be considering the vacant lot between Main Street and Highway 12 (northeast of the station) for a stormwater detention basin.

Cordelia Wye Junction

The Wye Junction is primarily surrounded by agricultural, government/miscellaneous (including Union Pacific right-of-way), and marsh land. Although there are multiple-unit and single-family residential land uses to the east of the site, this site is the least dense and most isolated from residential.

Cordelia Sites

South of I-80 (Two Sites)

The area that includes the two potential “south of I-80” station sites includes a variety of land uses, ranging from manufacturing/warehousing/industrial, single family residential, general office, commercial, to government/miscellaneous. As noted, the City of

Fairfield is updating its General Plan, which could lead to changes in current land use designations.

Due to the I-80/I-680/SR-12 interchange project, a large portion of the existing structures – along with several industrial and warehouse sites – will be demolished between I-80 and I-680 to make way for the new interchange structure. The I-680 project presents an opportunity to coordinate a new transportation and land use design with the SMART service and increased bus services at this station location, including parking facilities.

Red Top

Red Top is primarily surrounded by agricultural, government/miscellaneous (including the UPRR/California Norther right-of-way), single-family residential, industrial, and manufacturing/warehousing. The government/miscellaneous land includes the existing Red Top park and ride, a lot primarily used by carpool and vanpool commuters.

Trip attractions

The trip attractions are categorized into four main types: general points of interest (typically recreational), medical, educational, and parks. Trip attractions were determined by a variety of sources including Google Maps, local city and county websites, and general research about attractions in the county.

Suisun-Fairfield Sites

Suisun-Fairfield Train Depot

The Suisun-Fairfield Train Depot is in a denser area and located near many trip attractions, including both downtown Suisun and downtown Fairfield. Other major trip attractions include both Fairfield and Suisun City Halls and several medical facilities.

Cordelia Wye Junction

The Wye, as noted earlier, is in a less dense area and further from trip attractions. While the Wye is located near many of the same attractions as the Suisun-Fairfield Train Depot, it is more isolated and harder to access the attractions.

Cordelia Sites

South of I-80 (Two Sites)

The South of I-80 sites are near a variety of trip attractions, including a large shopping center (includes Costco, Safeway, and other big retailers) and Solano Community College (a public community college with roughly 10,000 students).

Red Top

Other than the park and ride lot, the Red Top location is not located near many trip attractions. While it is not far from the Costco shopping center and Solano Community College, the Cordelia at I-680 location is closer and has better access.

Multimodal access

The types of access reviewed are existing rail, express bus routes, local bus routes, transit centers, and bicycle facilities. The source of this data is from the Solano County GeoHub Open Data website and Google Maps.

Suisun-Fairfield Sites

Suisun-Fairfield Train Depot

The Suisun-Fairfield Train Depot is an existing Amtrak Capitol Corridor train station, linking the site with communities between Auburn and San Jose as the route runs through Oakland. This train depot saw 128,185 trips in 2019 (compared to the approximately 1.77 million total trips recorded by Capitol Corridor in 2019).

This station also serves local destinations. Several bus operators serve the station, including:

- Solano Express Green and Red Lines (20-minute and 15-minute peak headways, respectively)
- Fairfield and Suisun Transit (FAST) Route 5 (60-minute peak headways)
- The Vine (operated by Napa Valley Transportation Authority) Route 21 (60-minute headways)
- Rio Vista Delta Breeze Route 50 (combination of

7. Appendix

fixed schedule and on-demand at the Suisun-Fairfield Train Depot)

- Greyhound

The station connects to a few bike facilities, including the Central County Bikeway, an east-west protected trail along SR-12, and the Grizzly Island Trail, a 17.7-mile trail in southern Solano County The surrounding streets are not particularly bike-friendly, which is not unusual for Solano County.

This station has a park and ride lot east of the station along Main Street and South of SR-12. The lot has 256 regular car spaces, five accessible spaces, and two electric vehicle charging spaces. Additionally, there are five bike rack spaces and four BikeLink eLockers.

Cordelia Wye Junction

The Cordelia Wye is not served by any existing rail service.

There is one FAST route serving the area (Route 5, with 60-minute peak headways), serving the Fairfield Transit Center, Suisun Senior Center, and the Suisun-Fairfield Train Depot.

There are no dedicated bike facilities or trails near this location.

Cordelia Sites

South of I-80 (Two Sites)

The South of I-80 sites are not served by any existing rail service.

Several regional express bus services and local bus services run along or near this site. These include:

- Solano Express Blue, Green and Red Lines (linking to BART – both in El Cerrito and Walnut Creek – to the south and Sacramento on the north) (10-minute, 20-minute, and 15-minute peak headways, respectively)
- FAST Routes 7 (Fairfield Transit Center to Cordelia) and 8 (Cordelia service) (30-minute and 60-minute peak headways, respectively)
- Napa Vine Route 21 (Fairfield to Napa) (60-minute headways).

This location is also near two trails: Bay Area Ridge Trail and the Fairfield Linear Park Trail. The Bay Area Ridge Trail is envisioned as a continuous, 550-mile trail along Bay Area ridges. The Bay Area Ridge Trail continues to be built and connected. The South of I-80 sites are less than a mile from the trail (connecting at Green Valley Road north of the site).

Fairfield Linear Park Trail is approximately six miles between Solano Community College into Fairfield. The community college is about two miles from this site, accessible by bicycle-friendly roads.

Red Top

Red Top is largely isolated from transit and activity mobility but has good highway and rail access. Red Top is not currently served by any existing rail service or bus service.

There are minimal bike lanes along Red Top Road and SR-12.

The Red Top park and ride lot has 214 spaces and is primarily used for carpoolers and vanpoolers.

Biological Conditions Review

Area West Environmental, Inc. (AWE) prepared a biological constraints report to document existing biological conditions at the potential SMART station locations to help identify biological constraints including the needs for future study(ies), costs, and schedules for development of each potential SMART station location.

Methods

AWE determined survey areas for each location and gathered and reviewed available information regarding biological resources that could occur within or near the project site. A detailed description is provided below.

AVE reviewed the federal and state regulation that protect sensitive biological resources (special-status

species; waters of the U.S. and State, including wetlands; and communities of special concern). AWE also reviewed pertinent Solano County, Suisun City, and City of Fairfield goals and policies relating to the protection and preservation of biological resources. The full list and description of regulatory settings and policies can be found in Appendix A.

AWE used a general survey area boundary for each potential station location to conduct database searches and surveys. Available information regarding biological resources that could occur within or near the project site was gathered and reviewed, including the following:

- a 12 quad records search of the California Department of Fish and Wildlife (CDFW's) California Natural Diversity Database (CNDDB) centered on the Cordelia and Fairfield South USGS topographic quadrangles.
- a species list from the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation database (IPaC) for the project locations (USFWS 2019a).
- USFWS Critical Habitat Mapper (USFWS 2019b).
- A 12 quad records search of the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants Database centered on the Cordelia and Fairfield USGS topographic quadrangles (CNPS 2019).
- The National Wetlands Inventory (USFWS 2019).
- The California Aquatic Resources Inventory.
- The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) (FEMA 2019).
- Central Valley Flood Protection Board's (CVFPB) Jurisdictional Area – Best Available Maps (CBFPB 2019).
- Soils information from the Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS 2019).

AWE biologist Cory Brinkman conducted a reconnaissance-level biological field survey (survey) of the potential station locations on December 3, 2019, along with much of the study team. The survey included the potential station locations and a 250-foot buffer, to account for potential design changes and/or indirect effects to species or habitats. The weather was overcast with winds to 10 miles per hour and temperatures ranged from 55 to 60 degrees Fahrenheit during the survey. A formal aquatic resources delineation was not completed, nor was a botanical survey conducted for rare plants.

Mr. Brinkman conducted the survey on foot within the locations by walking along accessible properties. Adjacent properties were scanned from the public roads or evaluated using aerial photography. Habitat features that could support special-status species were recorded.

Results

A summary of results is presented below.

Land cover

A total of eight habitats were observed and mapped during the reconnaissance survey of the locations. The eight habitats are briefly described below.

Developed

The developed areas consist of buildings, roads, parking lots, the existing railroad and railroad ballast, and graveled areas.

Annual Grassland

The annual grassland areas consist of areas that are dominated by native and non-native annual grasses.

Ruderal

The ruderal areas consist of annual grassland which has been disturbed by earthwork and when vegetation is present, are dominated by invasive species. Ruderal areas within the potential station locations contain invasive species such as wild mustard (Brassica sp.) and yellow starthistle (Centaurea solstitialis).

7. Appendix

Riparian

Riparian areas consist of trees and plants that occur along the banks of stream channels. Riparian habitat is present at the Red Top location and is dominated by live oak (Quercus agrifolia) and California buckeye (Aesculus californica) and located along unnamed intermittent streams.

Detention Basin

One detention basin was observed immediately adjacent to the Red Top location. The detention basin is a constructed basin that collects stormwater from Red Top. The basin is lined with rock but the center is dominated by cattails (Typha sp.).

Ditch

Ditches are features that have been excavated and generally convey urban stormwater and roadway runoff. Ditches were mapped at the Suisun-Fairfield Train Depot location but exist at each of the locations.

Freshwater Emergent Wetland

Freshwater emergent wetland areas consist of areas that are regularly inundated with freshwater. Freshwater emergent wetlands were observed at the Suisun-Fairfield Train Depot location and were dominated by cattails.

Brackish Wetland

Brackish wetland areas consist of areas that are regularly inundated with influxes from both freshwater and saltwater. Brackish wetlands are present at the Cordelia Wye and Suisun-Fairfield locations. These wetlands receive freshwater from upstream features and saltwater from the Peytonia Slough. The brackish wetlands were dominated with cattails, but also contained saltgrass (Distichlis sp.). The brackish marsh at the Cordelia Wye location is part of the Suisun Marsh, which is the largest contiguous brackish water marsh on the west coast of North America (CDFW 2019).

Aquatic Resources

A jurisdictional wetland delineation was not completed as a part of this reconnaissance survey; however, aquatic features visible during the survey or on aerial photographs were mapped and are discussed below. Additionally, the California Aquatic Resources Inventory, National Wetland Inventory, and FEMA FIRM maps were consulted to identify potential aquatic resources and the extent of the 100-year floodplain. None of the Survey Areas are located adjacent to CVFPB regulated streams or designated floodways (CVFPB 2019).

Suisun-Fairfield Sites

Suisun-Fairfield Train Depot

Brackish wetlands were observed in the southwest portion of this location and are continuous with the brackish wetlands at the Cordelia Wye location. Additionally, urban ditches were observed in the northern portion of the Suisun-Fairfield Train Depot location. The existing railroad crosses the ditch near Main Street.

Cordelia Wye Junction

Brackish wetlands were observed at the Cordelia Wye location. These wetlands appear to receive freshwater from upstream urban and roadside runoff and saltwater intrusion from the Peytonia Slough. These brackish wetlands are mapped as Tidal Marsh in the Suisun Marsh Protection Plan. The brackish wetlands at this location are part of the Suisun Marsh.

Cordelia Sites

South of I-80 (Two Sites)

No aquatic resources were observed at the South of I-80 sites.

Red Top

Two intermittent streams were observed at Red Top. One feature conveys water underneath SR-12 to

the north side of the existing railroad grade and the other feature conveys water from Jameson Canyon under I-80 on the south side of the existing railroad grade.

Special-status Plants

For this memo, special-status plants are defined as plants listed, proposed for listing, or candidates for possible future listing as threatened or endangered under the federal or State Endangered Species Acts and/or plants considered by the California Native Plant Society (CNPS) to be "rare, threatened, or endangered" in California (Rare Plant Rank 1 and 2). Habitat suitability for special-status plant species is based on a review of existing information including the California Natural Diversity Database (CNDDB) and CNPS; species distribution and habitat requirements data; and an analysis of elevational ranges, geographic ranges, and suitable habitat present within the survey area. Based on this review, the survey area could support these special-status plant species:

Common and Scientific Name	Legal Status[1]		Red Top	South of I-80	Cordelia Wye	Suisun Fairfield Station
	Federal	CNPS				
Franciscan onion (*Allium peninsulare var. franciscanum)*	--	1B.2	♦	♦	--	--
Napa false indigo (*Amorpha californica var. napensis*)	--	1B.2	♦	--	--	--
Alkali milk-vetch (*Astragalus tener* var. *tener*)	--	1B.2	♦	♦	♦	♦
Brittlescale (*Atriplex depressa*)	--	1B.2	♦	♦	♦	♦
Vernal pool smallscale (*Atriplex persistens*)	--	1B.2	--	--	♦	--
Big-scale balsamroot (*Balsamorhiza macrolepis*)	--	1B.2	♦	♦	--	--
Big tarplant (*Blepharizonia plumose*)	--	1B.1	♦	♦	--	--
Narrow-anthered brodiaea (*Brodiaea leptandra*)	--	1B.2	♦	♦	--	--
Mt. Diablo fairylantern (*Calochortus pulchellus*)	--	1B.2	♦	♦	--	--
Lyngbye's sedge (*Carex lyngbyei*)	--	2B.2	--	--	♦	♦
Holly-leaved ceanothus (*Ceanothus purpureus*)	--	1B.2	♦	--	--	--

Table 23: Special-status Plants with Potential to Occur within the Survey Area

7. Appendix

Common and Scientific Name	Legal Status[1]		Red Top	South of I-80	Cordelia Wye	Suisun Fairfield Station
	Federal	CNPS				
Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*)	--	1B.1	♦	♦	--	--
Pappose tarplant (*Centromadia parryi* ssp. *parryi*)	--	1B.2	♦	♦	♦	♦
Hispid bird's-beak (*Chloropyron molle* ssp. *hispidum*)	--	1B.2	--	--	♦	♦
Soft bird's-beak (*Chloropyron molle* ssp. *molle*)	FE	1B.2	--	--	♦	♦
Bolander's water-hemlock (*Cicuta maculata* var. *bolanderi*)	--	2B.1	--	--	♦	♦
Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*)	FE	1B.1	--	--	♦	♦
Western leatherwood (*Dirca occidentalis*)	--	1B.2	♦	--	--	--
Jepson's coyote thistle (*Eryngium jepsonii*)	--	1B.2	♦	♦		
San Joaquin spearscale (*Etriplex joaquinana*)	--	1B.2	♦	♦	♦	♦
Adobe-lily (*Fritillaria pluriflora*)	--	1B.2	♦	--	--	--
Diablo helianthella (*Helianthella castanea*)	--	1B.2	♦	--	--	--
Santa Cruz tarplant (*Holocarpha macradenia*)	FT/SE	1B.1	♦	♦	--	--

Common and Scientific Name	Legal Status[1]		Red Top	South of I-80	Cordelia Wye	Suisun Fairfield Station
	Federal	CNPS				
Carquinez goldenbush (*Isocoma argute*)	--	1B.1	♦	♦	--	--
Northern California black walnut (*Juglans hindsii*)	--	1B.1	♦	--	--	--
Contra Costa goldfields (*Lasthenia conjugens*)	FE	1B.1	--	--	♦	♦
Coulter's goldfields (*Lasthenia glabrata* ssp. *Coulteri*)	--	1B.1	--	--	♦	♦
Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*)	--	1B.2	--	--	♦	♦
Jepson's leptosiphon (*Leptosiphon jepsonii*)	--	1B.2	♦	♦	--	--
Mason's lilaeopsis (*Lilaeopsis masonii*)	--	1B.1	♦	--	♦	♦
Delta mudwort (*Limosella australis*)	--	2B.1	--	--	♦	♦
Marsh microseris (*Microseris paludosa*)	--	1B.2	♦	--	--	--
Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*)	--	1B.1	♦	--	--	--
California alkali grass (*Puccinellia simplex*)	--	1B.2	--	--	♦	♦
California beaked-rush (*Rhynchospora californica*)	--	1B.1	--	--	♦	♦
Chaparral ragwort (*Senecio aphanactis*)	--	2B.2	♦	--	--	--

Common and Scientific Name	Legal Status[1]		Red Top	South of I-80	Cordelia Wye	Suisun Fairfield Station
	Federal	CNPS				
Long-styled sand-spurrey (*Spergularia macrotheca Heynh.* var. *longistyla*)	--	1B.2	--	--	♦	♦
Slender-leaved pondweed (*Stuckenia filiformis* ssp. *Alpina*)	--	2B.2	--	--	♦	♦
Suisun Marsh aster (*Symphyotrichum lentum*)	--	1B.2	--	--	♦	♦
Napa bluecurls (*Trichostema ruygtii*)	--	1B.1	♦	♦	--	--
Two-fork clover (*Trifolium amoenum*)	--	1B.1	♦	♦	--	--
Saline clover (*Trifolium hydrophilum*)	--	1B.2	--	--	♦	♦
Oval-leaved viburnum (*Viburnum ellipticum*)	--	2B.3	♦	--	--	--

-- = no listing.

Federal
FT = listed as threatened under the federal Endangered Species Act.
FE = listed as endangered under the California Endangered Species Act.

State
SE = listed as endangered under the California Endangered Species Act.
ST = listed as threatened under the California Endangered Species Act.
SR = listed as Rare by the California Fish and Game Commission.

California Native Plant Society
1B = List 1B species: rare, threatened, or endangered in California and elsewhere.
2B = List 2B species: rare, threatened, or endangered in California but more common elsewhere.
0.1 = Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat)
0.2 = Moderately threatened in California (20%-80% occurrences threatened/ moderate degree and immediacy of threat)
0.3 = Not very endangered in California

[2]Rationale includes an effects determination under the FESA for all federally listed species

Suisun-Fairfield Sites

Suisun-Fairfield Train Depot

There are known CNDDB occurrences of special status plant species within the Suisun-Fairfield Train Depot location. There are occurrences of California alkali grass and Suisun Marsh aster within the survey area. Additionally, the afore-mentioned Mount Diablo buckwheat occurrence overlaps with this location, as well as an extirpated occurrence of legenere.

Cordelia Wye Junction

There are known CNDDB occurrences of special status plant species within the Cordelia Wye Junction location. There are occurrences of saline clover, California alkali grass, long-styled sand-spurrey, and Suisun Marsh aster within the Survey Area. Additionally, there is a Mount Diablo buckwheat occurrence, but it is an 1888 collection identified only as “Suisun City”; Mount Diablo buckwheat was considered extinct until 2005 when it was observed on Mount Diablo, so it is extremely unlikely to occur at this location.

Cordelia Sites

South of I-80 (Two Sites)

There are known CNDDB occurrences of pappose tarplant, Jepson’s coyote thistle, and saline clover

7. Appendix

within the South of I-80 location. The pappose tarplant and Jepson's coyote thistle occurrences are from 1933 observations identified only as "Cordelia", but potential habitat is present. The saline clover occurrence is a 1928 observation only identified as "Benicia to Cordelia highway", and likely does not refer to this segment of I-680 due to more suitable habitat along I-680 south of the survey area.

Red Top

There are no known CNDDB occurrences of any of these plants within the Red Top location.

Special-status Wildlife and Nesting Birds

Based on a review of existing information including a search of the CNDDB, US Fish and Wildlife Service (USFWS) species lists, and species distribution and habitat requirements data, the following sections discuss special-status wildlife species that could potentially occur in or near the survey area.

Suisun-Fairfield Sites

Suisun-Fairfield Train Depot

There are known CNDDB occurrences of salt marsh harvest mouse adjacent to the Suisun-Fairfield Train Depot location.

Cordelia Wye Junction

Common and Scientific Name	Legal Status[1]		Red Top	South of I-80	Cordelia Wye	Suisun Fairfield Station
	Federal	State				
Invertebrates						
Crotch bumblebee (*Bombus crotchii*)	--	SC	♦	♦	♦	♦
Western bumble bee (*Bombus occidentalis*)	--	SC	♦	♦	♦	♦
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	FT	--	♦	--	--	--
Amphibians						
California red-legged frog (*Rana draytonii*)	FT	SSC	♦	--	--	--
Reptiles						
Western pond turtle (*Actinemys marmorata*)	--	SSC	♦	--	--	--
Birds						
Cooper's hawk (*Accipiter cooperi*)	--	WL	♦	--	--	--
Tricolored blackbird (*Agelaius tricolor*)	--	SE, SCC	--	--	♦	♦
Grasshopper sparrow (*Ammodramus savannarum*)	--	SSC	♦	♦	--	--
Short-eared owl (*Asio flammeus*)	--	SSC	♦	♦	♦	♦
Burrowing owl (*Athene cunicularia*)	--	SSC	♦	♦	♦	♦
Ferruginous hawk (*Buteo regalis*)	--	WL	♦	♦	♦	♦
Swainson's hawk (*Buteo swainsoni*)	--	ST	♦	--	--	--

Table 24: Special-status Wildlife with Potential to Occur within the Survey Area

Common and Scientific Name	Legal Status[1]		Red Top	South of I-80	Cordelia Wye	Suisun Fairfield Station
	Federal	State				
Northern harrier *(Circus hudsonius)*	--	SSC	♦	--	♦	♦
Yellow rail *(Coturnicops noveboracensis)*	--	SSC	--	--	♦	♦
White-tailed kite *(Elanus leucurus)*	--	FP	♦	--	--	--
San Francisco common yellowthroat *(Geothlypis trichas sinuosa)*	--	SSC	--	--	♦	♦
California black rail *(Laterallus jamaicensis coturniculus)*	--	ST, FP	--	--	♦	♦
Suisun song sparrow *(Melospiza melodia maxillaris)*	--	SSC	--	--	♦	♦
San Pablo song sparrow *(Melospiza melodia samuelis)*	--	SSC	--	--	--	--
Ridgway's rail *(Rallus longirostris obsoletus)*	FE	SE, FP	--	--	♦	♦
Yellow-headed blackbird *(Xanthocephalus xanthocephalus)*	--	SSC	--	--	♦	♦
Mammals						
Western red bat *(Lasiurus blossevillii)*	--	--	♦	--	--	--
Big free-tailed bat *(Nyctinomops macrotis)*	FT/SE	--	♦	♦	--	--
Salt marsh harvest mouse *(Reithrodontomys raviventris)*	FT/SE	--	--	--	♦	♦
Suisun shrew *(Sorex ornatus sinuosus)*	--	SSC	--	--	♦	♦

-- = no listing.
Delisted = removed from federal or California Endangered Species Act list.

Federal
FE = listed as endangered under the federal Endangered Species Act.
FT = listed as threatened under the federal Endangered Species Act.
FC = candidate for listing under the federal Endangered Species Act.

State
SE = listed as endangered under the California Endangered Species Act.
ST = listed as threatened under the California Endangered Species Act.
SC = candidate for listing under the California Endangered Species Act.
FP = designated as a fully protected species under the CFGC.
WL = CDFW Watch List
SSC = state species of special concern

There are known CNDDB occurrences of Suisun shrew and salt marsh harvest mouse adjacent to the Cordelia Wye location.

Cordelia Sites

South of I-80 (Two Sites)

There are no known CNDDB occurrences of any special-status wildlife species within or adjacent to the South of I-80 sites.

Red Top

There are known CNDDB occurrences of California red-legged frog adjacent to the Red Top, including an occurrence within the detention basin adjacent to the existing park and ride.

Critical Habitat

Critical habitat is a geographic area designated by the USFWS as part of the FESA. Critical habitat is an area that contains features essential to the

7. Appendix

conservation of a species listed as Threatened or Endangered under FESA or areas that are not currently occupied by the species but will be required for its recovery. Projects within or adjacent to designated critical habitat must have special considerations to impacts to the critical habitat and identify whether project activities will impair the features essential to species conservation.

Suisun-Fairfield Sites

Suisun-Fairfield Train Depot

The Suisun-Fairfield Train Depot location is adjacent to Contra Costa goldfields critical habitat.

Cordelia Wye Junction

The Cordelia Wye location is adjacent to Suisun thistle critical habitat and within Contra Costa goldfields critical habitat.

Cordelia Sites

South of I-80 (Two Sites)

There is no designated critical habitat within or adjacent to the South of I-80 sites.

Red Top

Red Top is adjacent to critical habitat for the California red-legged frog.

Potential Environmental Documentation and Surveys Needed

The following include a list of potential environmental documentation and surveys that would be needed to develop a SMART station and associated infrastructure at each location, followed by additional notes for each location.

Suisun-Fairfield Sites

Suisun-Fairfield Train Depot

The track realignment at this location is expected to avoid impacts to brackish wetlands but will require the replacement of the bridge that crosses an urban ditch which will likely qualify as a jurisdictional

Site	Biological Resources Evaluation	Biological Assessment	Aquatic Resources Delineation	404 Nationwide Permit	404 Individual Permit	401 Water Quality Certification	1600 Lake and Streambed Alteration Agreement	BCDC Permit	California Environmental Quality	2081 Incidental Take Permit	Approximate Duration	Approximate Cost (with mitigation)
Suisun-Fairfield Train Depot	♦	♦	♦	♦		♦	♦		♦		2 years	$250,000
Cordelia Wye Junction	♦	♦	♦		♦	♦	♦	♦	♦		3 years	$1,310,000
South of I-80	♦		♦						♦		1 year	$180,000
Red Top	♦	♦	♦	♦		♦	♦		♦		2 years	$260,000

Table 25: Potential Environmental Documentation and Surveys Needed to Develop a SMART Station

feature and will require permits from CDFW, U.S. Army Corps of Engineers (Corps), and the Regional Water Quality Control Board (RWQCB).

A Biological Assessment (BA) for impacts to salt marsh harvest mouse, Contra Costa goldfields, Contra Costa goldfields critical habitat, and Ridgway's rail is anticipated for indirect impacts to the brackish marsh. Based on the preliminary project description, it is anticipated that the BA will reach a may affect, not likely to adversely affect conclusion, which is a relatively simple Section 7 process.

Cordelia Wye Junction

The track realignment at this location is expected to require fill of brackish marsh which will likely qualify as jurisdictional wetlands and will require permits from CDFW, the Corps, the RWQCB, and the San Francisco Bay Conservation & Development Commission (BCDC). It is anticipated that an Individual Permit from the Corps will be required. Additional considerations for impacts to the brackish wetlands include the lack of readily available compensatory mitigation for brackish wetlands. No mitigation banks sell brackish wetland mitigation credits. Therefore, compensatory mitigation would entail locating, purchasing, and setting up a permanent conservation easement and development of brackish wetland habitat at an offsite location.

A BA for impacts to salt marsh harvest mouse, Contra Costa goldfields, Contra Costa goldfields critical habitat, Suisun thistle, Suisun thistle critical habitat, and Ridgway's rail may be required. Based on the preliminary project description, it is anticipated that the BA will reach a may affect, likely to adversely affect conclusion, which is a longer and more contentious Section 7 process than that required for the Red Top location. Additional considerations for these species include a lack of readily available compensatory mitigation for salt marsh harvest mouse, Suisun thistle, and Ridgway's rail. Potentially, an offsite location suitable for brackish wetland mitigation (discussed above) could be suitable mitigation for these species. Additionally, mitigation ratios for impacts to Contra Costa goldfields are often 9:1, and these mitigation banking credits can be prohibitively expensive due to their scarcity.

Cordelia Sites

South of I-80 (Two Sites)

Although no aquatic features were identified during the reconnaissance survey, a formal aquatic delineation to determine that no aquatic features are present, especially at the base of the railroad ballast, where water often tends to pool, is recommended. Permitting would be required if aquatic resources are identified and cannot be avoided.

Red Top

The pedestrian bridge crossing the intermittent stream may require permits from CDFW, the Corps, and the RWQCB. It is anticipated that a Nationwide Permit from the Corps will be sufficient. Additionally, CDFW exerts jurisdiction over riparian trees, so an inventory of riparian trees that may be removed to construct the project would need to be included in the CDFW permit. Compensatory mitigation for impacts to jurisdictional waters and riparian trees is readily available at mitigation banks whose service area overlaps with the Red Top location.

A BA for impacts to California red-legged frog, California red-legged frog critical habitat, and valley elderberry longhorn beetle (if an elderberry shrub is identified within the riparian zone) will be required. Based on the preliminary project description, it is anticipated that the BA will reach a may affect, not likely to adversely affect conclusion, which is a relatively simple Section 7 process.

7. Appendix

Site Selection Criteria

A preferred station location should be in an area that supports ridership, supports local land use aspirations and has limited biological and other environmental constraints. A preferred location should also have good access, dense land uses, and be reasonably located near trip attractions. A list of specific recommended site selection criteria is below.

- Variety of surrounding land uses
- Higher density of land uses (including residential, commercial, office space, etc.)
- Proximity to trip attractions
- Good multimodal access to public transportation, bike, and pedestrian facilities
- Limited biological constraints
- Limited potential environmental documentation and surveys, and associated time and costs

The summary of findings is found in Section 5.

Summary of Findings

A summary of the existing conditions and biological conditions review is below.

The purpose of the study is to identify appropriate locations for two new SMART stations in the county. One location is required to make a connection to the Capitol Corridor, and potentially include local and express bus services. Another location can be advanced to add an additional station that could serve SMART and initially express buses.

These criteria limit considerations to two general areas – the Cordelia area, near I-680, and the Suisun-Fairfield area (for the connection with Capitol Corridor).

As noted, the Cordelia Wye location on the Suisun-Fairfield line is the least preferred and has significant environmental concerns. Removing that location from consideration then leaves the current site of the Suisun-Fairfield Train Depot as the best option for connections to Capitol Corridor and other local and regional services.

In Cordelia, none of the options have environmental "fatal flaws," but all should be reviewed further during the Fairfield General Plan Update Process.

Suisun-Fairfield Sites

Suisun-Fairfield Train Depot

The station could provide a direction connection between SMART and Capitol Corridor and it could become the Solano County Hub mentioned in the State Rail Plan. The station is primarily surrounded by residential, government (including UP right-of-way), and agricultural land. This station is in a relatively dense area for Solano County and located near many trip attractions, including both cities' downtowns and City Halls. Because this is an existing Capitol Corridor station and is served by various bus operators, transit access is relatively good at this location. There are also nearby bike facilities and a park and ride lot.

There are several biological constraints on or near this site, including aquatic resources, known special-status plants and wildlife and nesting birds, and adjacency to critical habitat.

The proposed track alignment will avoid the present brackish wetlands but will require a bridge replacement that crosses an urban ditch. This new station will require permits from CDWF, the Corps, and RWQCB. A BA will also be required, but will likely reach a may affect, which is a relatively simple Section 7 process. The approximate duration of documentation and surveys is two years and may cost around $250,000.

Cordelia Wye Junction

The location is primarily surrounded by agricultural, government (including UP right-of-way), and marsh land. This location is the least dense and most isolated from residential units. While this location is near many of the same attractions as the Suisun-Fairfield Train Depot, it is more isolated and less accessible. The location is not served by any existing rail service. There is minimal bike facilities

and no dedicated bike facilities or trails near this location.

Of the surveyed locations, this location has the most biological constraints on or near the site, including aquatic resources, known special-status plants and wildlife and nesting birds, and contains and is adjacent to critical habitat, including Contra Costa goldfields.

The proposed track realignment will require fill of brackish marsh which will likely qualify as jurisdictional wetlands and will require permits from CDFW, the Corps, the RWQCB, and the San Francisco Bay Conservation & Development Commission (BCDC). Because there is a lack of readily available compensatory mitigation for brackish wetlands, compensatory mitigation would entail locating, purchasing, and setting up a permanent conservation easement and development of brackish wetland habitat at an offsite location.

A BA for impacts to salt marsh harvest mouse, Contra Costa goldfields, Contra Costa goldfields critical habitat, Suisun thistle critical habitat, and Ridgway's rail may be required. The BA will likely reach a may affect, which is a longer and more contentious Section 7 process than required for other locations. Similar to brackish wetlands, these species include a lack of readily available compensatory mitigation for salt marsh harvest mouse, Suisun thistle, and Ridgway's rail. Additionally, mitigation ratios for impacts to Contra Costa goldfields are often 9:1, and these mitigation banking credits can be prohibitively expensive due to their scarcity. The approximate duration of documentation and surveys is three years and may cost around $1,310,000.

Cordelia Sites

South of I-80 (Two Sites)

The station includes multiple and complex land uses. Primary use includes manufacturing/warehousing/industrial, single family residential, office, commercial, and government. The I-80/I-680/SR-12 interchange project provides opportunity for station support facilities, including parking. This site is near a variety of trip attractions, including a shopping center, Solano Community College, and the Red Top park and ride. Although this site is not served by existing rail service, several regional express and local bus services serve this site. This site is also adjacent to two trails.

Of the potential locations, this location has the least biological constraints on or near the site. No aquatic resources, special-status wildlife and nesting birds, nor critical habitat are within or adjacent to the site. There are known occurrences of special-status plants.

Although no aquatic features were identified during the reconnaissance survey, a formal aquatic delineation to determine that no aquatic features are present, especially at the base of the railroad ballast, where water often tends to pool, is recommended. Permitting would be required if aquatic resources are identified and cannot be avoided.

The approximate duration of documentation and surveys is one year and may cost around $180,000.

Red Top

The station is primarily surrounded by agricultural, government/miscellaneous (including Union Pacific right-of-way), single-family residential, industrial, and manufacturing/warehousing. Other than the park and ride lot, Red Top is not located near many trip attractions. While it is not far from the Costco shopping center and Solano Community College, the South of I-80 location is closer and has better access. The site is also isolated from public transit and bike facilities.

There are several biological constraints on or near this site, including aquatic resources, known wildlife and nesting birds, and contains and is adjacent to critical habitat for the California red-legged frog, including an occurrence within the detention basin adjacent to the park and ride.

The pedestrian bridge crossing the intermittent

stream may require permits from CDFW, the Corps, and the RWQCB. A Nationwide Permit from the Corps will likely be sufficient. Additionally, CDFW exerts jurisdiction over riparian trees, so an inventory of riparian trees that may be removed for construction would be included in the CDFW permit. Compensatory mitigation for impacts to jurisdictional waters and riparian trees is readily available at mitigation banks.

A BA for impacts to California red-legged frog and critical habitat, and valley elderberry longhorn beetle (if an elderberry shrub is identified within the riparian zone) will be required. The BA will likely reach a may affect, which is a relatively simple Section 7 process.

The approximate duration of documentation and surveys is two years and may cost around $260,000.

Appendix C

I-680/I-80/SR-12 Interchange Station Alternatives (abridged from original memorandum)

Purpose

Identify potential SMART-Solano Express Station locations in the Cordelia area.

As part of the tasks required in SMART Station and SolanoExpress Feasibility Study, Arup is to identify up to two stations that can be used initially by SolanoExpress (and Napa Vine, intercity buses, and local transit) and ultimately by an extension of SMART rail services into Solano from Marin or Napa Counties. At least one of the stations requires a connection to the Capitol Corridor service, while the other station locations must be able to serve both SolanoExpress and potentially SMART in the future.

Capitol Corridor Connection – The location of the station connecting to Capitol Corridor is limited to the Suisun City area. The anticipated SMART corridor uses the Union Pacific/California Northern right-of-way (ROW) from Cordelia Junction to American Canyon. Within this area, at the Cordelia Junction, the anticipated SMART corridor has a junction with the Union Pacific (UPRR) Martinez Subdivision, which operates between Oakland and Roseville.

Cordelia Station – The other potential station site is the subject of this memorandum.

This structure of this memo:

1. Introduction/Purpose
2. Planning Criteria and Potential Sites
3. Engineering Constraints
4. Alternatives
5. Summary

Planning Criteria and Potential Sites

SMART Station siting prioritizes:

1. Adjacency to the proposed SMART rail line within Solano County.
2. Adjacency between SMART and Capitol Corridor lines (not the subject of this memo).
3. Adjacency between the rail line and potential freeway in-line bus stations serving Solano Express services.
4. Ability to leverage or coordinate with upcoming projects.
5. Ability to coordinate or support local land use plans and aspirations, including transit-oriented development.
6. Ability to meet Caltrans, SMART and UPRR design criteria.

7. Avoidance of significant additional land acquisitions (i.e., using the existing rights-of-way).
8. Avoidance of adverse impacts on environmentally sensitive areas.

The universe of options that meet these criteria is limited and (after identifying the existing Suisun-Fairfield Station, where Capitol Corridor and the SMART line merge) essentially focuses on several alternatives near the proposed junction for I-80/I-680 and Highway 12 in Cordelia (western Fairfield). Four locations in this area meet the requirements to accommodate the station within the existing ROW, use publicly owned property, and can be useful for extensive local bus service and Solano Express.

A station near the I-80/I-680/SR-12 Interchange in western Fairfield can meet the city's land use aspirations, allow use by other transit services, and has limited environmental impact on the surroundings. The station sites can also meet adopted design criteria and other technical requirements.

Background Information

Proposed Interchange Project – The existing I-80/I-680 interchange has become congested in recent years, due in part to no direct connector from northbound I-680 to westbound Hwy 12. Rather, cars must travel on local roads to make this connection. To mitigate the congestion, use of local roads, and associated vehicle safety issues, a freeway improvement project is underway by Caltrans, the Solano Transportation Authority (STA), and the Metropolitan Transportation Commission (MTC) (City of Fairfield, 2015). The project is divided into phases. Phase 1 encompasses the interchange improvements, and subsequent phases include downstream improvements. Phase 1 is divided into 7 packages. Packages 1-7 are fully funded and scheduled for construction, and construction of the package 1 design is currently underway. Hence, the SMART Station design alternatives at the interchange assume completion of the Phase 1 Package 7 future condition. This future condition is shown below:

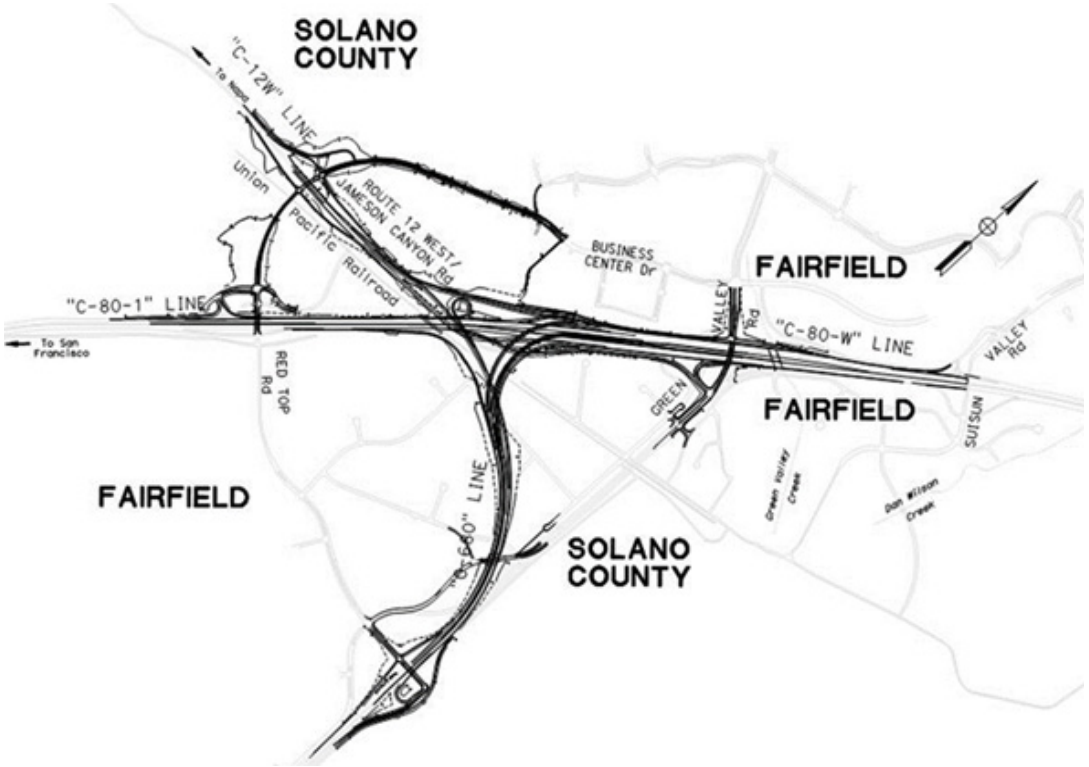


Figure 21: SMART Future Conditions

7. Appendix

As shown in the image, the existing UPRR/California Northern route is located adjacent to Hwy 12 in Jameson Canyon, bridges over I-80, and continues east past the interchange towards Suisun. Previous studies identified SMART using this corridor and right-of-way; all the proposed station layout options in this area act as a transfer point between the SMART train and regional buses. Each option includes a bus station placed optimally for freeway access, a corresponding SMART station along the UPRR/California Northern ROW with minimal walking distance to transfer, and adjacent parking.

Engineering Constraints

From the SMART Station Program Guidance (Arup, 2020), the following minimum Caltrans Facility Median Freeway Bus Station Dimensions shall be adhered to:

Length of station: 250 feet

Transition: 1,200 feet

Minimum station width: 80 feet (includes platforms and bus roadway; does not include HOV bypass)

Minimum station spacing: 2 miles

In the Cordelia area, there are a limited number of locations that a bus platform may be placed for optimal freeway access. There is no single location that can provide both I-680 and I-80 access. Typical median widths near this interchange are not wide enough to accommodate an 80' wide bus station, so the medians from the current designs require revision to accommodate for the future bus station. Additionally, the approach lanes on either side of a center bus platform should be at the same elevation for platform access. Ideally, access to the new station should include a 1,200-foot long deceleration lane and acceleration lane on both side of the station ramps.

It should be noted that the bus station designs are similar to the existing Silver Line bus stations in the I-110 corridor in Los Angeles, which were delivered by Caltrans.

Alternatives

Considering the planning criteria and engineering constraints, five different SMART Station location options at the I-80/I-680/SR-12 Interchange area were selected for additional analysis and are shown in figures below. They are discussed in detail below. The width of the bus station footprints shown includes the bus platform(s) and lanes into/out of the station and excludes the transition lanes.

Option 1 (Red)

Option 1 consists of two bus stations on both I-80 and I-680 (it is not geometrically feasible to have one station at this site) – these stations would be used by buses operating on I-80 to El Cerrito del Norte and on I-680 to Walnut Creek. The I-80 bus station is a center platform located in the median of the proposed I-80 freeway. I-80 is flat and at-grade at this location. Westbound I-80 has an HOV lane on the innermost lane next to the median. The proposed project design, provided by Mark Thomas, does not have sufficient room in the median for the 80' wide bus stop. The width of the proposed median is approximately 40' wide in the west and approximately 50' wide in the east. Hence, the width of proposed median would need to be modified by shifting the eastbound I-80 lanes south to accommodate the bus station at this location.

The proposed I-680 bus station includes two side platforms on either side of the Route 80/680 HOV connector. This connector provides a direct connection between HOV lanes on both I-80 and I-680. The connector is mostly constructed on an elevated viaduct structure at this location. This connector is elevated to go over eastbound I-80 and multiple ramps before descending toward the I-80 median and eventually connecting to I-80 HOV lanes at-grade. The platforms are shifted to the northern end of the connector to minimize

the elevation of the bus platform. The platform for eastbound buses is shifted further north to where there is enough horizontal distance between the two eastern connectors for the platform. Consequently, there are then only about 500' from the northern end of this platform to the connection to I-80 at-grade. Since the recommended transition length is 1200', the proposed eastbound I-80 lanes would need to be shifted south for approximately 700' after the connection to allow for a merging lane.

The SMART train platform is located directly south of the bus platforms, 500-700' south of the bus stations, about the maximum desired walking distance to either bus station. The UPRR/ California Northern track is at-grade at this location. To provide a station at this location, the UPRR/ California Northern trackway would be widened for the 17' wide SMART platform, plus a passing track. Vehicle parking would be located between the bus and train platforms under the I-680 structures.

Grade-separated pedestrian access would be provided under the freeway to the bus platforms. To access the I-80 median bus platform, ramps and stairs would similarly be provided under the eastbound at-grade I-80 lanes and back up to platform-level between the eastbound and westbound lanes. To access the I-680 connector platforms, ramps and stairs would connect at ground-level and travel up to the elevated platform-level. To access the single side SMART platform, a simple pedestrian connection to the platform would be constructed from Cordelia Road.

Pros & Cons

Pros

- Access to buses on both I-80 & I-680
- Proximity to parking and use of property that would be under the freeway structures

Cons

- Long pedestrian path between bus and train platforms with up to 700' horizontal distance, not including ramps down and up
- Complex pedestrian routes from bus to train plaforms
- Multiple modifications to Caltrans proposed inter-change design are required
- Large amount of new construction, with four platforms in total

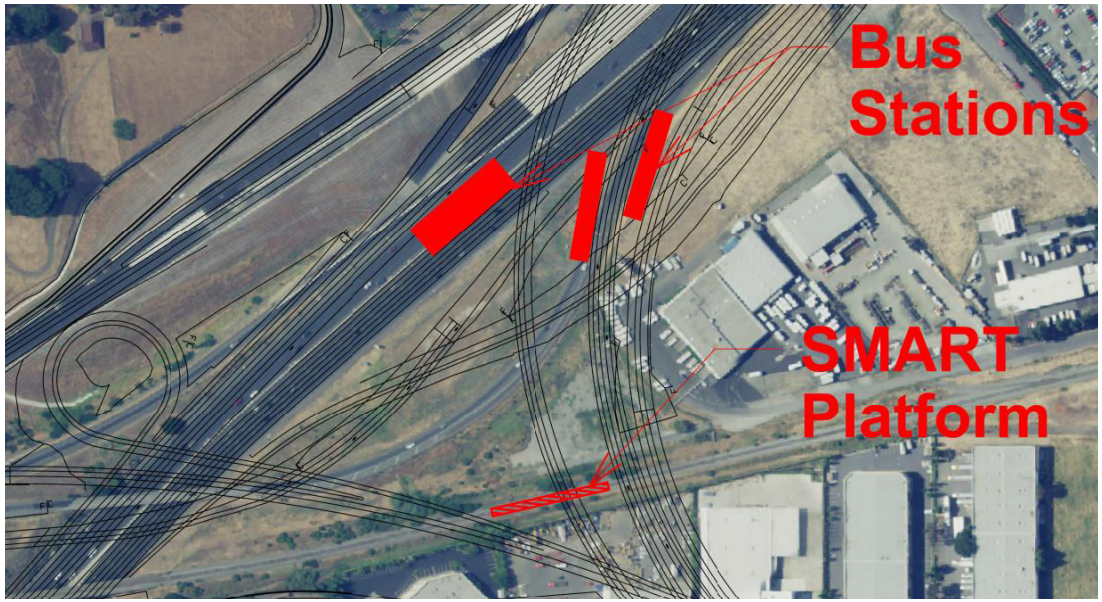


Figure 22: Option One SMART Platform and Express Bus Station Alignments

7. Appendix

Option 2 (Blue)

Option 2 consists of one center bus platform on the existing I-680 bridge over UPRR. The proposed interchange design includes converting this section of I-680 to a local road. The I-680 project maintains this right-of-way and converts it to a local roadway. Option 2 proposes to provide a bus-only lane on this roadway with the platform in the median between the northbound and southbound bus lanes. Buses operating on I-680 to and from central Contra Costa would be able to directly access I-80 east, however there may be conflicts and bus delay as the buses cross over five traffic lanes to reenter the HOV lane on I-80 (located in the median). The proposed connection between Green Valley Rd to I-680 south of the Option 2 bus station is also sufficient for access to I-680 in either direction. Overall, since Option 2 is not aligned with the proposed travel lanes, the paths to get to & from I-80 & I-680 would be longer in time and distance than other median options.

The proposed SMART platform location is directly below the bridge. The UPRR/California Northern tracks would be widened for the 17' wide SMART platform, plus a passing siding. The parking would be located in the parcels to the southwest of the platforms.

Grade-separated pedestrian access would be provided to the bus platforms. To access the I-680 bus platform, ramps and stairs would start at-grade and travel up to the elevated platform level on structure. To access the single side SMART platform, a simple pedestrian connection to the platform would be constructed from Cordelia Road.

Pros & Cons

Pros

- Reuses existing infrastructure to provide significant transit benefit and passenger amenities.
- Potential exclusive use of existing I-80E ramp
- Short transfer walk and proximity to parking, providing greater accessibility
- Can be implemented after I-680 interchange project reducing risk for that project

Cons

- Significantly longer path for buses, including additional delays for cutting across lanes between on/off ramps and the I-80 HOV lanes
- Potential construction staging and maintenance challenges with rail at grade and buses on the aerial structure.
- Additional ROW required for parking that would not already be acquired for the interchange project

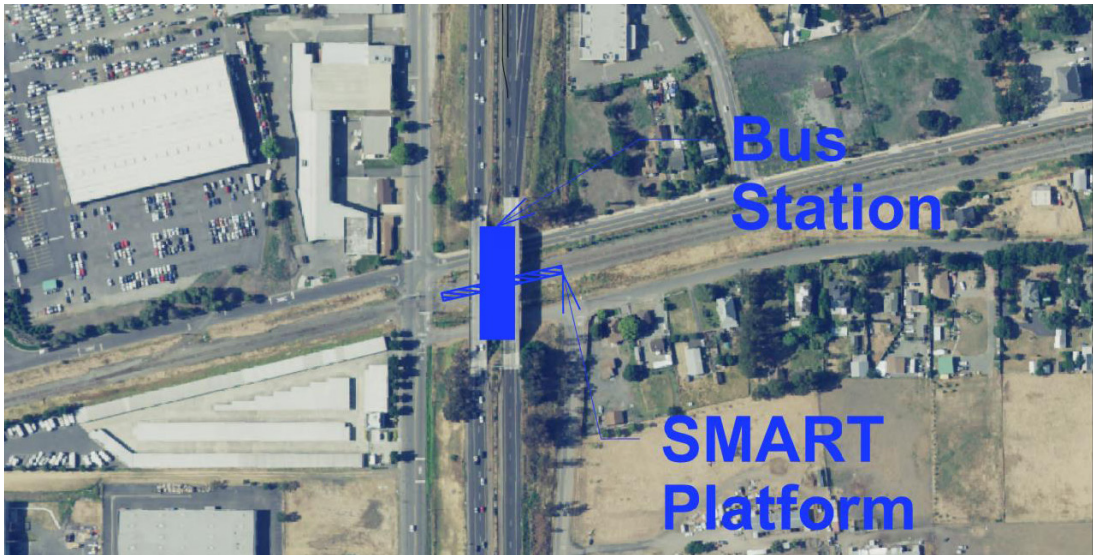


Figure 23: Option Two SMART Platform and Express Bus Station Alignments

Option 3 (Orange)

Option 3 focuses on leveraging the existing Red Top park and ride location. Option 3 places the bus station in the median of I-80, southwest of the interchange. I-80 is flat and at-grade at this location. Westbound I-80 has an HOV lane on the innermost lane next to the median. The current design does not have enough room in the median for the 80' wide bus stop. The median is only 22' wide, so the proposed design would have to be modified to accommodate the bus station at this location. The SMART platform is located nearby on the UPRR/California Northern ROW just west of I-80, with less than a 300' horizontal distance between platforms. The parking would be located nearby in the parcels southwest of the interstate at the Red Top expansion.

Grade-separated pedestrian access would be provided under the freeway to the bus platform and over the creek to the train platform. Separate sets of ramps and stairs would be provided for full grade separation of buses/trains and pedestrians.

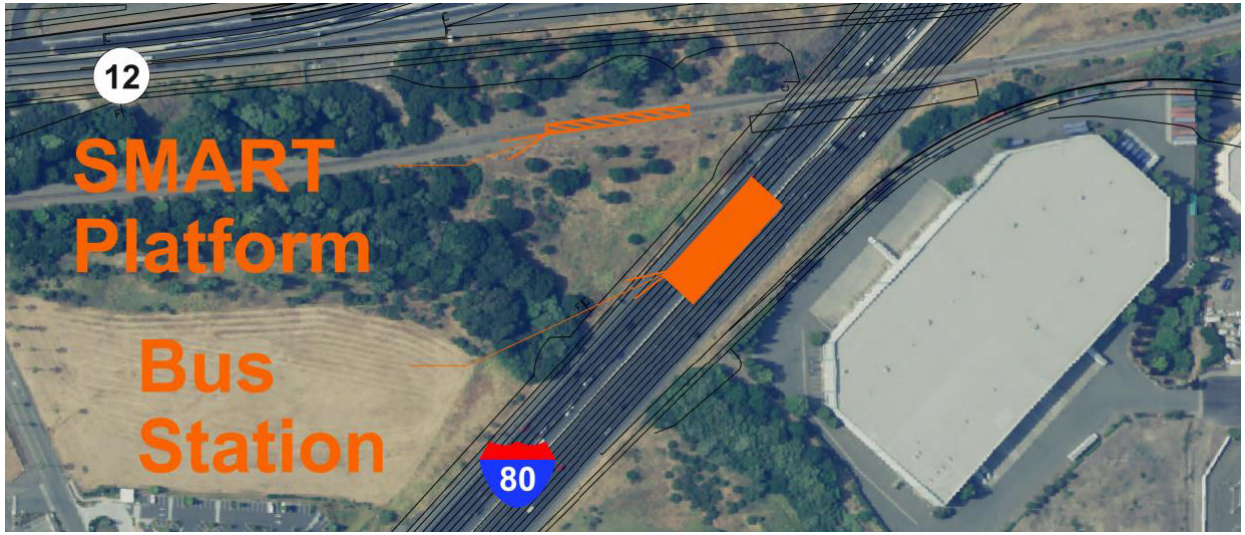


Figure 24: Option Three SMART Platform and Express Bus Station Alignments

Pros & Cons

Pros

- Both platforms are at-grade
- Proximity to parking

Cons

- No access to I-680 buses
- Additional ROW required for parking that would not already be acquired for the interchange project
- Potential environmental considerations related to bridging over the creek adjacent to the railroad right-of-way

7. Appendix

Option 4 (Green)

Option 4 consists of one bus platform in the median of I-80, northeast of the interchange. I-80 is flat and at-grade at this location. Both eastbound and westbound I-80 have HOV lanes on the innermost lanes next to the median. The current design does not have enough room in the median for the 80' wide bus stop. The median is only 44' wide, so the proposed design would need to be modified to accommodate the bus station at this location. The SMART platform is located directly south on the UPRR ROW. Despite this being the closest location on the rail alignment to the proposed bus platform, the walk between the two stations is almost 2,000 feet, excluding the ramps down and up to the platforms.

As a result of the long transfer distances between the bus and rail station, this option is considered fatally flawed and will not be considered further.

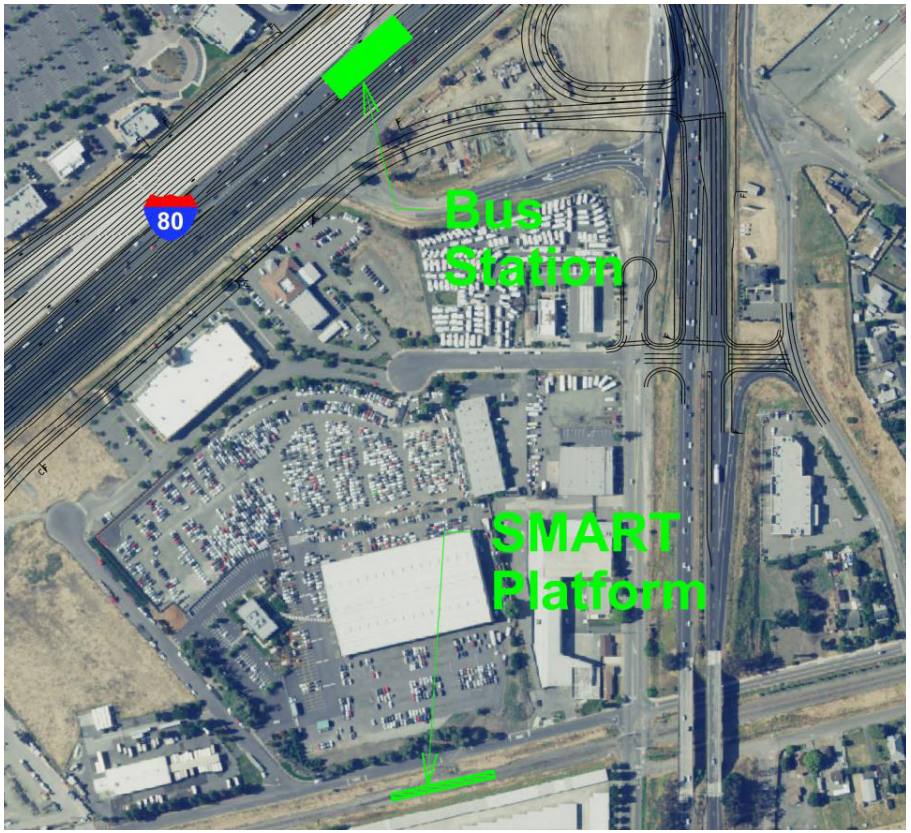


Figure 25: Option Four SMART Platform and Express Bus Station Alignments

Option 5 (purple)

Option 5 consists of two bus platforms on the Hwy 12 on- and off-ramps just east of Red Top Rd. This bus station could be used for a variety of bus movements. They are listed below:

- North platform (off-ramp)
  - Northbound I-680 to westbound Hwy 12
  - Northbound I-680 to westbound I-80
  - Highway 12 through movements
- South platform (on-ramp)
  - Eastbound I-80 to eastbound I-80
  - Eastbound Hwy 12 to eastbound I-80
  - Highway 12 through movements

Both bus platforms would be side platforms on the right side (when facing the flow of traffic) of each ramp. The typical 1200' transition length criteria does not apply to this layout, as the platforms are not on the freeway itself and speeds would be significantly lower. Since the platforms are on the side of the ramps and do not conflict with other lanes, the proposed Mark Thomas design requires minimal modification. The freeway ramps are at steep 9% grades at this location. The on-ramp is on a viaduct structure, and the off-ramp is on a tall embankment. Both platforms are up to 50' above the existing grade in the area.

The SMART platform would be located on the adjacent UP corridor. The UPRR/California Northern track is at-grade at this location. To provide a station at this location, the UPRR/California Northern trackway would be widened for the 17' wide SMART platform, plus a passing track. Vehicle parking would be located between the Hwy 12 on-ramp, Hwy 12, and Red Top Rd.

Ramps would be provided from the parking lot area and the SMART platform at-grade up to Red Top Rd on an elevated bridge structure over Hwy 12 and the train tracks. Sidewalks on Red Top Rd would connect with sidewalks on the Hwy 12 on- and off-ramps for pedestrian access to the bus ramps. Once on Red Top Rd, the walk on sidewalks to the northern platform would be about 600', and the walk to the southern platform would be about 300'.

Figure 26: Option Five SMART Platform and Express Bus Station Alignments

7. Appendix

Pros & Cons

Pros

- Access to buses on Hwy 12
- Minimal impact to proposed interchange design required
- Less vehicle traffic and lower vehicle speeds on ramps

Cons

- No access for westbound I-80 buses
- Potential environmental considerations related to bridging over the creek adjacent to the railroad right-of-way
- Steep grade on bus platforms

Conceptual Design

Underground access is not needed for the Red Top Road at Highway 12 station option. The tracks are at-grade, and Red Top is on a bridge above the tracks. Parking will be north of the tracks. SMART passengers can also deboard to the north. Hence, a ped ramp would go up from parking area to the Red Top bridge. Peds can then walk from Red Top to either platform.

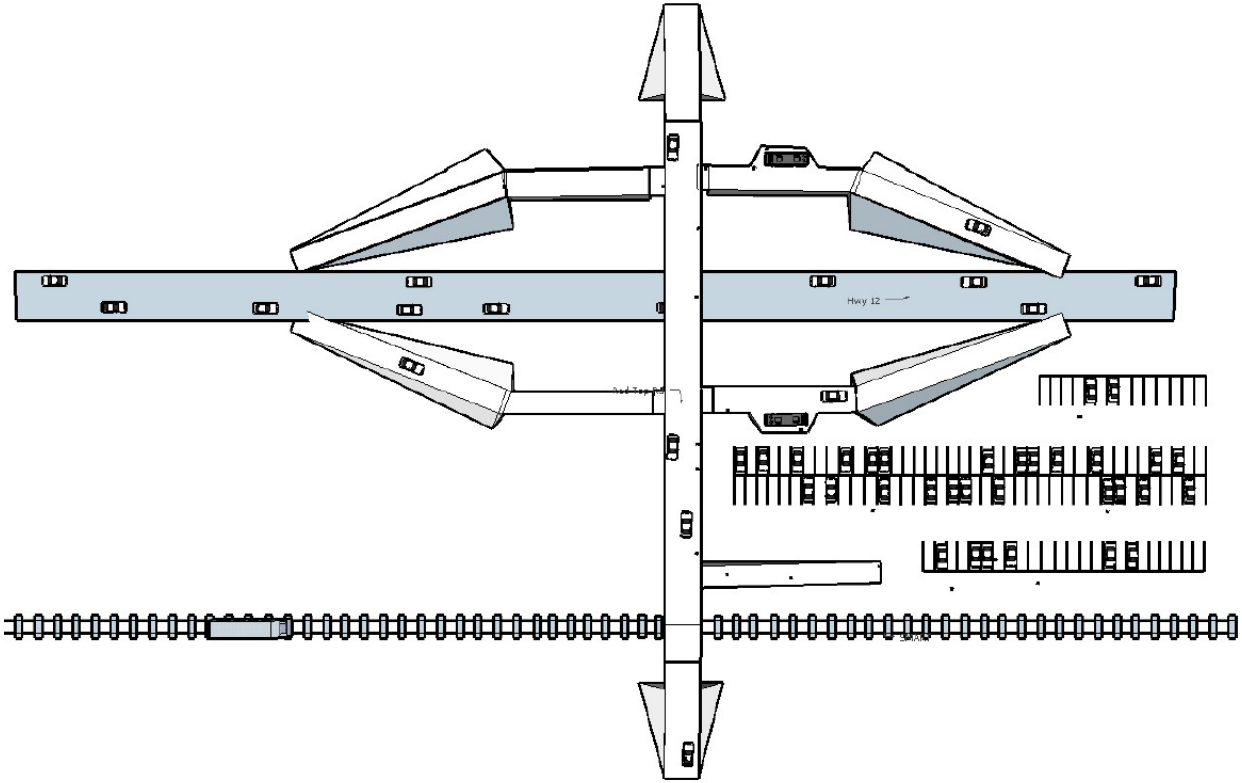


Figure 27: Option Five (Red Top Road at Highway 12) Aerial view

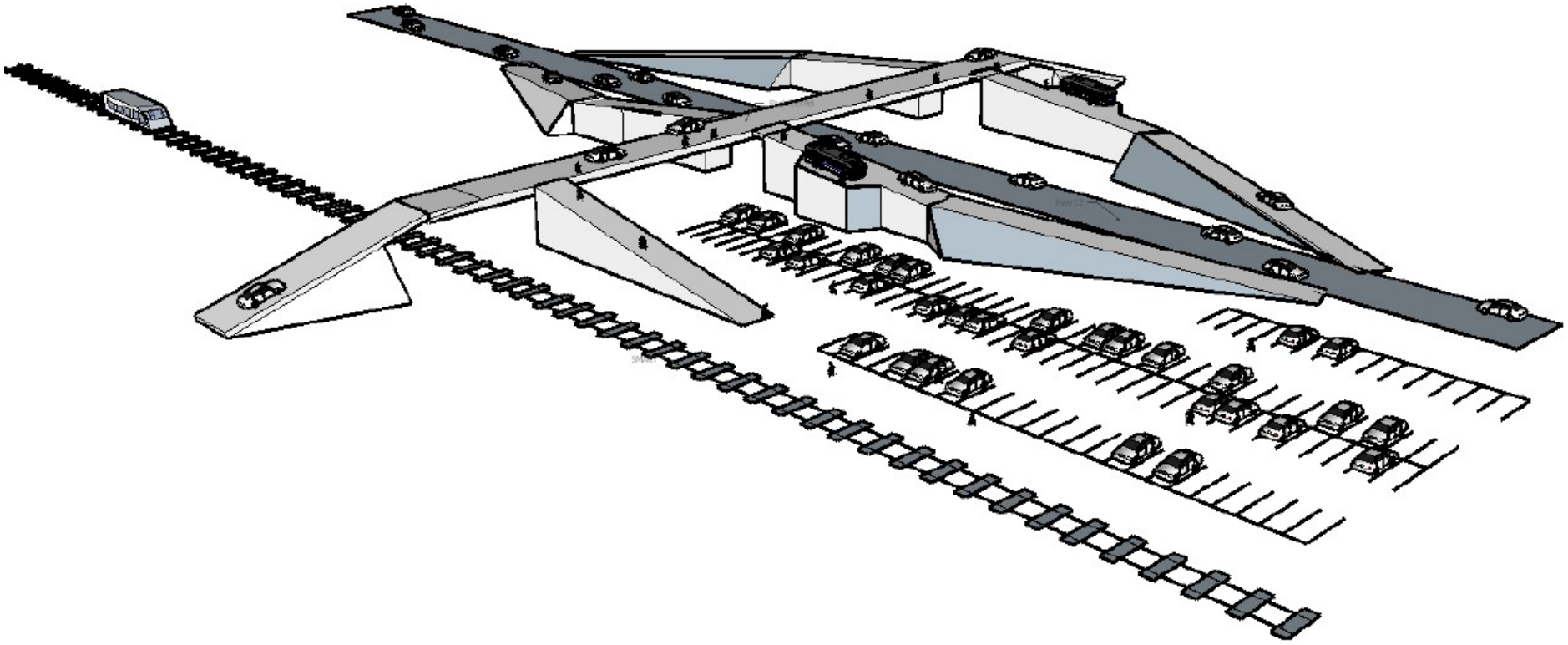


Figure 28: Option Five (Red Top Road at Highway 12) Southeast view

7. Appendix

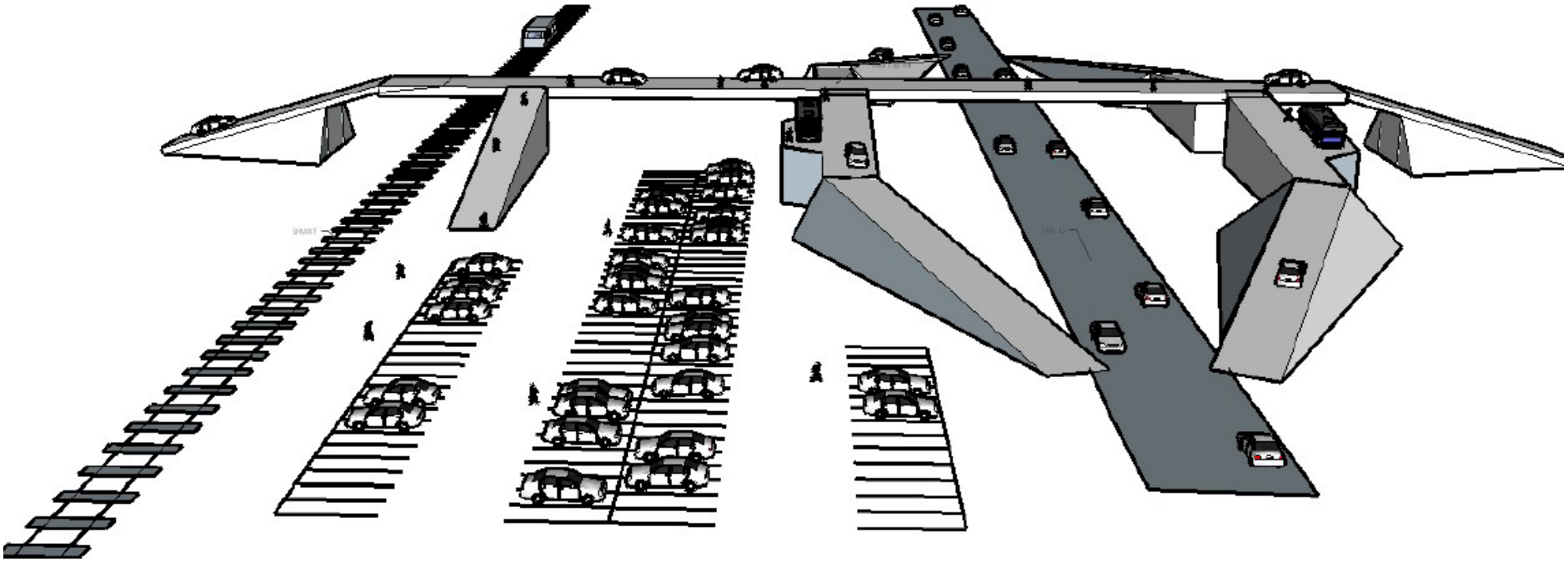


Figure 29: Option Five (Red Top Road at Highway 12) East view

Appendix D

Basis of Cost Estimate

Basis of Pricing

The cost estimate is classified as a Class 5 rough order of magnitude estimate according to Arup's estimate classification matrix (Level 5), which was developed from the Association for the Advancement of Cost Engineering (AACE) best practices.

The accuracy range of this estimate has been determined to be -30% and +50%. The accuracy range is a gauge of likely bid prices if the project was issued to tender at this current stage.

Pricing shown reflects probable construction costs obtainable for replacement works on the date of this statement of cost estimate. This estimate is a determination of fair market value for the construction of this project. It is not a prediction of low bid. Pricing assumes competitive bidding for every portion of the construction work for all subcontractors that is to mean 4 to 5 bids. If fewer bids are received, bid results can be expected to be higher.

Estimate Level	Estimate Description	Design Phase	Level of Completion	Methodology	Accuracy Range
5	Rough Order of Magnitude	Planning, Schematic Design	0% to 5%	Parametric Models, Capacity Factored, Historical Costs	L: -20% to -50% H: +30% to +100%
4	Concept Feasibility	Planning, Schematic Design	1% to 15%	Equipment Factored, Parametric Models	L: -15% to -30% H: +20% to +50%
3	Budget Authorization	Planning, Schematic Design, Design Documents	10% to 40%	Unit Costs, Assemblies	L: -10% to -20% H: +10% to +40%
2	Budget Control Estimate	Preliminary Design, Engineering, Design Documents, Construction Documents	30% to 70%	Detailed Unit Cost, Detailed Take-Off	L: -5% to -15% H: +5% to +30%
1	Bid	Detailed Design Engineering, Construction Documents	50% to 100%	Detailed Unit Cost, Detailed Take-Off, Productivities, Subcontractor Quotes	L: -2% to -5% H: +3% to +15%

Table 26: AACE International Cost Estimate Classification Matrix

7. Appendix

Assumptions

Arup prepared two independent estimates, one for Suisun-Fairfield Station, other for I680 Freeway Bus Station and other for I680 Rail Work. For I680 Freeway Bus Station, Arup is providing the cost estimate for two bus platform options: central platform and lateral platforms. The Cost Estimate is based on the key cost assumptions for each transportation project.

Below the list of the main components included in each estimate.

Suisun-Fairfield Station

- Pedestrian and bike tunnel includes: excavation, tunnel structure, interior finishes and services
- Track work, includes required track relocation, new track, turnouts and crossovers
- Capital Corridor Platforms
- Relocation of existing station building, including utilities relocation allowance
- Sinking plaza to tunnel level including: excavation, concrete, lighting and landscaping
- Parking at grade

I680 Freeway Bus Station

- Freeway bus station (either central or lateral platforms)
- Parking at grade

I680 Rail Works

- Additional track for new sidings, includes required track relocation, turnouts and crossovers

Capital Cost

The values are in US dollars from the first quarter of the year 2020.

Direct unit costs are formed by material, equipment and labor. Such costs are obtained from benchmarks from industry projects, Arup past projects and data bases such as RS Means and Caltrans.

Other Costs

Besides the Direct Construction Costs, the estimate includes the following costs as well:

- General Conditions / Indirect, which includes construction staff, site conditions and temporary power, maintenance of traffic (MOT), mobilization/demobilization, overhead and profit, and construction contingency. This cost is allocated to the contractor and corresponds to 10% of the direct costs
- A Maintenance of Traffic (MOT) allowance of 3% from the direct cost. This MOT allowance was included for the Suisun-Fairfield estimate and I680 rail estimate only.
- A mobilization and demobilization allowance of 2% from the direct cost.
- Contractor Fees allowance of 10% from the direct and indirect costs.
- Contractor's contingency is allocated as 15% from the direct and indirect costs.

Soft Costs

- A design fees allowance of 8% from the construction price is considered.
- Project Management and Construction Management fees are allocated as 5% from the construction price
- Permits, licenses and Fees are allocated as 2% of the construction price.

Owner's Contingency

Due to the level of design, Arup proposes an owner's contingency of 15% from the total soft cost and construction price.

Items excluded from the Estimate

The following items are excluded from the estimate:

- Other owner's costs, which include consultant fees, liability, surveys and site investigation fees
- Risk-based contingency analysis
- The costs or impacts of latent environmental issues that result in litigations or development delays
- Local taxes and duties
- Right of way and or land acquisition costs
- Removal and disposal of hazardous materials, unless stated in the estimate
- Pedestrian only tunnel for Suisun-Fairfield Station
- SMART track relocation and new track

Items that may affect the Estimate

The following items may affect the estimate:

- Modifications to the scope of work included in the estimate
- Restrictive technical specifications or excessive contract conditions
- Any other non-competitive projects schedule
- Additional loss of productivity
- Future market conditions

Additional items for project's next phase

A platform for SMART and an additional storage track for the Capital Corridor will be consider as part of the next phase of this project. The total project cost for these additional items is estimated to be in a range of $5M to $10M.

Scope of Work	Unit	Total Cost
Tunnel - Ped.and Bike	**LS**	**$ 44,077,700**
Structure	LS	$ 37,534,500
Interiors	LS	$ 913,200
Services	LS	$ 5,630,000
Rail	**LS**	**$ 20,642,000**
Track & Rail Accessories	LS	$ 17,292,000
Platforms	LS	$ 3,350,000
Existing Building Station	**LS**	**$ 241,000**
Relocate existing station	LS	$ 241,000
Plaza	**LS**	**$ 5,825,600**
Sinking Plaza for tunnel	LS	$ 5,825,600
Parking At Grade	**LS**	**$ 1,325,000**
Parking	LS	$ 1,325,000
Total Direct Cost	LS	$ 72,100,000
General Conditions/Indirect	%	$ 7,210,000
MOT	%	$ 2,163,000
Mobilization/Demobilization	%	$ 1,442,000
Subtotal		*$ 82,915,000*
Contractor Fees (Overhead and profit)	%	$ 8,291,500
Subtotal		*$ 91,206,500*
Contractor's Contingency	%	$ 13,680,975
Total Construction Price		**$ 104,887,000**
Design Fees	%	$ 8,390,960
PM/CM	%	$ 5,244,350
Permits, Licenses, Fees	%	$ 2,097,740
Total Construction Price + Soft Costs		**$ 120,620,000**
Owner's Contingency	%	$ 18,093,000
TOTAL PROJECT PRICE		**$ 138,713,000**
Expected Low Range - Estimate Level 5	-30%	$ 97,099,100
Expected High Range - Estimate Level 5	50%	$ 208,069,500

Table 27: Suisun-Fairfield Rail Station Cost Estimate Details

7. Appendix

Scope of Work	Unit	Total Cost
Bus Station at Highway	**LS**	**$ 29,070,000**
Platforms	**LS**	**$ 28,000,000**
Parking At Grade	**LS**	**$ 1,070,000**
Total Direct Cost	**LS**	**$ 29,100,000**
General Conditions/Indirect	%	$ 2,910,000
Mobilization/Demobilization	%	$ 582,000
Subtotal		*$ 32,592,000*
Contractor Fees (Overhead and profit)	%	$ 3,259,200
Subtotal		*$ 35,851,200*
Contractor's Contingency	%	$ 5,377,680
Total Construction Price		**$ 41,229,000**
Design Fees	%	$ 3,298,320
PM/CM	%	$ 2,061,450
Permits, Licenses, Fees	%	$ 824,580
Total Construction Price + Soft Costs		**$ 47,413,000**
Owner's Contingency	%	$ 7,111,950
TOTAL PROJECT PRICE		**$ 54,525,000**
Expected Low Range - Estimate Level 5	-30%	$ 38,167,500
Expected High Range - Estimate Level 5	50%	$ 81,787,500

Table 28: Suisun-Fairfield Bus Station Cost Estimate Details

Scope of Work	Unit	Total Cost
Bus Station at Highway	**LS**	**$ 34,070,000**
Platforms	**LS**	**$ 33,000,000**
Parking At Grade	**LS**	**$ 1,070,000**
Total Direct Cost	**LS**	**$ 34,100,000**
General Conditions/Indirect	%	$ 3,410,000
Mobilization/Demobilization	%	$ 682,000
Subtotal		*$ 38,192,000*
Contractor Fees (Overhead and profit)	%	$ 3,819,200
Subtotal		*$ 42,011,200*
Contractor's Contingency	%	$ 6,301,680
Total Construction Price		**$ 48,313,000**
Design Fees	%	$ 3,865,040
PM/CM	%	$ 2,415,650
Permits, Licenses, Fees	%	$ 966,260
Total Construction Price + Soft Costs		**$ 55,560,000**
Owner's Contingency	%	$ 8,334,000
TOTAL PROJECT PRICE		**$ 63,894,000**
Expected Low Range - Estimate Level 5	-30%	$ 44,725,800
Expected High Range - Estimate Level 5	50%	$ 95,841,000

Table 29: I-680 Lateral Platform Bus Station Cost Estimate Details

Scope of Work	Unit	Total Cost
Rail	**LS**	**$ 4,450,841**
Track and rail accessories	**LS**	**$ 4,450,841**
Total Direct Cost	**LS**	**$ 4,500,000**
General Conditions/Indirect	%	$ 450,000
MOT	%	$ 135,000
Mobilization/Demobilization	%	$ 90,000
Subtotal		*$ 5,175,000*
Contractor Fees (Overhead and profit)	%	$ 517,500
Subtotal		*$ 5,692,500*
Contractor's Contingency	%	$ 853,875
Total Construction Price		**$ 6,546,000**
Design Fees	%	$ 523,680
PM/CM	%	$ 327,300
Permits, Licenses, Fees	%	$ 130,920
Total Construction Price + Soft Costs		**$ 7,528,000**
Owner's Contingency	%	$ 1,129,200
TOTAL PROJECT PRICE		**$ 8,657,000**
Expected Low Range - Estimate Level 5	-30%	$ 6,059,900
Expected High Range - Estimate Level 5	50%	$ 12,985,500

Table 30: I-680 Rail Station Cost Estimate Details

Unit Cost		
Activity	**Unit**	**Unit Cost**
Pavement Demolition	SF	$ 5
Utility Relocation	AL	$ 1
Excavation	CY	$ 250
CLSM backfill	CY	$ 200
Braced sheet pile	SF	$ 80
Shoring props (24in. diam. X 1in. thick)	LF	$ 100
Concrete	CY	$ 2,000
Reinforcement	LBS	$ 6
Paint tunnel walls	SF	$ 4
Tunnel Flooring Acrylic Sealer	SF	$ 1
Ceiling finish for slab	SF	$ 2
Waterproofing	SF	$ 20
Dewatering	AL	$ 300,000
Moving existing station	SF	$ 40
Utilities reconnection	AL	$ 25,000
Compaction	SF	$ 2
Concrete for plaza	SF	$ 40
Ramp	SF	$ 410
Stairs	CY	$ 1,300
Relocate Existing Tracks (Double Track)	TF	$ 1,060
Relocate Existing Tracks (Single Track)	TF	$ 456
New Track	TF	$ 2,570
Turnouts (No. 10)	EA	$ 150,000
Turnouts (No. 20)	EA	$ 410,000
Additional Storage Track	TF	$ 2,570
Double Crossover (No. 10)	EA	$ 750,000
Parking	Space	$ 5,000
Retaining wall	SF	$ 75
Rail Platform	CY	$ 1,250
Landscaping	AL	$ 60,000
Lighting	AL	$ 80,000
Bus Central Platform Station	EA	$ 28,000,000
Bus Lateral Platforms Station	EA	$ 33,000,000
New Track		
Earthwork	mile	1,100,000
Track	mile	2,000,000
Ballast	cy	50
single ballasted track - relocate	mile	2,409,759
Double ballasted track - relocate	mile	5,598,842

Table 31: Unit Cost Schedule

7. Appendix

Appendix E

Big Data

Detailed travel findings to and from Solano County

	To/From Solano	Percent Peak Period/ Direction	Solano to Region Share
Marin/Sonoma	**22,800**		
SMART Adjacent	*82%*		
Novato	22.4%		
San Rafael	24.8%		
Petaluma	14.6%		
Santa Rosa	20.0%	**46%**	**9%**
Other North Bay			
West San Marin	2.8%		
Fairfax-San Anselmo	4.5%		
Mill Valley	9.8%		
NW Marin	1.1%		
Napa	**27,000**	**40%**	**11%**

Table 32: Travel from Solano County to Other Counties by Solano Residents

	To/From Solano	Percent Peak Period/ Direction	Solano to Region Share
East Bay - Bay	**62,000**	**42%**	**25%**
Richmond	45.5%		
Berkeley	17.5%		
Oakland	36.9%		
East Bay - Central CCC	**56,000**	**45%**	**23%**
Walnut Creek	21.2%		
Pleasant Hill	25.5%		
Concord	53.3%		
East Bay- S. of Oakland	**7,400**	**36%**	**3%**
Peninsula	**10,900**	**28%**	**4%**
Burlingame	8.8%		
South SF	48.1%		
San Bruno/SFO	35.9%		
San Mateo/San Carlos	7.2%		

	To/From Solano	Percent Peak Period/ Direction	Solano to Region Share
San Francisco	**25,000**	**38%**	**10%**
Davis	**11,700**	**51%**	**5%**
Sacramento	**23,600**	**36%**	**10%**
Downtown Sac	26.5%		
West Sac	7.9%		
North & East Sac	34.1%		
South Sac	30.1%		
Roseville	1.3%		
TOTAL	**246,400**		

7. Appendix

	To Solano/ From	Percent Peak Period/ Direction	Solano to Region Share
Marin/Sonoma	**11,600**	**34%**	**8%**
SMART Adjacent	*74%*		
Novato	19%		
San Rafael	13%		
Petaluma	15%		
Santa Rosa	26%		
Other North Bay			
Tiburon	4%		
Fairfax-San Anselmo	3%		
Mill Valley	4%		
West Marin	1%		
Sonoma	13%		

	To Solano/ From	Percent Peak Period/ Direction	Solano to Region Share
Napa	**16,400**	**50%**	**11%**
East Bay - Bay	**24,600**	**41%**	**17%**
Richmond	59%		
Berkeley	10%		
Oakland	31%		
East Bay - Central CCC	**18,200**	**48%**	**12%**
Walnut Creek	16%		
Pleasant Hill	23%		
Concord	61%		
East Bay - S. of Oakland	**4,000**	**38%**	**3%**
Yolo	**30,300**	**49%**	**20%**
Davis	31%		
Woodland	28%		
Other Yolo	41%		

Table 33: Travel from Other Counties to Solano County by Non-Solano Residents

	To Solano/ From	Percent Peak Period/ Direction	Solano to Region Share
San Francisco	**7,200**	**28%**	**5%**
Peninsula	**3,300**		
Burlingame	8%		
South SF	18%	**32%**	**2%**
San Bruno/SFO	54%		
San Mateo/San Carlos	19%		
Sacramento	**32,500**		
Downtown Sac	10%		
West Sac	5%		
North & East Sac	51%	**54%**	**22%**
South Sac	32%		
Elk Grove	2%		
TOTAL	**148,100**		