Chapter 3 Affected Environment; Environmental Consequences; and Avoidance, Minimization, and/or Mitigation Measures

The sections in Chapter 3 include the regulatory setting applicable to the environmental topic, the methodology of impact analysis, a description of the affected environment, environmental effects resulting from the build and no build alternatives, a discussion of environmental effects, and measures to avoid, minimize, or mitigate adverse impacts of the build alternatives. graphic exhibits, and data matrices are included throughout Chapter 3 where applicable to support the impact analyses.

This chapter presents the analyses of environmental effects and the measures developed to address them. The resource areas listed below are addressed in this chapter.

- Human Environment:
  - Land Use (except Coastal Zone and Wild and Scenic Rivers).
  - Growth.
  - Farmlands.
  - Community Impacts.
  - Utilities and Emergency Services.
  - Traffic and Transportation/Pedestrian and Bicycle Facilities.
  - Visual and Aesthetic Resources.
  - Cultural Resources.
- Physical Environment:
  - Hydrology and Floodplain.
  - Water Quality and Stormwater Runoff.
  - Geology/Soils/Seismic/Topography.
  - Paleontology.
  - Hazardous Waste/Materials.
  - Air Quality.
  - Noise.
  - Energy.
- Biological Environment:
  - Natural Communities.

  - Wetlands and Other Waters.
  - Plant Species.
  - Animal Species.
  - Threatened and Endangered Species.
  - Invasive Species.
  - Native Trees.
  - Suisun Marsh Secondary Management Area.
- Relationship between Local Short-Term Uses of the Human Environment and the Maintenance of Long-Term Productivity.
- Irreversible and Irretrievable Commitments of Resources.
- Cumulative Impacts.

As part of the scoping and environmental analysis conducted for the project, the following environmental issues were considered but no adverse impacts were identified. Consequently, there is no further discussion regarding these issues in this document.

- Timberlands. There are no Timberlands in the project area.
- Coastal Zone (within Land Use). The project area is not within a Coastal Zone.
- Wild and Scenic Rivers (within Land Use). The proposed project does not have the potential to affect a Wild and Scenic River or a river under study for designation as a Wild and Scenic River.

3.1 Human Environment

3.1.1 Land Use

The *I-80/I-680/SR 12 Interchange Community Impact Assessment* (CIA) was prepared for the project in 2009, and this discussion is based largely upon that document.

3.1.1.1 Existing and Future Land Use

The I-80/I-680/SR 12 interchange was originally constructed during the 1960s. At the time, the interchange was located in a rural setting and surrounded entirely by agricultural lands. The Bay Area and Northern California region have since experienced substantial population growth; the Bay Area's population has grown by 86% since the interchange's original construction, and the population of Solano County has tripled. Over time, I-80 and I-680 have become major commute corridors linking Solano County and the Sacramento region beyond to the San Francisco Bay area. Solano County, including the Cities of Fairfield and Suisun City, contributes substantial numbers of commuters to traffic on I-80, I-680, and SR 12.

The population growth in Northern California, the Bay Area and surrounding communities has made the I-80/I-680/SR 12 interchange one of the most congested stretches of roadway in the state. Additionally, population growth in the City of Fairfield has caused extensive changes in the land uses surrounding the interchange area over the past several decades. The general land uses along the proposed project area are discussed below by segment.

Land Use

In order to characterize the setting which the project would unfold, a study area was established that represents a much larger area than the project area. Statistical information for Solano County, the Cities of Fairfield and Suisun City, and nine 2000 Census Tract Block Group areas in which the project is situated is used to describe the study area.

Western Segment

The Western Segment begins just east of Red Top Road and ends at the I-80/Suisun Valley Road interchanged. Land uses at the western end of this segment consist primarily of grazing lands. Areas of current development (gas stations, fast food) are located at the I-80/Red Top Road interchange. Industrial (a dairy distribution facility) and rural residential uses are located between I-80 and SR 12W and to the north of SR 12W.

As I-80 and SR 12W converge, land uses change dramatically. To the northeast of this intersection is a major retail shopping and commercial center that includes a Costco, Safeway, and other regional retailers. To the south, the predominant land use is industrial with many warehouses and distribution businesses. Land uses to the east include residential and retail uses in the town of Cordelia. Commercial uses such as gas stations, car dealerships, and smaller retail outlets are located in areas immediately visible from the I-80 and I-680 freeways.

Along I-680, land uses to the west are dominated by residential subdivisions with commercial and retail uses located at major intersections. Rodriguez High School occupies a large amount of land along the north side of Red Top Road, west of its intersection with I-680. In general, lands south of Cordelia Road and east of I-680 are within the Suisun Marsh and support agriculture and open space uses.

Land uses along I-80 between I-680 and Suisun Valley Road are characterized by a large commercial/office park to the north and smaller retail/highway commercial uses to the south, including many gas stations and fast food outlets centered around the I-80/Suisun Valley Road interchange.

Central Segment

The Central Segment begins at the I-80/Suisun Valley Road interchange and ends at the Abernathy/Chadbourne Road interchange. Along I-80 from Suisun Valley Road to SR 12E, land uses on the north side between Suisun Valley Road and Suisun Creek include the currently vacant lands that are now under development for the mixed-use Fairfield Corporate Commons Project and the existing westbound truck scales facility. East of Suisun Creek, land uses are primarily agricultural with scattered residential and commercial uses (farm equipment sales). Land uses on the south side of I-80 include the freeway commercial (hotels and RV sales) and retail (fast food outlets and gas stations) uses located immediately east of the I-80/Suisun Valley Road interchange. Further east, land uses are agricultural with scattered residential uses and the eastbound truck scales facility (which is planned to be relocated to the east as part of a separate project). At the eastern end of this segment, land uses include a large industrial use (Budweiser brewery) that extends along SR 12E.

Eastern Segment

The Eastern Segment begins at the Abernathy/Chadbourne Road interchange and ends on Civic Center Boulevard in downtown Suisun City. Land uses along the north side of SR 12E include commercial uses focused along Chadbourne Road, such as several large auto dealerships. Farther east, land uses are dominated by residential neighborhoods with scattered commercial/retail uses along Beck and Pennsylvania Avenues. Land uses along the south side of SR 12E include industrial warehouse and distribution centers located off Beck and Pennsylvania Avenues. Further east of Pennsylvania Avenue to Suisun City, the predominant land use to the north is residential while to the south is predominately undeveloped land designated for general industrial development.[1] Suisun City is separated from Fairfield by the Union Pacific Railroad (UPRR) alignment and SR 12E. The only currently operational passenger rail terminal in Solano County is located in Suisun City and is directly north of the proposed eastern terminus of the proposed project at West Road. The portions of the study area within Suisun City are devoted to residential and commercial uses east of the UPRR tracks and undeveloped land west of the UPRR tracks.

Development Trends

Solano County and Fairfield have experienced substantial growth in population over the past several decades. Suisun City, while experiencing a brief decline in population following the construction of I-80 in the 1960s, has also demonstrated a general trend toward increased

[1] Solano County, 2008 General Plan Land Use Diagram (http://solanocountygeneralplan.net/GP%20Documents/12-15-08/X06264476_04_067_FigureLU-1_Land_use_diagram.pdf).

population growth. The population in all three jurisdictions is expected to continue growing, with substantial future growth centered on Fairfield and, to a lesser extent, Suisun City. Effects of the proposed project on growth are discussed in Section 3.1.2, "Growth."

Solano County

As an agricultural county, Solano County typically channels large development projects into its cities, and limits development in its unincorporated areas to small residential subdivisions. According to the CIA prepared for the proposed project, there are currently no proposed development projects on unincorporated land within the immediate project area. Future urban growth identified in the Solano County General Plan, such as the area adjoining Nelson Hill, will be allowed only upon annexation to the appropriate city.

City of Fairfield

Table 3.1.1-1 shows current and planned development projects in the city of Fairfield. The predominant type of development currently taking place in Fairfield is residential, with more than 8,000 residential units currently under development or planned for development. In addition, several commercial and office development projects are also planned or currently under development. Planning is also underway for a new train station in northeast Fairfield, providing service to the residents of Fairfield and neighboring Vacaville on the Amtrak Capitol Corridor commuter line between Sacramento and Oakland.

Table 3.1.1-1. Current and Planned Development Projects as of April 2009—City of Fairfield

Name of Project	Project Status	Project Location	Type of Project
Hillside Terrace	Completed	North Texas Street and Dickson Hill Road	Community Commercial/Retail—33,035 square feet
Oakmont Plaza Phase II	Completed	North Texas Street and Acacia Street	Thoroughfare Commercial Retail—35,000 square feet
Del Taco Retail	Completed	Pittman Road and Central Way	Regional Commercial/Retail—9,875 square feet
Staples	Under construction	Oliver Road and Hartford Avenue	Regional Commercial/Retail—25,000 square feet
Residence Inn	Plan check (Building Division)	Holiday Lane and Travis Boulevard	Regional Commercial/Hotel—70,000 square feet
Fresh-N-Easy	Tenant improvements largely completed; project is delayed	Beck Avenue and West Texas Street	Community Commercial/Grocery—20,000 square feet
Orchard Supply	Tenant improvements approved and underway	Travis Boulevard and North Texas Street	Community Commercial/Home Store—20,000 square feet
Wal Mart	Approved	North Texas Street and Air Base Parkway	Community Commercial/Retail—187,480-square-foot building, 15,130-square-foot seasonal garden center, 1,103-square-foot parking spaces
Ortega Meat Market	Approved; in plan check	Travis Boulevard and North Texas Street	Mixed Commercial/Retail—2,400 square feet

Name of Project	Project Status	Project Location	Type of Project
Green Valley Ranch	Project approved for approximately 115,000-square-foot retail center and hotel; 40,000-square-foot hotel already completed and occupied; Dave Reilly received approval for 6,800-square-foot retail building	Central Way and Pittman Road	Regional Commercial/Retail—75,000 square feet
Laurel Creek Plaza	Approved; currently planning for infrastructure improvements to accompany the Villages at Fairfield project	Air Base Parkway and Claybank Road	Community Commercial/Retail—110,186 square feet
Green Valley Corporate Park Retail	Approved	Business Center Drive and Neitzel Road	Regional Commercial/Retail—8,450 square feet
Saturn	Approved	Auto Mall Court	Regional Commercial/Auto Dealer—24,160 square feet
Texas Corners	Approved	North Texas Street and West Texas Street	Thoroughfare Commercial/Retail—5,994 square feet
Texas Roadhouse	Approved	North Texas Street and Marigold Drive	Regional Commercial—7,200 square feet
Mercedes Benz	Approved	Auto Mall Parkway and Abernathy Road	Regional Commercial—Auto Dealer—77,-914 square feet
Premium Auto Mall	Application under review	Auto Plaza Court	Regional Commercial—10,000 +/- square feet
Sparkles Express Car Wash	Application under review	North Texas Street and Marigold Drive	Regional Commercial—3,000 square feet
KFC/Long John Silvers	Application under review	North Texas Street and Pacific Avenue	Thoroughfare Commercial/Retail—3,000 square feet
COSTCO Expansion	Submitted, but on hold	Business Center Parkway and Business Center Drive	Regional Commercial/Retail—22,168 square feet
Green Valley Plaza	Application incomplete	Suisun Valley Road and Rockville Road	Regional Commercial—455,000 square feet
Fairfield Corporate Commons	Under construction	Suisun Valley Road and Mangels Boulevard	Mixed-Use Office and Commercial—72 acres, parcel sizes range from 1.4 acres to 47 acres 846,000 sf of office and hotel use, 269 multi-family housing units, 167 single-family housing units Four office buildings at four stories each: Building 1: 73,000 square feet of office space; Building 2: 110,000 square feet of office space; Building 3: 130,000 square feet of office space; Building 4: 59,000 square feet of office space
Pony Express Business Park	Construction complete; space available	West America Drive and Mason Street	Office Commercial—45,660 square feet
Horizon Business Park	Under construction	Horizon Drive and Western Street	Service Commercial/Flex Space—62,179 square feet

Name of Project	Project Status	Project Location	Type of Project
Northbay Healthcare Corporate Headquarters	Under construction	Business Center Drive and Neitzel Road	Office Commercial/Headquarters—69,000 square feet
Western Business Center II	Under construction	Horizon Drive and Western Street	Service Commercial/Flex Space—29,600 square feet
Busch Campus Park (CDI)	Plan check (Building Division)	Chadbourne Road and Courage Drive	Office Commercial/Office—12,000 square feet
Sierra Pacific Cordelia	Plan check (Building Division)	Fermi Drive and Pascal Court	Limited Industrial/Flex Space—115,350 square feet
Buntain Phase IV	Approved; awaiting Plan check submittals	Courage Drive	Limited Industrial/Industrial—74,440 square feet
Diamond Services	Approved; time extension April 2007	Commerce Court and Central Road	Service Commercial/Truck Rental—13,200 square feet
Meyer Expansion	Approved	2000 Meyer Way	Limited Industrial/Warehouse—363,400 square feet
Penske Truck Rental	Approved	Pennsylvania Avenue and Illinois Street	Service Commercial/Truck Rental—13,200 square feet
Rinker Materials	Approved	Huntington Drive and Crocker Circle	General Industrial/Heavy Industrial—22,500 square feet
Green Valley Corporate Park Professional Building III	Approved	Business Center Drive and Neitzel Road	Industrial and Business Park—9,800 square feet
Green Valley Corporate Park Professional Building IV	Approved	Business Center Drive and Neitzel Road	Industrial and Business Park—9,800 square feet
Verizon MSC	Approved	North Watney Way and Courage Drive	Limited Industrial/Data Center—49.235 square feet
Amir Watney	Approved	South Watney Way and Courage Drive	Limited Industrial/Flex Space—50,677 square feet
NOI Industrial	Approved	Industrial Drive and Dobe Lane	Limited Industrial—42,000 square feet
Lincoln Cordelia Road	Under review	Cordelia Road and Chadbourne Road	Limited Industrial/Flex Space—177,000 square feet
Bella Vita (Cordelia Heights)	Approved	587 Via de Bella	Total units—25 Permits Issued—23 Permits Remaining—2
East Tabor Townhomes	Approved	855 E Tabor Avenue	Attached or multi-family housing units with single-story house plans Total Units—94 Permits Issued—0 Permits Remaining—94
Eastridge	Approved	902 Eastridge Drive	Single-story house plans Total Units—217 Permits Issued—155 Permits Remaining—62
Fieldcrest	Approved	Southwest of Red Top Road/Oakbrook Drive intersection	Single-story house plans Total Units—394 Permits Issued—0 Permits Remaining—394
Garibaldi Ranch	Approved	Far south side of the city Between Lopes and Gold Hill Road	Single-story house plans Total Units—673 Permits Issued—0 Permits Remaining—673

Name of Project	Project Status	Project Location	Type of Project
Goldridge	Approved	Southeast of Joseph Gerevas Drive/Peabody Road intersection	Single-story house plans Total Units—1458 Permits Issued—864 Permits Remaining—594
Green Valley Lake	Approved	5100 Lake Shore Road	Single-story house plans Total Units—475 Permits Issued—472 Permits Remaining—3
Hidden Meadows	Approved	North side of the city along Mangles Boulevard	Single-story house plans: 157 homes plus 53 second dwellings Total Units—210 Permits Issued—196 Permits Remaining—14
Hidden Oaks	Approved	West side of Suisun Valley Road 100 yards north of West America Drive	Attached or multi-family housing units Total Units—55 Permits Issued—0 Permits Remaining—55
Ivy Wreath	Approved	Eastern end of East Tabor Avenue near Walters Road	Medium-density single-family detached housing with lots below 4,500 square feet in area Total Units—73 Permits Issued—0 Permits Remaining—73
Madison Square	Approved	2728 Midtown Lane	Medium-density single-family detached housing with lots below 4,500 square feet in area with attached or multi-family housing units Total Units—221 Permits Issued—27 Permits Remaining—194
Paradise Valley: The Masters Collection	Approved	North of Dover Road/Foothill Parkway intersection; Paradise Valley Golf Course	Single-story house plans Total Units—164 Permits Issued—129 Permits Remaining—35
Paradise Valley: Paradise Valley Townhomes	Approved	North of Dover Road/Foothill Parkway intersection; Paradise Valley Golf Course	Attached or multi-family housing units Total Units—220 Permits Issued—0 Permits Remaining—220
Brush Creek	Approved	4405 Avondale Circle; Paradise Valley Golf Course	Single-story house plans Total Units—150 Permits Issued—1 Permits Remaining—149
Paradise Crest	Approved	Manuel Campos Parkway/Mystic Drive intersection; Paradise Valley Golf Course	Single-story house plans Total Units—334 Permits Issued—108 Permits Remaining—226
Rancho Solano Phase III	Approved	3250 Rancho Solano Parkway; Rancho Solano Golf Course	Single-story house plans Total Units—217 Permits Issued—170 Permits Remaining—47
River Oaks	Approved	East of Pittman Road/Link Road intersection	Medium-density single-family detached housing with lots below 4,500 square feet in area with attached or multi-family housing units Total Units—28 Permits Issued—7 Permits Remaining—21

Name of Project	Project Status	Project Location	Type of Project
Southbrook	Approved	West of I-680/Smith Drive undercrossing	Single-story house plans Total Units—1,355 Permits Issued—1,340 Permits Remaining—15
Strawberry Fields	Approved	Southwest corner of east Tabor Avenue and Walters Road	Medium-density single-family detached housing with lots below 4,500 square feet in area with attached or multi-family housing units Total Units—39 Permits Issued—0 Permits Remaining—39
Turnstone	Approved	4587 Turnstone Way	Medium-density single-family detached housing with lots below 4,500 square feet in area with attached or multi-family housing units Total Units—136 Permits Issued—106 Permits Remaining—30
Villages at Fairfield	Approved	North of Air Base Parkway, between Clay Bank Road and Peabody Road	Single-family projects with single-story house plans Total Units—611 Permits Issued—0 Permits Remaining—611 Medium-density residential with attached or multi-family housing units and lots below 4,500 square feet in area Total Units—872 Permits Issued—0 Permits Remaining—872 Apartments with attached or multi-family housing units Total Units—923 Permits Issued—0 Permits Remaining—923
Shaded Boxes	= Current or Planned Projects located within or in close proximity to the I-80/I-680/SR 12 Interchange project study area.		

Source: City of Fairfield Planning Commission 2008; I80/I-680/SR 12 Community Impact Assessment

Suisun City

Table 3.1.1-2 describes the current and planned development projects in Suisun City. Several projects are focused on revitalizing the downtown area of Suisun City and other projects involve residential, mixed-use, and commercial development in areas outside Suisun City limits but within the city's sphere of influence and proposed for incorporation into the city.

Table 3.1.1-2. Current and Planned Development Projects as of April 2009—Suisun City

Name of Project	Project Status	Project Location	Type of Project
Suisun-Gentry Development	In planning	SR 12 and Pennsylvania Avenue[a]	Mixed-use—retail/commercial/residential Retail/commercial area (regional power center, general merchandise stores, small shops, home improvement center, service providers)—71.3 acres Residential area (medium to high density, small lot single-family attached and/or detached townhomes and condominiums)—17.1 acres
Four Seasons RV, Boat and Self Storage	Under construction	1600 Peterson Road	Open and covered RV and boat storage, plus enclosed self-storage units with office and on-site caretaker's residence on 4.76-acre parcel
Bank of America Kiosk	Under construction	Sunset Avenue and Highway 12	Walk-up ATM kiosk in Sunset Shopping Center
Rick's Auto Spa	Under construction	Anderson Drive and McCoy Creek Way	Three-bay full-service car wash center with detached 1,975-square-foot two-unit retail building
Hampton Inn & Suites	Under construction	Harbor Center and Lotz Way	Four-story 63,412-square-foot hotel with 102 suites, conference room, indoor swimming pool, and a number of other amenities
McCoy Creek	Building permit for office is ready to issue, mixed-use units are under construction	South side of Highway 12—between McCoy Creek Way and Suisun Marsh, and between Grizzly Island Road and Crescent Elementary School	Office building—6,818-square-foot, four-unit, one-story building with potential 2,234-square-foot mezzanine area Residential area—19 units Live-work units—ten units are single-family homes with additional commercial/business area; five units include an apartment Work/retail portion: five units with 533-square-foot business area plus additional 732-square-foot apartment above; five units with 693-square-foot business area with no additional apartment
Dollar Tree	Building permit ready to issue	Corner of Highway 12 and Sunset Avenue	10,944-square-foot tenant improvement
Washington Mutual Drive-Thru ATM	In plan review	Corner of Sunset Avenue and Merganser Drive	New drive-through ATM
Travis Credit Union	Awaiting construction drawings	SR 12 and Sunset Avenue	2,100-square-foot tenant improvement for new branch office
Main Street West Development: Parcels 1 & 2	Under construction	Southeast corner of Main Street and Solano Street	Two-story 34,456-square-foot commercial building: first floor 17,956 square feet of retail sales possibly including a restaurant; second floor 16,500 square feet of office space. Building configuration would be U-shaped, creating a public courtyard to the south, which would contain an open fireplace/firepit feature
Main Street West Development: Parcel 3	In plan review	Northeast corner of Main Street and Solano Street	Two-story 10,579-square-foot commercial or mixed-use building: first floor 5,437 square feet of retail sales possibly including a restaurant; second floor 5,142 square feet of office space or residential units
Main Street West Development: Parcel 7	In plan review	Solano Street and Suisun Street	Two-story 7,626-square-foot restaurant and banquet room overlooking the marina and Harbor Plaza: Ground floor restaurant 4,060 square feet; upstairs banquet room 3,616 square feet.
Almond Tree Storage	Awaiting construction drawings	West of Olive Avenue, between East Tabor Avenue and Railroad Avenue[b]	59,050-square-foot expansion of existing self-storage complex that includes five new buildings and extension of one existing building
Walters Road West Development	Awaiting construction drawings	Highway 12 and Walters Road	175,000-square-foot Wal-Mart Supercenter, plus restaurant, garden center, and service station with market and car wash on 20.86 acres

Name of Project	Project Status	Project Location	Type of Project
Peterson Ranch	Under construction	Between East Tabor Avenue and Bella Vista Drive	546 detached single-family homes
Main Street West: Parcel 10	Awaiting construction drawings	North of Lotz Way, between Civic Center Boulevard and Port Way/Alder Street	16 detached single-family homes
Courtyards at Sunset/ Summerwood	Construction temporarily suspended due to market	North of Railroad Avenue and west of Sunset Avenue	69 detached courtyard-style single-family units; 30 units have been built

Source: I80/I-680/SR 12 Community Impact Assessment.
Note: Shaded boxes indicate projects that occur within or in close proximity to the eastern project area.
[a] Within the project area.
[b] This project would include the rerouting of the eastern portion of Railroad Avenue, which would connect directly to Olive Avenue. This is phase one of the Railroad Avenue Reroute Project.

3.1.1.2 Consistency with State, Regional, and Local Plans and Programs

Suisun Marsh Protection Act

In 1974, the California Legislature passed the Suisun Marsh Protection Act (Public Resources Code Section 29000 et seq.), designed to preserve Suisun Marsh from residential, commercial, and industrial development. The Act directs the Bay Conservation and Development Commission and the California Department of Fish and Game (DFG) to prepare a protection plan for Suisun Marsh "to preserve the integrity and assure continued wildlife use" of the marsh. The objectives of the protection plan are to preserve and enhance the quality and diversity of the Suisun Marsh's aquatic and wildlife habitats and to ensure retention of upland areas adjacent to the marsh in uses compatible with its protection.

Under the Suisun Marsh Protection Act, Solano County and other agencies having jurisdiction within the Suisun Marsh were required to bring their policies, regulations, programs, and operating procedures into conformity with the provision of the Suisun Marsh Protection Act and the Suisun Marsh Protection Plan through the preparation of a Local Protection Program. Solano County's component of the Local Protection Program includes General Plan policies and other policies, programs, and regulations to preserve and enhance the wildlife habitat of the Suisun Marsh and to assure retention of upland areas adjacent to the marsh in uses compatible with its protection. The Solano County General Plan policies are discussed below.

Alternative B, Alternative C, and Alternative C, Phase 1 would encroach on portions of the Suisun Marsh Secondary Management Area[2] which are privately owned. Construction would involve installation of culverts and placement of fill for construction of the Red Top Road/I-680 interchange and realignment of Ramsey Road, resulting in direct disturbance of jurisdictional seasonal drainages in the Suisun Marsh secondary management area. Construction in this area will additionally remove nonnative annual grassland within the secondary management area. These activities would be subject to issuance of a Marsh Development Permit by the San Francisco Bay Conservation and Development Commission (BCDC). All conditions that are

[2] "Secondary management area" means the upland grasslands, cultivated lands, and low-lying areas adjacent to the primary management area as shown on the Suisun Marsh Protection Plan Map. Suisun Marsh Protection Plan, December 1976.

attached to the permit will be implemented as part of the proposed project and included in the Environmental Commitments Record (ECR) for the project (see Appendix I). The conditions will be clearly identified in the construction plans and specifications and monitored during and after construction to ensure compliance. With issuance of that permit, the alternative would be consistent with the General Plan, as well as the Suisun Marsh Protection Act.

Farmland Mapping and Monitoring Program

The California Department of Conservation's Farmland Mapping and Monitoring Program (FMMP) keeps track of changes in farmland use, including the conversion of farmland to urban use. This program is informational only, and does not regulate land uses. The FMMP classifies farmland according to four types: Prime Farmland is considered land with the best physical and chemical features able to sustain long-term production of crops; Farmland of Statewide Importance is land that is similar to Prime Farmland but has minor faults such as slopes or limited ability to store soil moisture; Unique Farmland has lesser-quality soils, is used for the production of the state's leading crops, and may be irrigated or include non-irrigated orchards or vineyards (together, these three farmland classifications constitute "Important Farmland"); and Grazing Land contains existing vegetation suitable for livestock. This is a program for identifying agricultural lands and tracking the conversion of such lands to other uses. It is not a plan, per se, and does not require any consistency from the proposed project.

Regional Transportation Plan & Transportation Improvement Program—Metropolitan Transportation Commission

The MTC is responsible for preparation and adoption of the Bay Area's RTP. The current RTP, *Transportation 2035 Plan for the San Francisco Bay Area*, identifies the major transportation projects needed to accommodate the present and future demands of motorized and non-motorized transportation within the Bay Area. The proposed project is identified in the RTP as project number 230326.

Both Alternative B, Phase 1 and Alternative C, Phase 1 are fully funded in the financially constrained Regional Transportation Plan *Transportation 2035 Plan for the San Francisco Bay Area: Change in Motion* (RTP). The project is also included in the MTC's financially constrained 2009 Transportation Improvement Program as TIP ID SOL070020. The TIP is being updated to be consistent with the RTP as part of the 2011 TIP process. The 2009 RTP and 2009 TIP (Revised) were found to conform with the *State Implementation Plan* (SIP) by the MTC on April 22, 2009. The FHWA and FTA found the 2009 RTP to be in conformity with the SIP on May 29, 2009. The FHWA and FTA found the 2009 TIP (Revised) to be in conformity with the SIP also on May 29, 2009.

An air quality conformity concurrence letter was signed by the FHWA on April 13, 2011. Currently, only Alternative C, Phase 1 is listed in the 2035 RTP and 2009 TIP (Revised). The design concept and scope of Alternative C, Phase 1 is consistent with the project description in the most recent 2035 RTP and 2009 TIP (Revised). The design concept and scope of the proposed project are consistent with the project listings in the 2035 RTP and 2009 TIP (Revised) and would not interfere with timely implementation of TCMs.

The STA, as sponsor of the project, would be required to submit a TIP amendment if the selected alternative is other than Alternative C, Phase 1.

Solano Transportation Authority

The Solano Transportation Authority (STA) was created in 1990 through a Joint Powers Agreement between Solano County and the cities of Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo to serve as the congestion management agency for the jurisdictions within Solano County. The STA is also responsible for countywide transportation planning and programming transportation funds. The proposed project is identified in the STA's Comprehensive Transportation Plan (CTP 2030), which identifies the proposed project as the "top transportation priority for Solano County" (Metropolitan Transportation Commission 2009; Solano Transportation Authority 2005).

The proposed project is included in, and therefore conforms to, the adopted transportation plans and programs of the STA and the MTC.

Habitat Conservation Plan/Natural Communities Conservation Plan

There is currently no approved Habitat Conservation Plan (HCP) or Natural Communities Conservation Plan in effect for the project area.

A multi-species habitat conservation plan is being prepared for Solano County by the Solano County Water Agency. A final administrative draft HCP was prepared in June 2009 but has not been formally adopted. The proposed Solano HCP establishes a framework for complying with state and federal endangered species regulations while accommodating future urban growth, development of infrastructure, and ongoing operation and maintenance activities associated with flood control, irrigation facilities, and other public infrastructure undertaken by or under the permitting authority/control of the Plan Participants within the Plan Area.[3]

As the proposed Solano HCP is currently in the administrative draft state, the final text included in the HCP has not been finalized. Pending CEQA and public review, the HCP may be subject to substantial changes. Although the Solano County Water Agency plans to adopt the HCP in the fall of 2012,[4] the Department is not required to find consistency with draft documents.

Solano County General Plan

Solano County has land use jurisdiction over lands that are outside the incorporated city limits of the cities of Fairfield and Suisun City. The county establishes formal goals and policies for the regulation of land uses through its General Plan. This follows from California Planning Law, which requires each city and county to adopt a comprehensive general plan that acts as a "blueprint" for growth from the perspectives of land use, housing, open space, conservation, circulation, noise, and safety (Solano County 2008).

In November 2008 the people of Solano County approved Measure T which confirmed approval of a new County General Plan including an amendment to Solano County's 1994 Orderly Growth Initiative that updates certain provisions of the Solano County General Plan relating to

[3] Solano County Water Agency website, http://www.scwa2.com/Conservation_Habitat_FinalAdminDraft.aspx.
[4] Lee, Chris, Supervising Environmental Scientist, Solano County Water Agency. May 3, 2011.

agricultural and open space policies and land use designations, and extends the initiative until December 2028. A cornerstone principal of the new General Plan and Orderly Growth Initiative is the direction of new urban growth and development toward municipal areas.

Lands within the Suisun Marsh to the south of Fairfield and east of I-680 are protected by strict limitations on development within the primary and secondary management areas of the Marsh under the Solano County General Plan (Solano County 2008). Portions of the proposed project would encroach into the secondary management area of the Marsh as discussed above.

Unincorporated lands adjoining the proposed project are designated as "Agriculture" on the Solano County General Plan land use map. The Agriculture designation "provides areas for the practice of agriculture as the primary use, including areas that contribute significantly to the local agricultural economy, and allows for secondary uses that support the economic viability of agriculture. Agricultural land use designations protect these areas from intrusion by nonagricultural uses and other uses that do not directly support the economic viability of agriculture" (Solano County 2008).

An area on the east side of Nelson Hill, south of the proposed project alignment, is designated an "Urban Project Area" with a "Neighborhood Agricultural/Tourist Center" adjoining it. The Urban Project Area designation "reflects city-designated master plan, specific plan, or other future plan areas. This designation is applied to these areas to reflect the current city designation for this area. Once specific land uses have been applied to these areas by the cities, the County will amend the General Plan to reflect such changes" (Solano County 2008).

The Neighborhood Agricultural/Tourist Center designation provides for areas supporting complementary agricultural and tourism commercial facilities that are compatible with surrounding agricultural uses. In addition, permitted uses should enhance the agricultural character of surrounding areas, develop brand recognition, and create a destination for tourists. Permitted uses include small hotels, restaurants, retail shops, and facilities for the sale of local produce (Solano County 2008).

Lands within the Suisun Marsh, to the south of Fairfield and east of I-680 are designated "Marsh," with a "Resource Conservation" overlay. The Marsh designation "provides for protection of marsh and wetland areas. [It] permits aquatic and wildlife habitat, marsh-oriented recreational uses (duck hunting, fishing and wildlife observation), agricultural activities compatible with the marsh environment and marsh habitat, educational and scientific research, educational facilities supportive of and compatible with marsh functions, and restoration of historic tidal wetlands." The Resource Conservation overlay "identifies and protects areas of the county with special resource management needs. This designation recognizes the presence of certain important natural resources in the county while maintaining the validity of underlying land use designations. The overlay protects resources by (1) requiring study of potential effects if development is proposed in these locations, and (2) providing mitigation to support urban development in cities" (Solano County 2008).

The General Plan's Suisun Marsh Policy Addendum's "Utilities, Facilities, and Transportation" Policy 1(e) provides that:

> New roadways (highways, primary and secondary roads) and rail lines that form barriers to movement of terrestrial wildlife should not be constructed in the Suisun Marsh or in adjacent uplands necessary to protect the Marsh except where such roadways and rail lines are necessary in the secondary management area for the operation of water-related industry and port uses within the area designated by the Protection Plan as a water-related industry reserve area at Collinsville. Rail access to serve the water-related industrial reserve area may be permitted within the existing Sacramento Northern Railroad right-of-way or along the east side of the Marsh, whichever route would result in the least disturbance to wetlands and wildlife. Wherever possible, rail access to the Sacramento River and through the area designated as a water-related industrial reserve area should be located above the ten-foot contour in order to avoid adverse effects to wetlands. Whenever the reconstructed line would pass through wetland areas, it should be constructed on trestles or in a manner which allows for the natural movement of water and wildlife beneath the alignment.

Policy 1(f) further provides:

> The Solano County General Plan acknowledges the need for the possible future expansion of Highway 12. When future traffic loads warrant the widening of Highway 12, such expansion must be designed so as to minimize adverse environmental effects on the Marsh.

The County component of the Marsh Protection Plan[6] contains several Wildlife Habitat Management and Preservation, and Water Quality policies that would pertain to the project. These include:

Wildlife Policy 1

> The diversity of habitats in the Suisun Marsh and surrounding upland areas should be preserved and enhanced wherever possible to maintain the unique wildlife resource.

Wildlife Policy 2

> The Marsh waterways, managed wetlands, tidal marshes, seasonal marshes, and lowland and grasslands are critical habitats for marsh-related wildlife and are essential to the integrity of the Suisun Marsh. Therefore, these habitats deserve special protection.

The project alternatives would have minimal impacts on lands within the Suisun Marsh secondary management area. Impacts of the project on waterways, wetlands, and marshes would be mitigated as described in Section 3.2.2 of the Draft EIR/EIS. These mitigation measures would require compensation for affected waterways, wetlands, and marsh areas at a 1:1 ratio to ensure no net loss of these habitats as a result of the project.

[6] Solano County is required to prepare and adopt a component of the local protection program required under the 1977 Suisun Marsh Preservation Act (Marsh Act) to implement the Suisun Marsh Protection Plan within the Suisun Marsh Management area. The County component of the LPP is comprised of polices contained in the County General Plan; County Code provisions including the Zoning Code (Chapter 28), Drainage and Flood Control (Chapter 9), and Grading and Erosion Control (Chapter 31); policies regulating sewage disposal systems; and findings of consistency between the Marsh Act and existing county policy.

Water Quality Policy 3

> Disruption or impediments to runoff and stream flow in the Suisun Marsh watershed should not be permitted if it would result in adverse effects on the quality of water entering the Marsh. Riparian vegetation in the immediate Suisun Marsh watershed should be preserved, and stream modification permitted only if it is necessary to ensure the protection of life and existing structures from floods. Only the minimum amount of modification necessary should be allowed in such cases.

Chapter 3.2.1 of the Draft EIR/EIS describes the potential water quality impacts of the project alternatives and describes both permanent and temporary (during construction) best management practices that would be implemented to protect water quality, preserve existing vegetation, and treat stormwater runoff before entering the Suisun Marsh.

Water Quality Policy 6

> Riparian vegetation in the immediate Suisun Marsh watershed should be preserved due to its importance in the maintenance of water quality and its value as Marsh—related wildlife habitat. Stream modification should only be permitted if it is proved necessary to ensure the protection of life and existing structures from floods and only the minimum amount of modification necessary should be allowed.

The project would not affect any riparian habitat located within the Suisun Marsh area.

Project activities occurring within the Suisun Marsh Secondary Management Area would be subject to the issuance of a Marsh Development Permit by the BCDC and all conditions attached to the permit will be implemented as part of the project. Issuance of a Marsh Development Permit by BCDC would ensure project activities are consistent with the Suisun Marsh Protection Act policies and Solano County General Plan.

The Solano County General Plan continues the county's long-time commitment to preserving agricultural land by limiting urbanized development outside of the incorporated cities and their "municipal service areas." The Solano County General Plan Land Use Element establishes the following goals.

> **LU.G-1:** Preserve and protect the current development pattern of distinct and identifiable cities and communities.
>
> **LU.G-2:** Encourage a development pattern that first seeks to maintain existing communities, second, to develop vacant lands within existing communities presently served by public services, and third, to develop lands immediately adjacent to existing communities where services can easily be provided.
>
> **LU.G-3:** Create sustainable communities with areas for employment, shopping, housing, public facilities and services, and recreation in close proximity to each other.
>
> **LU.G-4:** Encourage land use development patterns and circulation and transportation systems that promote health and wellness and minimize adverse effects on agriculture and natural resources, energy consumption, and air quality.

Key Solano County General Plan Land Use Element policies include the following.

> **LU.P-1:** Collaborate with cities to guide development to the county's urban centers and promote sustainable development patterns.
>
> **LU.P-2:** A cornerstone principle of this General Plan is the direction of new urban development and growth toward municipal areas. In furtherance of this central goal, the people of Solano County, by initiative measure, have adopted and affirmed the following provisions to assure the continued preservation of those lands designated "Agriculture", "Watershed", "Marsh", "Park & Recreation", or "Water Bodies & Courses"; Land Use policy LU.P-3 and Agricultural policies AG.P-31, AG.P-32, AG.P-33, AG.P-34, AG.P-35, and AG.P-36. The General Plan may be reorganized, and individual goals and policies may be renumbered or reordered in the course of ongoing updates of the General Plan in accord with the requirements of state law, but the provisions enumerated in this paragraph shall continue to be included in the General Plan until December 31, 2028, unless earlier repealed or amended by the voters of the County.
>
> **LU.P-3:** The designation of specific lands and water bodies as "Agriculture", "Watershed", "Marsh", "Park & Recreation", or "Water Bodies & Courses" on the Solano County Land Use Diagram, adopted by the Solano County Board of Supervisors on December 19, 1980, and as amended subsequently consistent with Proposition A, and the Orderly Growth Initiative, shall remain in effect until December 31, 2028 except lands designated Agriculture may be redesignated pursuant to the procedure specified in Agricultural Policies AG.P-32 through AG.P-36 (providing for re-designation upon the making of specific findings, or as necessary to comply with state law requirements regarding provision of low and very low income housing, or permitting certain re-designations to open space).
>
> In addition, these agricultural and open space lands may also be redesignated after a final judgment by a court of competent jurisdiction determining that the absence of a redesignation would constitute an unauthorized taking of private property or is otherwise unconstitutional, but only to the minimum geographical extent and intensity of use necessary to avoid such unconstitutional result. Any such redesignation shall be designed to carry out the goals and provisions of this policy to the maximum extent possible.
>
> Further, the precise boundaries of land use designations may be subject to minor adjustment and refinement prior to development, or upon request of an affected landowner, provided such refinements reflect the overall boundaries indicated on the General Plan Land Use Diagram and are consistent with all other General Plan policies, in particular, the General Plan policies prohibiting piecemeal conversions of agricultural lands to nonagricultural uses.

The Solano County General Plan Agricultural Element has the following policies that are relevant to the proposed project.

> **AG.P-1:** Ensure that agricultural parcels are maintained at a sufficient minimum parcel size so as to remain a farmable unit. Farmable units are defined as the size of parcels a farmer would consider viable for leasing or purchasing for different agricultural purposes. A farmable unit is not considered the sole economic function that will internally support a farm household.
>
> **AG.P-3:** Encourage consolidation of the fragmented pattern of agricultural preserves and contracts established under the Land Conservation Act (Williamson Act) and the retention of agricultural preserves and contracts in agricultural, watershed, and marshland areas.

AG.P-4: Require farmland conversion mitigation for either of the following actions:

a. General Plan amendment that changes the designation of any land from an agricultural to a nonagricultural use, or

b. an application for a development permit that changes the use of land from production agriculture to a nonagricultural use, regardless of the General Plan designation.

The Solano County General Plan Transportation Element contains the following policies that are relevant to the proposed project.

TC.P-1: Maintain and improve current transportation systems to remedy safety and congestion issues, and establish specific actions to address these issues when they occur.

TC.P-6: Participate in transportation programs that promote technical solutions resulting in more efficient use of energy, reduced greenhouse gas emissions and noise levels, and improved air quality.

TC.P-8: Actively participate with the California Department of Transportation, Solano Transportation Authority, cities, and other agencies to plan for any proposed future realignments of current interregional routes.

TC.P-11: Maintain and improve the current roadways and highway system to meet recommended design standards set forth by the County, including streets that also carry transit and nonmotorized traffic.

Solano County has entered into Williamson Act contracts on several parcels of agricultural land in the project area. These contracts encumber approximately 388 acres in the project area (see Table 3.1.3-2).

In addition, the project area includes lands restricted by conservation easements. Typically, conservation easements are legal agreements between property owners and government agencies or non-profit organizations that permanently limit land development. Easements can restrict land to a prior use or preserve land for purposes of creating and maintaining open space or agricultural uses. In the project area, there is approximately 72 acres encumbered by conservation easements (see Table 3.1.3-3).

The portion of the study area east of I-680 between the Gold Hill Road overpass and just south of Jameson Canyon Creek is within the Suisun Marsh Secondary Management Area (SMA). The secondary management area provides a buffer of upland grasslands and cultivated areas between the primary marsh and development. Development in the SMA is regulated by the BCDC through marsh development permits. This part of the study area supports nonnative annual grassland, with stands of eucalyptus trees, several seasonal wetlands, and ruderal vegetation adjacent to I-680.

The proposed project is generally consistent with the goals and objectives included in the Land Use Element of the Solano County General Plan. The proposed project is linear in nature and would not result in substantial changes in land uses that would conflict with the General Plan. A primary goal of the General Plan is to "provide and maintain a safe, economical, and efficient

circulation and transportation system to ensure adequate multi-modal movement of people and goods within, to, and from the county while incurring the least social, economic, and environmental harm to existing or planned activities and land uses." As a transportation improvement project, the proposed project directly serves and is consistent with this goal.

A second objective of the Solano County General Plan Land Use Element is to encourage land use development patterns and circulation and transportation systems that minimize energy consumption. The proposed project is fully consistent with this objective. By widening the existing roadway and building new access to I-80, I-680, and SR 12, the proposed project would provide for a reduction in traffic congestion within the project area, reducing the amount of fuel utilized by idling automobiles and the amount of emissions produced as a result of congestion.

Another Solano County land use goal applicable to the proposed project calls for "orderly growth which assures a harmonious relationship of land uses and maintains the distinctive character of each community."

City of Fairfield General Plan

The City of Fairfield General Plan Land Use Element policies restrict urban development to areas within the City's defined Urban Limit Line, reflecting a commitment on the part of the city to preserve the character of rural areas surrounding the city. In general, the City of Fairfield General Plan supports a buffer, or greenbelt, separating the city from other urban areas in Solano County. The Land Use and Agriculture Elements of the City of Fairfield General Plan include the following objectives, policies, and programs that are relevant to implementation of the proposed project.

> **Objective LU 2—**Achieve a pattern of development that reinforces the city's desired image.
>
> **Policy LU 2.1—**Encourage the preservation of agricultural land surrounding the city and permanently preserve agriculture in the Suisun Valley.

The City of Fairfield General Plan Circulation Element includes the following goal, objectives, policies, and programs that are relevant to the proposed project.

> **Goal—**The goal of the Circulation Element is to create and maintain an efficient, safe, and coordinated multi-modal circulation system, serving the needs of a variety of users.
>
> **Objective CI 1—**Establish a circulation system that is consistent with the land use patterns of the city. (See Objective LU 4 and Policy LU 4.2)
>
> **Policy CI 1.1—**Develop a network of roads that is compatible with the general land use patterns of the city.
>
> **Objective CI 2—**Achieve a coordinated regional and local transportation system that minimizes traffic congestion and efficiently serves users.
>
> **Policy CI 2.3—**Work with the California Department of Transportation (Caltrans) to identify needed improvements to its highway/interstate facilities in the city and implement necessary programs on the state highway system and its interchanges/intersections with local roadways.

> **Policy CI 2.4—**Work with Caltrans and adjacent jurisdictions to improve the operational performance of I-80, I-680, and SR 12 as regional facilities.

The build alternatives are consistent with the applicable City of Fairfield General Plan land use policies and programs. The primary focus of the City of Fairfield General Plan Land Use Element is the preservation of lands used for agricultural purposes within the City of Fairfield. Within Fairfield city limits, the majority of land used for agricultural purposes is located north of the city and Travis Air Force Base, well outside the project area.

City of Suisun City General Plan

The City of Suisun City 1992 General Plan Land Use Element addresses future land use in light of the county policy of directing growth to the cities and Suisun City's constraints from its location between two areas with very limited development potential: Travis Air Force Base on the east (land uses on lands surrounding the base are restricted in order to avoid conflicts with base operations) and Suisun Marsh to the south (state law limits development within the geographic marsh area). Whereas Fairfield is several miles long and adjoins most of the proposed project, Suisun City is relatively compact and is affected only by the eastern terminus of the proposed project.

The affected portion of Suisun City is located within the city's 1999 Downtown/Waterfront Specific Plan. The policies of the Specific Plan are intended to enhance the city's attractiveness to visitors, leading to potential development of water and tourist-oriented commercial services in the downtown area. SR 12 and the Capitol Corridor/UPRR line are emphasized as infrastructure important to attracting new commercial and light industrial development in adjacent areas of the city. The Downtown/Waterfront Specific Plan's circulation system map indicates that a "bypass road" is to be built on the east side of the railroad tracks from Cordelia Street north to Spring Street at the train station.

The Land Use Element of the City of Suisun City General Plan includes the following land use policy that is relevant to implementation of the proposed project.

> **Policy 20:** Gentry-Pierce Property. The Gentry-Pierce property, located south of SR 12 and east of the Southern Pacific Railroad tracks, is appropriate for business park land uses and should be developed as such. The intersection of Pennsylvania Avenue and SR 12 is also appropriate for a retail commercial center because of its location at this key intersection and as part of the entryway to the development. The retail center would serve businesses and employees of the development as well as the community at large. For this reason, the area immediately adjacent to the intersection on both sides of Pennsylvania Avenue is designated general commercial. The exact size and shape of the general commercial area would be determined through the development review process, but would not be less than 30 net acres (net area is defined as gross area less public right-of-way dedicated for arterial streets and non-developable areas such as wetlands).

The City of Suisun City General Plan Circulation and Transportation Element includes the following goal and objective that are relevant to the proposed project.

> **Goal—**To develop a street and highway system which provides for both local and regional vehicular circulation needs while maintaining a level of service (LOS) "E" on public streets wherever feasible. This level of service represents stable, high-volume traffic flows.

> **Objective 1—**Construct SR 12 to a four-lane expressway standard to Walters Road. Add an additional two lanes when conditions on any segment east of Sunset Avenue fall below LOS "E." Provide for the long-term possibility of a grade separation at Sunset Avenue.

A major development project, referred to as the Gentry-Suisun Project, was proposed for the unincorporated portion of the city's sphere of influence south of SR 12E and west of the extension of Pennsylvania Avenue. The Gentry-Suisun Project proposed to annex this site to the city and amend the City of Suisun City General Plan to allow mixed-use residential, commercial/retail, and business park uses on the site. The proposal did not progress beyond the environmental analysis stage and is no longer active.

The build alternatives are generally consistent with the City of Suisun City General Plan and Downtown/Waterfront Specific Plan. The eastern terminus includes improvements that will improve access to the transit center west of Main Street, as discussed in the City of Suisun City General Plan Downtown/Waterfront Specific Plan. Improvements to SR 12E are consistent with city policies for widening the state highway.

The build alternatives would be consistent with local land use plans and not induce growth beyond that envisioned in the General Plan.

3.1.1.3 Parks and Recreational Facilities

Section 4(f) of the Department of Transportation Act of 1966, codified in federal law at 49 U.S.C. 303, declares that "it is the policy of the United States Government that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites." Under the National Environmental Policy Act (NEPA) assignment provisions, the Department is responsible for undertaking Section 4(f) analysis for the proposed project.

The Department's analysis is prepared in accordance with federal requirements. Per FHWA and FTA regulations at 23 CFR 774.17, a Section 4(f) "use" occurs when 1) land is permanently incorporated into a transportation facility, 2) there is a temporary occupancy of land that is adverse in terms of the Section 4(f) statute's preservationist purpose as determined by the criteria in Section 774.13(d); or 3) when there is a constructive use of a Section 4(f) property as determined by the criteria in Section 774.15.

To note, the requirements of Section 4(f) will also be considered satisfied with respect to a Section 4(f) resource if it is determined that a transportation project will have only a "*de minimis* impact" on the 4(f) resource. The provision allows avoidance, minimization, mitigation, and enhancement measures to be considered in making the *de minimis* determination. The agencies with jurisdiction must concur in writing with the determination. Additional requirements for a *de minimis* impact finding include providing the public an opportunity to review and comment on the effects of the proposed project on the Section 4(f) resource. *De minimis* impact is defined in 23 CFR 774.17. For parks and recreation areas, a *de minimis* impact is one that will not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f). Per 49 U.S.C. 303 and 23 U.S.C. 138, once the U.S. Department of Transportation determines that a transportation use of Section 4(f) property results in a *de minimis* impact on the

property, an analysis of avoidance alternatives is not required and the Section 4(f) evaluation process is complete.

Recreational Resources

There are a number of parks and recreational resources in the general area of the proposed project. In addition, Rodriguez High School is located along I-680.

Fairfield Linear Park: The linear park is a 94-acre "rails-to-trails" publicly owned park located entirely within Fairfield. The length of the park is approximately five miles, reaching from the intersection of North Texas Street and East Tabor Avenue at the eastern terminus to Solano Community College at the western terminus. Within the project area, the trail parallels the northern side (westbound lanes) of I-80. Future plans include an extension of the park's eastern boundary to the Fairfield city limits, which would bring the park's total length to approximately eight miles.

The park is a multi-use facility that provides opportunities for both active and passive outdoor recreation. Some of the more common activities that occur at the park include jogging, biking, and walking, all of which mostly take place on a concrete/asphalt path that spans the entire distance between the park's termini. The path is eight to ten feet wide, on average, and is located entirely within the park right-of-way, which varies between 40 and 100 feet in width, depending on location. Jogging, bicycling, and walking are all permitted on the path.

The Fairfield City Council amended the General Plan designation of a portion of the Fairfield Linear Park between Abernathy Road and Solano Community College from open space recreation (OSR) to public facility (PF) on September 16, 2008. The change in designation allows this approximately 2-mile long segment of the Fairfield Linear Park to be replaced by a new joint-use pathway to be constructed as part of the North Connector Project (now referred to as the Suisun Parkway Project). The new joint-use pathway would connect with the Fairfield Linear Park at Abernathy Road and Suisun Valley Creek.

Vintage Green Valley Park: This city park is located at the northeast corner of Vintage Valley Drive and Mangels Boulevard, north of the intersection of Business Center Drive and Green Valley Road. It has a picnic area and landscaped open space.

Rodriguez High School: The high school is located west of I-680, adjoining the north side of Red Top Road. The school has a track and playing fields.

Ridgeview Neighborhood Park: This small city park is located on the north side of Silver Creek Road, in the residential neighborhood west of Lopes Road. It has a picnic area, basketball courts, and play fields.

American Canyon Creek Trail: This is a linear city park that runs along American Canyon Creek from Lopes Road on the east to Silverado Drive on the north. It consists of passive open space land and adjoins the north side of Ridgeview Neighborhood Park.

Suisun Marsh: Lands within the Suisun Marsh, to the south of Fairfield and east of I-680 are designated "Marsh," with a "Resource Conservation" overlay. The Marsh designation "provides

for protection of marsh and wetland areas. [It] permits aquatic and wildlife habitat, marsh-oriented recreational uses (duck hunting, fishing and wildlife observation), agricultural activities compatible with the marsh environment and marsh habitat, educational and scientific research, educational facilities supportive of and compatible with marsh functions, and restoration of historic tidal wetlands."

Bay Area Ridge Trail: A new segment of the Bay Area Ridge Trail was dedicated by the City of Fairfield and the Bay Area Ridge Trail Council in September 2010. This segment, which lies to the south of I-80 along McGary Road from Red Top Road to Hiddenbrooke Drive, is located immediately adjacent to the western segment of the project alignment. Approximately 3.5 miles long, this trail is designated for multi-uses including hiking, biking, and equestrian uses.

Impacts on Facilities

Under Alternatives B and C, a portion of the Fairfield Linear Park east of Abernathy Road would be relocated prior to construction of the proposed project. The park is considered a 4(f) resource. There would be no effect to the recreational activities, features, or attributes of this facility because the resource would be replaced and there would be no interruption of use.

Because both project alternatives are located approximately 0.5 mile from Vintage Green Valley Park, the project would not affect access to the park. The project would not affect the qualities, attributes, or features of Vintage Green Valley Park either directly or indirectly.

Under Alternative C and Alternative C Phase 1, Lopes Road would be realigned approximately 100 feet west of its current location between Fermi Road and Red Top Road. This realignment would move the road closer to Rodriguez High School, but would not affect any portion of the school including its recreational fields. Thus, the project would not affect the recreational activities, features, or attributes of the recreational fields.

Given the distance from Ridgeview Park from the project alternatives (approximately 500 feet), and intervening homes, commercial buildings, and/or businesses between the project and the park, the project would not affect the qualities, attributes, or features of Ridgeview Park either directly or indirectly. Further, access to the park would not change with implementation of the project alternatives.

American Canyon Creek is located approximately 50 feet away from the proposed project improvements. Given the existing proximity of the trail to I-680, trail users are already exposed to the noise effects of having a transportation facility nearby. Implementation of the project would not result in a significant increase in project noise levels; the increase in projected noise level with the project is barely perceptible (i.e., one dBA or less). Although construction of the project would result in minor visual effects for trail users during construction, these effects would be temporary in nature and would only occur during the construction period. Thus, project alternatives would not substantially impair the protected activities, features, or attributes of the trail. As such, the provisions of Section 4(f) are not triggered.

Both full build alternatives would involve improvements, including a new interchange at I-680 and Red Top Road and realigning Ramsey Road following construction of the new interchange, within the Suisun Marsh Secondary Management Area. These improvements would introduce

new roadway facilities to this portion of the Suisun Marsh Secondary Management Area. However, as these improvements occur on land which is privately owned, this portion of the Suisun Marsh is not a Section 4(f) resource. Therefore, the provisions of Section 4(f) are not triggered.

Although both project alternatives could indirectly affect access to the McGary segment of the Bay Area Ridge Trail in the project area during construction, implementation of the project would beneficially open up several alternatives for completing the gap between the existing segments of the Bay Area Ridge Trail between Green Valley Road and McGary Road. The project alternatives, once completed, would not impede access nor create a barrier to completing and opening segments of the planned Bay Area Ridge Trail in the project area. Further, the build alternatives would not cause a constructive use of the Bay Area Ridge Trail because the proximity impacts will not substantially impair the protected activities, features, or attributes of the trail. Thus, the provisions of Section 4(f) are not triggered.

The No-Build Alternative would not alter existing conditions and therefore would have no effect on parks or recreation facilities.

Appendix B contains additional information regarding resource evaluated relative to the requirements of Section 4(f).

Impact on Fairfield Linear Park

As noted above, the Linear Park Trail is a multi-use facility that provides opportunities for both active and passive outdoor recreation. Bicycling, running, and walking are all permitted on the path. Because the Linear Park Trail is a Class I publicly owned trail, is used for recreational purposes, and is not used primarily for transportation or as part of a local transportation system, it is considered a Section 4(f) resource.

Impacts on the Linear Park Trail

Alternative B and Alternative C include an improvement common to both that would have an impact on the Linear Park Trail.

Both alternatives include changes to the Abernathy Road/I-80 interchange. The existing westbound on- and off-ramps would be reconstructed to accommodate a loop on-ramp. This interchange would become the Suisun Parkway/I-80 interchange with completion of the eastern segment of the North Connector Project. Approximately 0.65 mile of the existing Linear Park Trail would potentially be affected under both of the alternatives (Figure 3.1.1-1).

However, as part of the project design, both alternatives would permanently realign the existing trail north of the proposed improvements at the Abernathy Road/I-80 interchange prior to construction. This realignment would allow for the continued use of the trail facilities during and after construction activities for either alternative. The Linear Park Trail would remain open and in use under both alternatives. Some minor visual effects for trail users would occur during construction, but these effects would be temporary in nature and would occur only during the construction period. This temporary change in view would not affect the use of Linear Park Trail. The proposed project would not adversely affect the activities, features, and attributes that qualify the trail for protection under Section 4(f).

Potential indirect impacts on the Linear Park Trail were also evaluated. As part of the traffic noise modeling study, the noise level at one prediction site, located 500 feet north of I-80 and the trail, was analyzed for existing and future conditions with and without the proposed project. At this location, the existing traffic noise level at the loudest hour was predicted to be 63 dBA. The future noise level (2035) at this site was predicted to be 65 dBA with the buildout of the four build alternatives and 64 dBA without buildout of the proposed project. Although the alternatives would be one dBA higher under design-year with-project conditions compared to design-year no-project conditions, noise levels do not approach or exceed the NAC for the land use (67 dBA) under 23 CFR 772. Therefore, there would be no noise-related impacts on this Section 4(f) resource due to implementation of the proposed project.

The proposed project would not result in any violations of CO NAAQS, is not considered a project of air quality concern (POAQC) for PM10 or PM2.5, would not exceed operational thresholds for ROG, NO_X, CO, and PM10 emissions, and would result in decreases (not increases) in all MSAT emissions. With implementation of measures outlined in Section 3.2-6 (Air Quality) in the EIR/EIS, construction of the project would not result in a significant increase in ROG, NO_X, CO, and particulate matter emissions. Therefore, no air quality-related effects on this Section 4(f) resource would occur as a result of this project.

No natural communities of special concern or special-status plant species are present within this portion of the proposed project. The full build alternatives could have adverse effects on potential nesting habitat for western burrowing owl, Swainson's hawk, migratory birds, and raptors found within this area. However, implementation of the measures outlined in Section 3.3 "Biological Resources" in the EIR/EIS would minimize these potential effects. A stormwater pollution prevention program (SWPPP) would be prepared and implemented as part of the project and best management practices would be implemented to ensure no adverse effects to water quality occur as a result of project construction (see Chapter 3, Section 3.2-2, "Water Quality" in the EIR/EIS for additional information). There would be no vegetation, wildlife or water quality related effects on this Section 4(f) resource as a result of the proposed project.

The preliminary determination is that the use of this property under Alternative B and Alternative C appears to qualify for a *de minimis* determination under Section 4(f). Thus, per 49 U.S.C. 303 and 23 U.S.C. 138, no discussion of avoidance alternatives is listed for this resource.

Measures to Minimize Harm to the Linear Park Trail

Measures to minimize harm to the Linear Park Trail would include realigning the existing trail north of both alternatives at the Abernathy Road/I-80 interchange prior to their construction. This realignment would allow for the continued use of the trail facilities while construction activities under the two alternatives were underway.

Coordination for the Linear Park Trail

In a letter dated November 22, 2010, the City of Fairfield concurred with the Department's finding that the effects on this Section 4(f) resource as a result of implementation of Alternative B and alternative C would be minimal under Section 4(f) (see Appendix B).

Concluding Statement for the Linear Park Trail

The determination is that the effects on this Section 4(f) resource as a result of implementation of Alternative B and Alternative C would be *de minimis* under Section 4(f).

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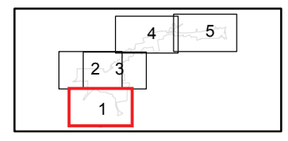
Architectural APE
Existing ROW
Existing Approved Facilities/ Development
Area of Project Impact

Project Alternatives
Alternative B, Phase 1
Alternative B
Alternative C
Alternative C, Phase 1
Initial Phase 1

Section 4(f) Resources
Historic Resource
Trails



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Aerial Photo Source: Aerials Express, 2007; © i-cubed, 2008

Figure 3.1.1-1
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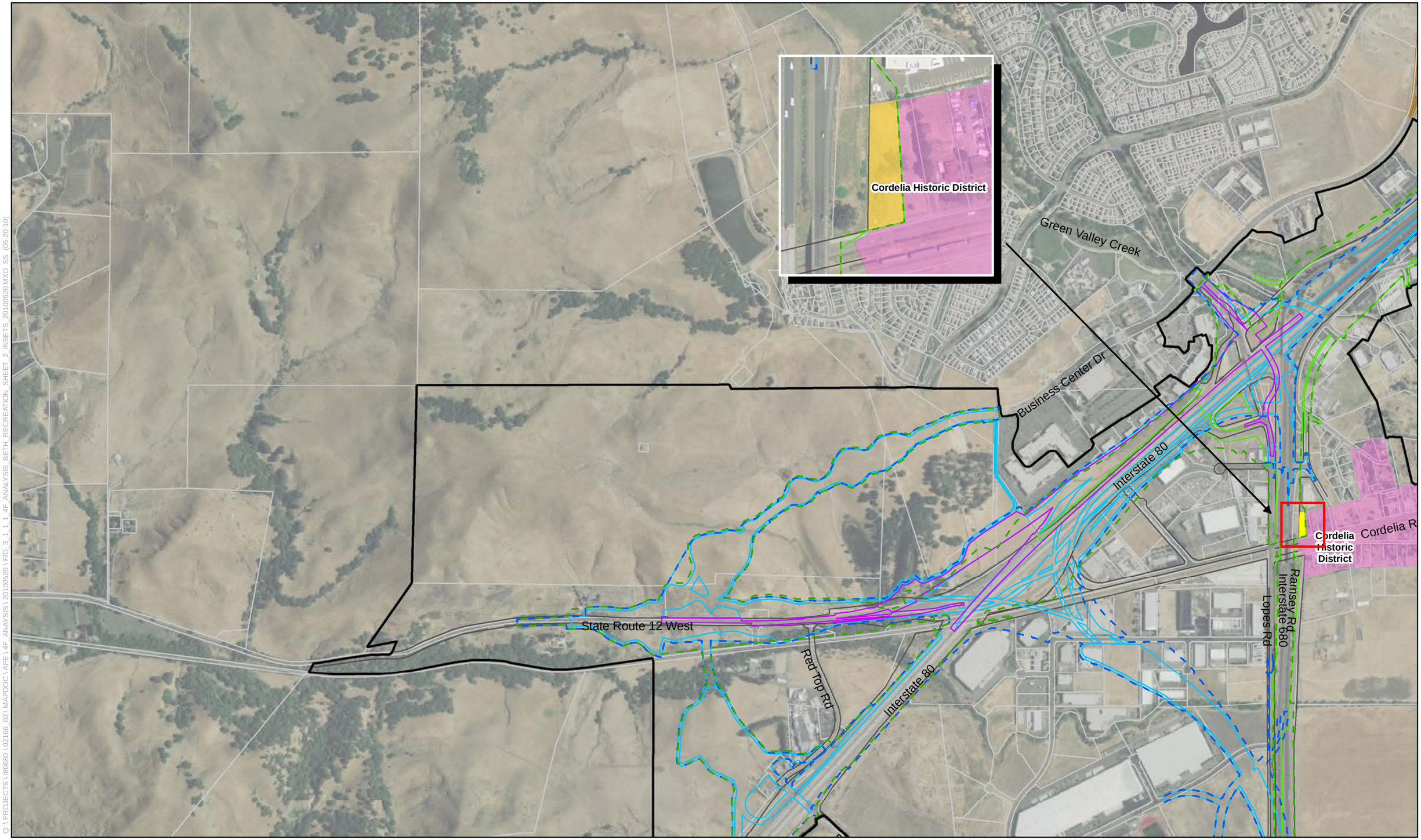
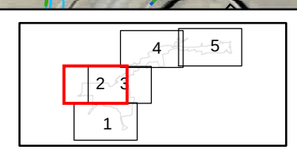


Architectural APE
Existing ROW
Existing Approved Facilities/ Development
Area of Project Impact

Project Alternatives
Alternative B, Phase 1
Alternative B
Alternative C
Alternative C, Phase 1
Initial Phase 1

Section 4(f) Resources
Historic Resource
Trails



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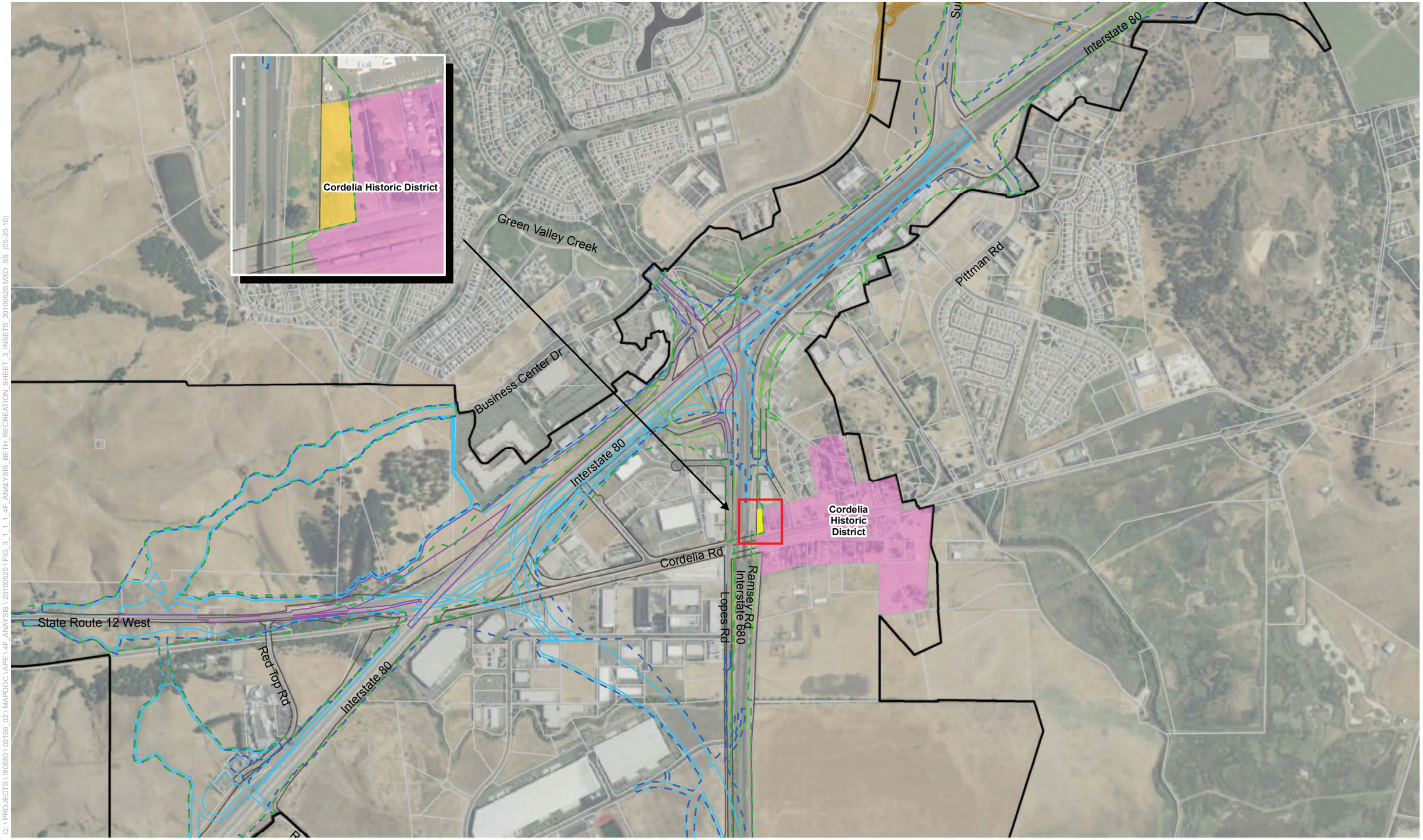

Architectural APE
Existing ROW
Existing Approved Facilities/ Development
Area of Project Impact

Project Alternatives
Alternative B, Phase 1
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Alternative C
Alternative C, Phase 1
Initial Phase 1

Section 4(f) Resources
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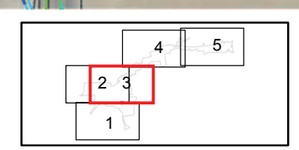

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Aerial Photo Source: Aerials Express, 2007; © i-cubed, 2008

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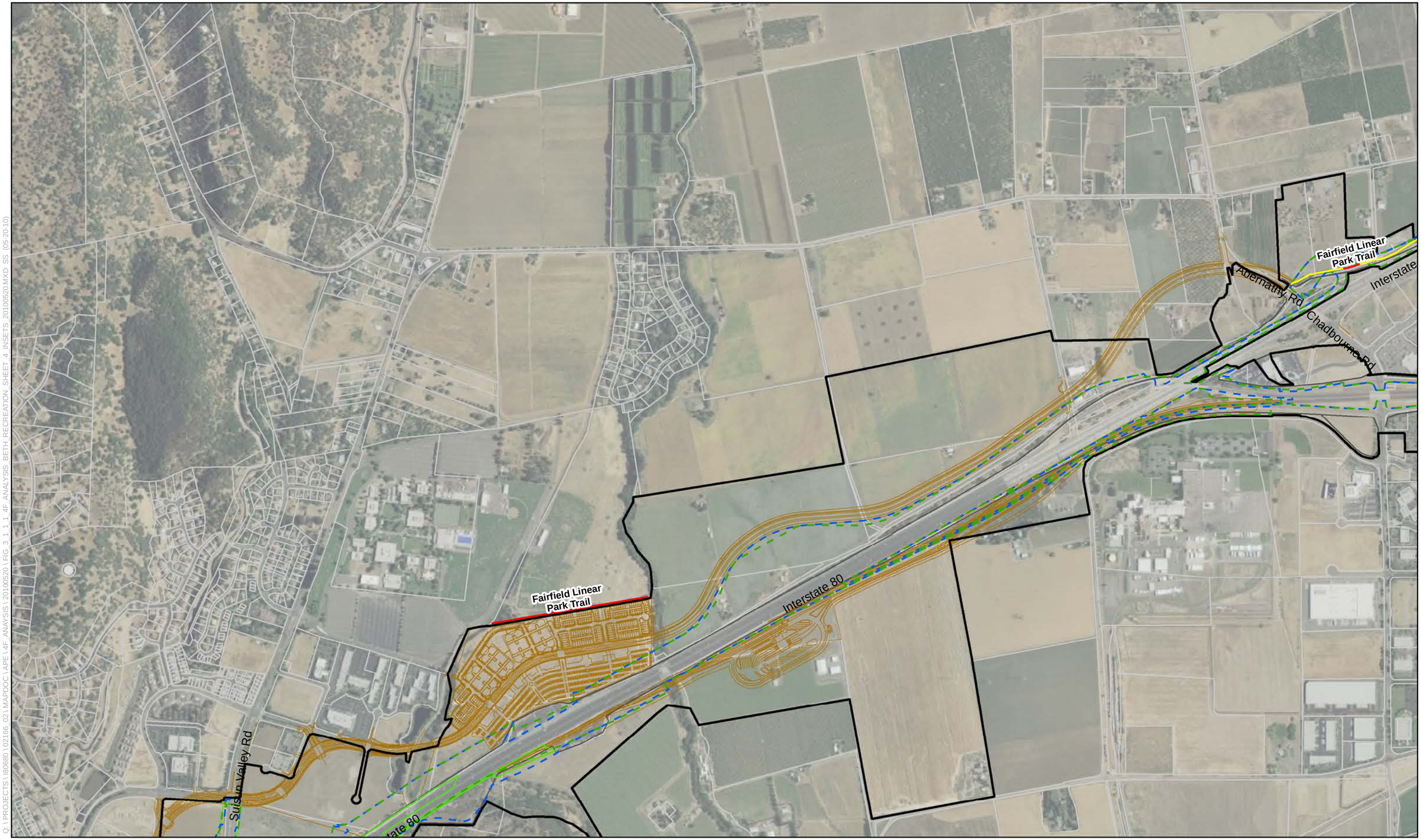

Architectural APE
Existing ROW
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Area of Project Impact

Project Alternatives
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Alternative C
Alternative C, Phase 1
Initial Phase 1

Section 4(f) Resources
Historic Resource
Trails

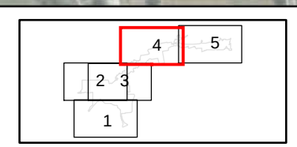

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Figure 3.1.1-1
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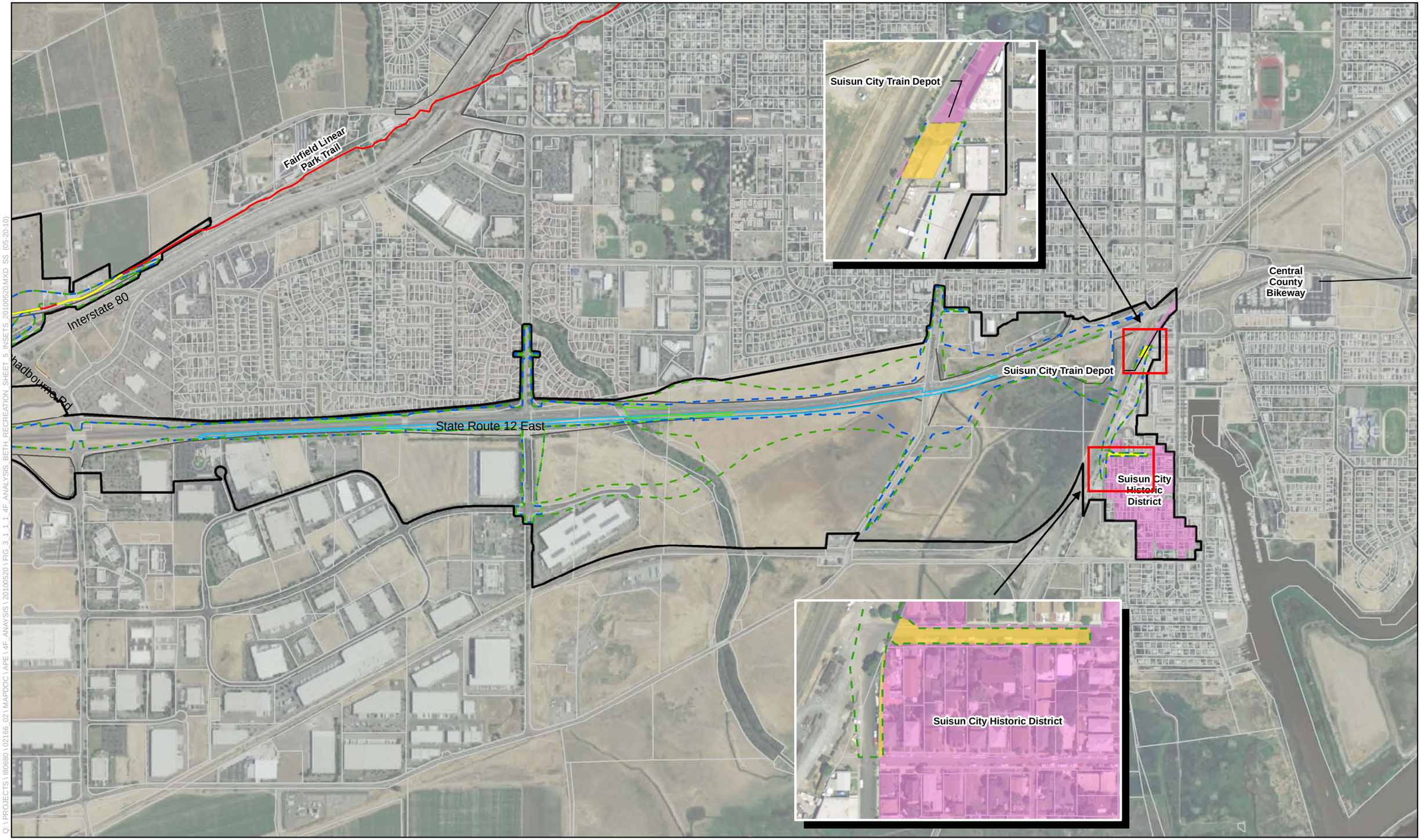

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Architectural APE
Existing ROW
Existing Approved Facilities/ Development
Area of Project Impact

Project Alternatives
Alternative B, Phase 1
Alternative B
Alternative C
Alternative C, Phase 1
Initial Phase 1

Section 4(f) Resources
Historic Resource
Trails

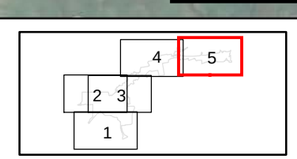

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Figure 3.1.1-1
Section 4(f) Resources in the Project Vicinity
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3.1.2 Growth

This discussion is based primarily on the CIA prepared for the proposed project.

Regulatory Setting

The Council on Environmental Quality (CEQ) regulations, which established the steps necessary to comply with the National Environmental Policy Act of 1969, requires evaluation of the potential environmental consequences of all proposed federal activities and programs. This provision includes a requirement to examine indirect consequences, which may occur in areas beyond the immediate influence of a proposed action and at some time in the future. The CEQ regulations, 40 CFR 1508.8, refer to these consequences as secondary impacts. Secondary impacts may include changes in land use, economic vitality, and population density, which are all elements of growth.

The California Environmental Quality Act (CEQA) also requires the analysis of a project's potential to induce growth. CEQA guidelines, Section 15126.2(d), require that environmental documents "…discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment…"

Affected Environment

For the purposes of this analysis, the study area was defined by available statistical data describing Solano County, the cities of Fairfield and Suisun City, and eleven 2000 Census Tract Block Group areas that encompass the project area and its environs.

Population and Housing Trends in the Study Area

The nine-county Bay Area region, or San Francisco–San Jose–Oakland Metropolitan Statistical Area (MSA), is the twelfth largest metropolitan area in the United States, with a population of 7,039,362 as of the 2000 U.S. Census. The 1990 U.S. Census reported the region's population as 6,253,311; this change constitutes a 13% increase. Solano County has grown the fastest of the nine counties, with an increase of 68% between 1980 and 2000. Fairfield alone grew by 66% between 1980 and 2000. This trend is expected to continue well into the twenty-first century. Table 3.1.2-1 shows the projected increase in population for the Bay Area, Solano County, Fairfield, and Suisun City from 2000 to 2035.

Table 3.1.2-1. Regional and Local Population—2000 through 2035

Jurisdiction	2000	2005	2010	2015	2020	2025	2030	2035
Bay Area Region	6,783,762	7,096,100	7,412,500	7,730,000	8,069,700	8,389,600	8,712,800	9,031,500
Solano County	392,542	421,600	455,200	488,400	514,900	539,900	562,900	585,800
City of Fairfield	96,178	106,000	115,500	123,700	129,700	135,000	139,600	144,500
Suisun City	26,118	27,600	29,700	31,600	32,900	34,400	35,900	37,400

Sources: ABAG Projections 2007; U.S. Census Bureau 2000.

The Association of Bay Area Governments' (ABAG's) Projections 2007 places the 2000 Bay Area regional population at 6,783,762. By 2035, the region is expected to have a population of

9,031,500, a 25% increase. The population of Solano County is expected to increase by 49%, Fairfield by 50%, and Suisun City by 43% in that same period.

As would be expected with the increase in population described above, housing has grown rapidly in the study area, both in total number and in average household size.

Approximately 63% of housing units in the county and 61% of housing units in Fairfield–Suisun City are owner occupied. Average household size is larger in Fairfield–Suisun City than in Solano County as a whole. Table 3.1.2-2 shows housing characteristics for Solano County (including the incorporated cities of Benicia, Dixon, Vacaville, Vallejo, and Fairfield–Suisun City) and Fairfield–Suisun City as a discrete unit.

Table 3.1.2-2. Housing Characteristics in 2000

	Solano County	Fairfield–Suisun City
Total Housing Units	134,513	41,635
Average Household Size	2.9	3.02
Owner-Occupied Units	84,994	25,549
Renter-Occupied Units	45,409	14,920
Two-Person Household	33,062	10,347
Three-Person Household	22,778	7,340
Four-Person Household	21,946	7,375
Five-Person Household	11,331	3,890
Six-Person Household	4,777	1,634
Vacant Units	4,110	1,166

Source: U.S. Census Bureau 2000.

The number of households in the Bay Area region is anticipated to grow by 34% between 2000 and 2035. Solano County is expected to experience a 50% increase, Fairfield a 52% increase, and Suisun City a 43% increase during the same period. Table 3.1.2-3 shows the projected number of households for the Bay Area Region, Solano County, Fairfield, and Suisun City between 2000 and 2035.

Table 3.1.2-3. Number of Regional and Local Households—2000 through 2035

Jurisdiction	2000	2005	2010	2015	2020	2025	2030	2035
Bay Area Region	2,466,020	2,583,080	2,696,580	2,819,030	2,941,760	3,059,130	3,177,440	3,292,530
Solano County	130,403	142,040	152,400	162,620	172,050	180,360	188,290	196,220
City of Fairfield	30,870	34,690	37,530	40,050	42,060	43,780	45,400	47,030
Suisun City	7,987	8,590	9,130	9,580	10,020	10,500	10,960	11,420

Source: ABAG Projections 2007; U.S. Census Bureau 2000.

Persons per household in the Bay Area region overall has increased from 2.61 in 1990 to 2.73 in 2005. Again, there is substantial variation within the region. With fewer families and more young singles than the rest of the Bay Area, San Francisco has the smallest average household size, reported at 2.30 persons per household in 2000. Solano County, on the other hand, has the second-highest average household size, estimated at 2.90 persons per household in 2000. ABAG expects household sizes across the Bay Area to level off, projecting a ratio of 2.71 persons per household for the region in 2025.

Environmental Consequences

The Department's *Environmental Handbook Volume 4, Community Impact Assessment* states that "growth inducement is defined as the relationship between the proposed transportation project and growth within the project area." The Department has development a checklist for determining if a project is considered to be growth inducing. The proposed alternatives were evaluated in accordance with this checklist as shown in Table 3.1.2-4.

Table 3.1.2-4. Growth-Inducement Checklist

Question	Answer
1. Would the project attract more residential development or new population into the community or planning area?	No. Though the project would increase highway capacity and allow some growth, it would do so in accordance with local planning documents. The project would increase the capacity of the I-80/I-680/SR 12 interchange complex to accommodate existing and planned increases in traffic. These improvements would allow, to some extent, future population growth both locally and regionally to occur. However, the project would not result in the direct development of residential land uses nor would it provide access to areas that currently do not have access. Furthermore, increases in population and residential development have been planned for by the City of Fairfield and Suisun City.
2. Would the project encourage the development of more acreage of employment-generating land uses in the area (such as commercial, industrial, or office)?	No. The project would not encourage the acreage of employment-generating land uses in the area beyond what is accounted for in local planning documents. By increasing the capacity of the interchange, the project could result in population growth both regionally and locally. Locally, several locations within the study area could be developed with employment-generating land uses. However, these areas have been planned for such development by the City of Fairfield or Suisun City.
3. Would the project lead to the increase of roadway, intersection, sewer, water supply, or drainage capacity?	Yes. The project would lead to an increase of freeway capacity by improving the interchange complex. The project would involve the reconstruction of several local interchanges and one new interchange on SR 12W. However, beyond the interchanges there would not be substantial improvement to local streets that would increase their capacity. The project would not result in increased sewer, water, or drainage capacity.
4. Would the project encourage the rezoning or reclassification of lands in the community General Plan from agriculture, open space, or low-density residential to a more intensive land use?	No. Rezoning and intensification of land uses is most likely to occur in areas where interchanges are reconstructed or new interchanges provided. While the project (both build alternatives) would result in the reconstruction of several interchanges and the construction of new interchanges at I-680/Red Top Road and SR12W, most areas around these interchanges are either already fully developed and intensification of land uses is highly unlikely, or current zoning is for continued agricultural use. Interchanges that would be reconstructed such as the I-80/Green Valley Road and I-80/Suisun Valley Road interchanges are already surrounded by commercial development making rezoning of existing land uses unlikely. The new interchange at I-680/Red Top Road is located in an area were Land uses to the west of the new interchanges at I-680/Red Top Road include residential areas and a high school to the west, and agricultural lands and the Suisun Marsh, which cannot be reclassified or rezoned, to the east. The new interchange at SR 12W is located in an area of the County zoned for continued agricultural use and due to the county's strong agricultural preservation policies, is unlikely to see reclassification or rezoning.
5. Is the project not in conformance with the growth-related policies, goals, or objectives of the local General Plan or the area growth management plan?	No. While the project would increase the capacity of the freeway system to accommodate existing and future increases in traffic, the growth generating this increase in traffic has been planned for both locally and regionally in the general plans of the county, City of Fairfield and Suisun City, and regional transportation plans.

Question	Answer
6. Would the project lead to the intensification of development densities or accelerate the schedule for development or would it facilitate actions by private interests to redevelop properties within four miles of a limited access highway interchange?	No. The project would not lead to intensification of development beyond that planned for by the cities. As stated above, the project could influence growth and intensification in the surrounding communities in some indirect way. However, the areas in which this intensification would occur have been planned for such development by the City of Fairfield or Suisun City.
7. Would the project measurably and significantly decrease home to work commuter travel times to and from or within the project area (more than 10% overall reduction or five minutes or more in commute time savings?)	Yes. Because the project would increase the capacity of the I-80/ I-680/SR 12 interchange complex, it would result in decreasing commute times by more than 10% overall and five minutes or more in commute time savings.
8. Is the project directly related to the generation of cumulative effects as defined by the CEQA guidelines?	No. The project is not directly related to cumulative growth in Solano County and surrounding communities.

Potential to Induce Growth

The proposed alternatives would add capacity to the I-80/I-680/SR 12 interchange complex to accommodate existing and future projected increases in traffic. By doing so, the proposed project would result, to some extent, in accommodating growth both locally and regionally. This growth in traffic is the result of local and regional land use plans, which, in turn, have been considered in regional transportation plans. However, this development would most likely occur in areas already planned for such development by the County, City of Fairfield, and Suisun City. Therefore, the proposed alternatives would not foster local development or growth beyond that which is already planned.

In November 2008 the people of Solano County approved Measure T which confirmed approval of a new County General Plan including an amendment to Solano County's 1994 Orderly Growth Initiative that updates certain provisions of the Solano County General Plan relating to agricultural and open space policies and land use designations, and extends the initiative until December 2028. A cornerstone principal of the new General Plan and Orderly Growth Initiative is the direction of new urban growth and development toward municipal areas. Adoption of the new County General Plan and extension of the Orderly Growth Initiative further supports the conclusion that the project alternatives would accommodate growth in areas already planned for such growth and that those areas are located within municipal areas.

Under the No-Build Alternative, no new effects associated with growth would occur.

Avoidance, Minimization, and/or Mitigation Measures

No avoidance, minimization, and/or mitigation measures are necessary because the project alternatives would not induce growth beyond areas that have been planned for such growth by the City of Fairfield and Suisun City.

3.1.3 Farmlands

As stated in the Department's *Environmental Handbook Volume 4, Community Impact Assessment*, "The intent of the California Department of Transportation is to avoid, whenever practical, locating public improvements within agricultural preserves or acquiring high quality agricultural land for transportation improvements" (California Department of Transportation 1997). This section presents a discussion of the agricultural resources and nature of agriculture in the project area, including a description of state, county, and city farmland preservation policies.

Regulatory Setting

The National Environmental Policy Act (NEPA) and the Farmland Protection Policy Act (FPPA, 7 USC 4201-4209; and its regulations, 7 CFR Part 658) require federal agencies, such as the FHWA, to coordinate with the Natural Resources Conservation Service (NRCS) if their activities may irreversibly convert farmland (directly or indirectly) to nonagricultural use. For purposes of the FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance.

The California Environmental Quality Act requires the review of projects that would convert Williamson Act contract land to non-agricultural uses. The main purposes of the Williamson Act are to preserve agricultural land and to encourage open space preservation and efficient urban growth. The Williamson Act provides incentives to land owners through reduced property taxes to deter the early conversion of agricultural and open space lands to other uses.

County of Solano

The 2008 Solano County General Plan continues the County's long-time commitment to preserving agricultural land by limiting urbanized development outside the incorporated cities and their "municipal service areas." County voters have established policies, by initiative, which restrict the conversion of lands designated for agricultural use on the General Plan to other uses. Solano County administers the Williamson Act on lands outside city limits.

The Solano County 2008 General Plan Agriculture Element identifies the Suisun Valley and the Western Hills as two of ten agricultural regions within the county that will be the subject of additional strategic planning for the purpose of encouraging the conservation of agricultural uses. Minimum parcel size within the Suisun Valley and areas of the Western Hills is set at 20 acres, and general land use is intended to include "agricultural production, agricultural processing facilities, and facilities to support the sale of produce, and tourist services that are ancillary to agricultural production."

At the present time, the County has issued a Draft Suisun Valley Strategic Plan that is intended to establish the means to implement the County's vision for the Suisun Valley in support of family farms and increased economic vitality from farming (County of Solano 2009). The draft is still being prepared (three public workshops have been held in 2009) and has not been formally adopted. As the plan is being drafted, the following have emerged as the top five priorities of the area's stakeholders, in order: maintain agricultural character; improve farm

production and income; create agri-tourism serving centers; provide infrastructure to support expanded use of Suisun Valley; and enable value-added agriculture.

The General Plan contains the following strategies for agriculture.

- Ensuring that agriculture endures as an essential part of Solano County's identity and lifestyle.
- Maintaining and promoting agriculture as an important business and major contributor to Solano County's economy.
- Preserving additional values of agricultural land, including important scenic value within the rural environment, providing habitat, providing options for recreation, and serving as community separators defining the county's distinct cities.
- Providing opportunities for agriculture to serve as an educational tool and tourist draw.

The goals listed below, excerpted from the County Agriculture Element, are pertinent to the proposed project.

> **AR.G-1:** Recognize, value, and support the critical roles of all agricultural lands in the stability and economic well-being of the county.
>
> **AR.G-2:** Preserve and protect the county's agricultural lands as irreplaceable resources for present and future generations.
>
> **AR.G-5:** Reduce conflict between agricultural and nonagricultural uses in Agriculture-designated areas.
>
> **AR.G-7:** Preserve and enhance the landscape and economy of the Vaca, Pleasants, Lagoon, and Suisun Valleys as rural agricultural communities.

In addition, the following policies from the County Agriculture Element are pertinent to the proposed project.

> **AG.P-1:** Ensure that agricultural parcels are maintained at a sufficient minimum parcel size so as to remain a farmable unit. Farmable units are defined as the size of parcels a farmer would consider viable for leasing or purchasing for different agricultural purposes. A farmable unit is not considered the sole economic function that will internally support a farm household.
>
> **AG.P-17:** Minimize potential conflicts between automobile and bicycle traffic and agricultural operations through transportation planning and capital improvement efforts.
>
> **AG.P-29:** Support the unique agricultural uses found in the interior valleys (Suisun, Pleasants, Vaca, and Lagoon) and encourage the development of complementary agritourism, processing, and commercial uses in these regions.

The Agricultural Element also provides the following pertinent implementation recommendations.

> **AG.I-1:** Create and adopt a farmland conversion mitigation program and ordinance. Require compensation for loss of agricultural land. Establish appropriate mitigation ratios for the program or utilize a graduated mitigation mechanism. The mitigation ratio shall be a minimum of 1.5:1 (1.5 acres of farmland protected through mitigation for each acre of farmland converted). The program shall not present regulatory barriers to agritourism, agricultural services, and agricultural processing in regions and within land use designations where such uses are permitted and encouraged. The program shall also establish mitigation within the same agricultural region as the proposed development project, or within the Agricultural Reserve Overlay district, as a preferred strategy. The program shall incorporate a fee option, and shall provide an exemption for farmworker housing. Mitigation lands shall be of similar agricultural quality to the lands being converted.
>
> **AG.I-8:** In coordination with programs in the Transportation and Circulation chapter, create a comprehensive plan for roadway improvements to support agricultural needs. The plan shall include increased connectivity across I-80 for farmers and their equipment, turnouts on agricultural roads, and grading/paving of unimproved roads. The plan shall also provide strategies to reduce automobile and bicycle conflicts with agricultural operations throughout the county. Recommendations shall be integrated into County transportation plans, recreation plans, and capital improvement programs. Partner with cities and the Solano Transportation Authority to address funding strategies for planned facilities.

City of Fairfield

The City of Fairfield General Plan Land Use Element includes the following goals, objectives, policies, and programs relevant to the proposed project.

> **Goals [Goal A]—**Preserve agricultural and grazing lands within the General Plan area which define the visual setting of Fairfield; and, recognize the economic importance of agriculture in Solano County by directing the city's growth away from Important Farmlands and prime agricultural soils.
>
> **Objective AG 1—**Support preservation of existing agricultural lands.
>
> **Policy AG 1.4—**Permanently preserve productive agricultural lands within the Suisun Valley by continuing to direct new urban development away from the Suisun Valley.
>
> **Program 1.4A—**Where land is identified as Prime Farmland, Farmland of Statewide Importance, or Unique Farmland on the most recent Important Farmland maps prepared by the California Department of Conservation and is proposed for conversion to urban uses, the city shall arrange for preservation of an equal amount of the same class of farmland within the area. Such an arrangement may be through fee purchase, purchase of conservation easements, payment of an in-lieu fee, or other mechanisms.
>
> **Objective AG 2—**Encourage the preservation and expansion of the local agricultural economy.

> **Policy AG 2.1—**Cooperatively work with farmers, property owners, universities, colleges, and agricultural organizations and agencies to enhance the viability of agricultural uses and activities.
>
> **Policy AG 2.3—**Development shall not encroach upon or consume productive cropland in areas such as the Suisun Valley.

Suisun City

The City of Suisun City General Plan Land Use Element includes the following policy relevant to the proposed project.

> **Policy 6—Open Space for Agriculture.** Open spaces suitable for agricultural production within the city's sphere of influence should be preserved under Solano County General Plan policies for agricultural preservation until such a time as these lands are needed and are determined to be feasible for urban development.

Affected Environment

The information below is summarized from the CIA prepared for the proposed project. Additional information comes from the County of Solano's 2008 General Plan.

The California Department of Conservation's FMMP tracks changes in farmland use, including the conversion of farmland to urban use. This program is informational only, and does not regulate land uses. The FMMP classifies farmland into four types. Prime Farmland is considered land with the best physical and chemical features able to sustain long-term production of crops. Farmland of Statewide Importance is land that is similar to Prime Farmland, but has minor faults, such as slopes or limited ability to store soil moisture. Unique Farmland has lesser quality soils used for the production of the state's leading crops; it may be irrigated or include non-irrigated orchards or vineyards (together, these three farmland classifications constitute "Important Farmland"). Grazing Land contains existing vegetation suitable for livestock.

As of 2006, Solano County had a total of 360,562 acres of land under cultivation. Of this total, 139,536 acres were designated as Prime Farmland, 7,164 acres were designated as Farmland of Statewide Importance, 11,036 acres were designated as Unique Farmland, and 202,826 acres were used for grazing purposes (California Department of Conservation 2006). In 2006, the county produced a grand total of $233,505,000 worth of agricultural products, accounting for 10% of all county economic activity but also representing a 2.2% decline from 2005, when Solano County produced a record $238,689,600 worth of agricultural products (Solano County Department of Agriculture 2006). Farm production supports between 2,500 and 4,200 jobs and results in personal income of approximately $140 million. However, it is important to keep in mind that these numbers do not reflect the sum of agriculture's contribution to the economy of Solano County. A "multiplier effect" exists, whereby transportation, processing, marketing, and other farm-related activities significantly increase these values to the benefit of the regional economy.

Fairfield contains 2,981 acres of farmland within its urban limit line. Of this total, 1,179 acres are Prime Farmland, 314 acres are Farmland of Statewide Importance and 1,488 acres are Unique Farmland. Most of this land is concentrated in areas north of Travis Air Force Base and between I-80 and I-680 on the city's far western edge. According to the City of Fairfield General Plan, almonds, walnuts, and grapes are the city's primary agricultural products. Apricots, cherries, peaches, pears, prunes, and row crops are also grown.

Areas designated for agricultural purposes within the Suisun City planning area are limited. Remaining agricultural areas are primarily located east of Walters Road and south of SR 12E. Because of the high water table and poor soil conditions, these lands are used for grazing purposes only. No higher-quality farmlands are located within Suisun City limits.

According to U.S. Agricultural Census figures, the total dollar value of agricultural output in Solano County has steadily increased over the past 20 years. This trend has occurred in spite of the fact that total farmland acreage in the county has declined over the same period. Table 3.1.3-1 illustrates the trend of farmland conversion in Solano County from 1984 to 2006.

Between 1984 and 2006, 40,537 acres (1,843 acres per year) of agricultural land was converted to non-agricultural uses in Solano County. This conversion included 23,221 acres of Important Farmland at a rate of 1,056 acres per year. Approximately half of the converted acreage, or 12,689 acres, was considered Prime Farmland (California Department of Conservation 2006). During this same period, about 13,000 acres inside the cities' spheres of influence were converted to non-agricultural uses. This trend has caused local and regional governments to implement measures to preserve farmland.

In 2007, there were 265,629 acres of land held under Williamson Act contracts in Solano County. Table 3.1.3-2 and Figure 3.1.3-1 show parcels within the project area that are currently bound by Williamson Act contracts, as well as the acres that are being removed from the contract through cancellation or non-renewal.

Table 3.1.3-1. Historical Agricultural Conversion in Solano County, 1984–2006

Land Use Category	Acreage By Category[a]												Net Change	Average Annual Change
	1984	1986	1988	1990	1992	1994	1996	1998	2000[b]	2002	2004	2006		
Prime Farmland	152,225	152,261	152,044	151,795	151,525	150,796	150,865	150,356	144,667	143,210	141,575	139,536	-12,689	-577
Farmland of Statewide Importance	12,620	12,293	12,084	12,125	11,580	11,345	11,498	11,088	10,772	7,582	7,286	7,164	-5,456	-248
Unique Farmland	16,112	15,972	17,211	13,641	13,469	13,380	13,504	13,969	14,495	13,736	12,012	11,036	-5,076	-231
Important Farmland Subtotal	180,957	180,526	181,339	177,561	176,574	175,521	175,867	175,413	169,934	164,528	160,873	157,736	-23,221	-1,056
Grazing Land	220,142	218,919	208,984	205,626	203,983	204,334	202,121	199,270	201,813	201,339	201,303	202,826	-17,316	-787
Agricultural Land Subtotal	401,099	399,445	390,323	383,187	380,557	379,855	377,988	374,683	371,747	365,867	362,176	360,562	-40,537	-1,843
Urban and Built-Up Land	40,171	40,610	41,594	46,066	48,374	48,651	51,015	53,130	53,801	55,434	57,717	58,628	18,457	839
Other Land[c]	90,489	91,791	99,832	102,497	102,714	101,548	101,184	102,375	107,129	111,376	112,730	113,433	22,944	1,043
Water Area	50,612	50,524	50,622	50,621	50,726	52,316	52,182	52,182	49,695	49,696	49,749	49,749	-863	-39
Total Area Included in Inventory	582,371	582,370	582,371	582,371	582,371	582,370	582,369	582,370	582,372	582,373	582,372	582,372	1	0

Source: Solano County 1984–2006 Land Use Summary. California Department of Conservation Farmland Mapping and Monitoring Program 2006.

[a] Figures are generated from the most current version of the GIS data. Files dating from 1984 through 1992 were reprocessed with a standardized county line in the Albers Equal Area Projection and other boundary improvements.

[b] Due to the incorporation of digital soil survey data (SSURGO) in 2000, acreages for farmland, grazing and other land categories may differ from those published in the 1998–2000 Farmland Conversion Report. Water acreage also changed due to improvements to more accurately reflect the shoreline of San Pablo Bay.

[c] Other Land consists of nonagricultural land larger than 40 acres in size, and vacant land.

Table 3.1.3-2. Affected Williamson Act Lands

Map #	APN	Contract Number	Total Acres in Contract[a]
1	0027-251-330 0027-271-060	739	69.97
2	0148-260-010 0148-270-010	97	268.9
3	0148-270-340	1100	42.2
4	0150-270-050 0150-270-060	2	7.51
Total			**388.58**

Source: Solano Transportation Authority 2008.

[a] Acres for contracts 739 and 2 have been adjusted to account for land removed from these contracts by the North Connector Project which was approved by STA, May 14, 2008, and is under construction as of November 2009.

In addition to lands under Williamson Act contract, the project area includes lands restricted by conservation easements. Typically, conservation easements are legal agreements between property owners and government agencies or nonprofit organizations that permanently limit land development. Easements can restrict land to a prior use or preserve land for purposes of creating and maintaining open space. Some parcels in the project area are under both an agricultural easement and an open space easement. These easements are held by the Solano Land Trust. Table 3.1.3-3 shows the parcels in the project area that are restricted by conservation easements.

Table 3.1.3-3. Conservation Easements in the Project Area

Map #	APN	Type of Easement	Total Acres
1	0027-251-330 0027-271-060	Agricultural	69.97[a]
5	0027-251-340	Agricultural	0.15
6	0027-251-400	Agricultural	0.06
7	0027-251-420	Agricultural	0.23
8	0027-251-440	Agricultural	2.05
Total			72.46

Source: Solano Transportation Authority 2008

[a] Acres have been adjusted to account for land removed from this easement by the North Connector Project which was approved by STA, May 14, 2008, and is under construction as of November 2009.

Environmental Consequences

The method for determining affected agricultural parcels was identical to that used for determining parcel acquisitions (see Section 3.1.1). Additionally, affected acreage for each acquired agricultural parcel was determined by measuring the area of overlap between the project roadway linework and the edge of the parcel. Table 3.1.3-4 and Figures 3.1.3-2 and 3.1.3-3 show agricultural parcels affected by the proposed project alternatives. Parcels located in the footprint of more than one alternative are listed under each relevant alternative. Affected agricultural parcels in the western and central project segments are located within the Suisun Valley and the Western Hills agricultural regions.

Table 3.1.3-4. Impacted Agricultural Parcels

Map #	APN	Project Segment	Total Acreage	Impacted Acreage
Alternative B				
1	0148-260-010[a, b]	Western	256.1	19.2
2	0148-260-050[a]	Western	44.0	11.5
3	0148-260-080[a]	Western	21.7	14.1
4	0148-270-010[a, b]	Western	12.8	2.2
5	0148-270-060	Western	6.0	3.0
6	0148-270-240[a]	Western	15.0	4.8
7	0148-270-340[a, b]	Western	42.2	4.4
8	0046-050-180[a]	Western	157.6	12.5
9	0027-251-330[c, d]	Central	54.71	11.2
10	0027-271-060[b, c, d]	Central	15.26	11.3
11	0148-260-060[a]	Western	2.72	2.6
12	0027-510-160	Central	4.9	0.3
13	0150-270-050[b]	Central	7.7	1.0
14	0150-270-060	Central	10.5	2.1
15	0032-010-390	Eastern	65	23.45
16	0032-020-040	Eastern	5	3.28
17	0032-020-140	Eastern	21.51	10.05
18	0032-020-160	Eastern	4.54	1.91
Total			**747.24**	**138.89**
Alternative B, Phase -1				
	No Agricultural Parcels Impacted		0	0
Alternative C				
1	0148-260-010[a, b]	Western	256.1	19.3
2	0148-260-050[a]	Western	44.0	10
3	0148-260-080[a]	Western	21.7	13.7
4	0148-270-010[a, b]	Western	12.8	3.9
5	0148-270-060	Western	6.0	4.5
6	0148-270-240[a]	Western	15.0	6.8
7	0148-270-340[a, b]	Western	42.2	4.6
8	0046-050-180[a]	Western	157.6	11.8
9	0027-251-330[c, d]	Central	54.71	11.2
10	0027-271-060[b, c, d]	Central	15.26	11.3
12	0027-510-160	Central	4.85	0.27
13	0150-270-050[b]	Central	7.66	1.01
14	0150-270-060	Central	10.47	2.05
15	0032-010-390	Central	65	7.06
16	0032-020-040	Central	5	0.87
17	0032-020-140	Central	21.51	8.6
18	0032-020-160	Central	4.54	2.83
19	0148-260-060[a]	Western	2.72	2.6
Total			**747.12**	**122.39**
Alternative C, Phase -1				
1	0148-260-010[a, b]	Western	256.1	19.3
2	0148-260-050[a]	Western	44.0	10
3	0148-260-080[a]	Western	21.7	13.7
4	0148-270-010[a, b]	Western	12.8	3.9
5	0148-270-060	Western	6.0	4.5

Map #	APN	Project Segment	Total Acreage	Impacted Acreage
6	0148-270-240[a]	Western	15.0	6.8
7	0148-270-340[a, b]	Western	42.2	4.6
8	0046-050-180[a]	Western	157.6	11.8
19	0148-260-060[a]	Western	2.72	2.6
Total			**680.51**	**77.2**

Source: Solano County Assessor's Office 2007.
[a] Not Prime Farmland.
[b] Williamson Act Parcels.
[c] Valine Conservation Easement.
[d] Total Acreage adjusted to account for land removed by the North Connector Project which was approved by STA, May 14, 2008, and is under construction as of November 2009.

The federal AD-1006 Farmland Conversion Impact Rating form, which was completed in conjunction with the NRCS, allows the alternatives of the proposed project to be assessed for their impact on the viability of farmlands. This assessment helps to determine the impact each alternative might have on the farmlands in the project area. Correspondence with the NRCS and the completed AD-1006 Farmland Conversion Impact Rating form are contained in Appendix E.

For purposes of NEPA analysis, the assessment rates the impact of a proposed project on the basis of a scoring system. Specific criteria related to agricultural viability are examined by both the NRCS and the federal agency involved. Each criterion has a set number of points it may be awarded. A project's point total is compared to the "significance score" created by the U.S Department of Agriculture. If the total site assessment is less than 160 points, a minimal level of consideration of protection would be given, but no further alternative analysis would be needed. The completed form may be found in Appendix E. The Farmland Conversion Impact Ratings for Alternatives B and C are 137.7 and 134.3 respectively which are below the "significance score" of 160 points. As such, the NEPA analysis concludes that the proposed project would not adversely affect agriculture.

Direct Conversion of Farmland

Alternative B would affect 18 parcels, converting roughly 140 acres of agricultural land to roadway, while Alternative B, Phase 1 would not affect agricultural land. Alternative B would encroach upon 48.76 acres of land held in Williamson Act contracts. Additionally, Alternative B would affect 22.5 acres of land protected by the Valine Ranch Conservation Easement through construction of the westbound truck scales relocation.

Alternative C would affect 19 parcels, converting roughly 122 acres of agricultural land, while Alternative C, Phase 1 would affect nine parcels, converting roughly 77 acres of agricultural land.

Affected farmlands in the western segment are not categorized as Prime Farmland and are used for dryland grazing. Prime Farmland in the central segment between Dan Wilson Creek and Suisun Creek have already been approved for development of a mixed-use project (Fairfield Corporate Commons Project) and is therefore not included in calculation of affected farmland. Alternative C would affect 22.5 acres of land protected by the Valine Ranch Conservation Easement and 40 acres of land under a Williamson Act contract through construction of the

westbound truck scales relocation. Alternative C, Phase 1 would affect 27.8 acres of land under Williamson Act contract.

Based on the results of the Farmland Conversion Impact Rating , neither Alternative B nor Alternative C would result in a substantial adverse effect on farmland and therefore Alternatives B, Phase 1 and Alternative C, Phase 1, because they represent a subset of improvements under Alternatives B and C, would also not result in a substantial adverse effect on farmlands.

The No-Build Alternative would make no physical changes and therefore would have no effect on existing agricultural uses.

Conversion of Agricultural Lands under Williamson Act Contracts

Alternative B, Alternative C, and Alternative C, Phase 1 would not be able to avoid the conversion of land held in Williamson Act contracts in the vicinity of the extension of Red Top Road to Business Center Drive and in the area of the westbound truck scales relocation. The affected portion of the Williamson Act parcels would be removed from the Williamson Act contract by cancellation, upon acquisition by the Department. The remainder of the parcels would be unaffected. Because Williamson Act contracts are related to the tax status of the parcel, and since the remainder of the Williamson Act contract would remain in place, this is not considered an adverse effect.

Alternative B, Phase 1 would not include construction in the vicinity of any Williamson Act parcels and therefore no conversion of lands under Williamson Act contracts would result. The No-Build Alternative would not result in any physical changes to the project area and therefore, would have no effect on lands under Williamson Act Contracts.

Conversion of Agricultural Lands under Conservation Easements

Lands under the Valine Conservation Easement would also be affected by the proposed project. Both Alternative B and C would result in the acquisition and conversion of all of this land between the North Connector and I-80 for the westbound truck scales, approximately 22.5 acres. Because a conservation easement has been placed over this land, it is considered to have higher agricultural value than other agricultural land in the project area.

The No-Build Alternative would not result in any physical or land use changes and therefore would have no effect on agricultural lands under conservation easements.

Avoidance, Minimization, and/or Mitigation Measures

The Department's *Environmental Handbook Volume 4, Community Impact Assessment*, Section 4-5.3 offers many possible mitigation measures for significant impacts on agriculture. They include choosing alternative alignments that would avoid farmland altogether, or that would convert fewer acres of farmland or take other farmland that has a lower relative value. However, Alternatives B and C have very similar impacts on agricultural lands in terms of the number of parcels and total acreage affected. Of the fundable first phases, Alternative B, Phase 1 would affect the least amount of agricultural land. The manual lists a number of measures to mitigate

farmland impacts, of which the proposed project has implemented the use of concrete median barriers instead of wider medians.

Compensate for Conversion of Important Farmland

Under NEPA, based on the results of the Farmland Conversion Impact Rating, the project alternatives will not result in a substantial adverse effect to farmlands. Under CEQA, the Department will, however, mitigate for agricultural impacts, on a case by case basis, in a quantity or ratio according to professional judgement based on local plans, the type of farmland, and economic impacts. In this project, important farmland ("prime farmlands") will be mitigated at a 1:1 ratio (one acre protected for every one acre affected). Farmlands under an agricultural conservation easement will be mitigated at a slightly higher ratio, 1.25:1.

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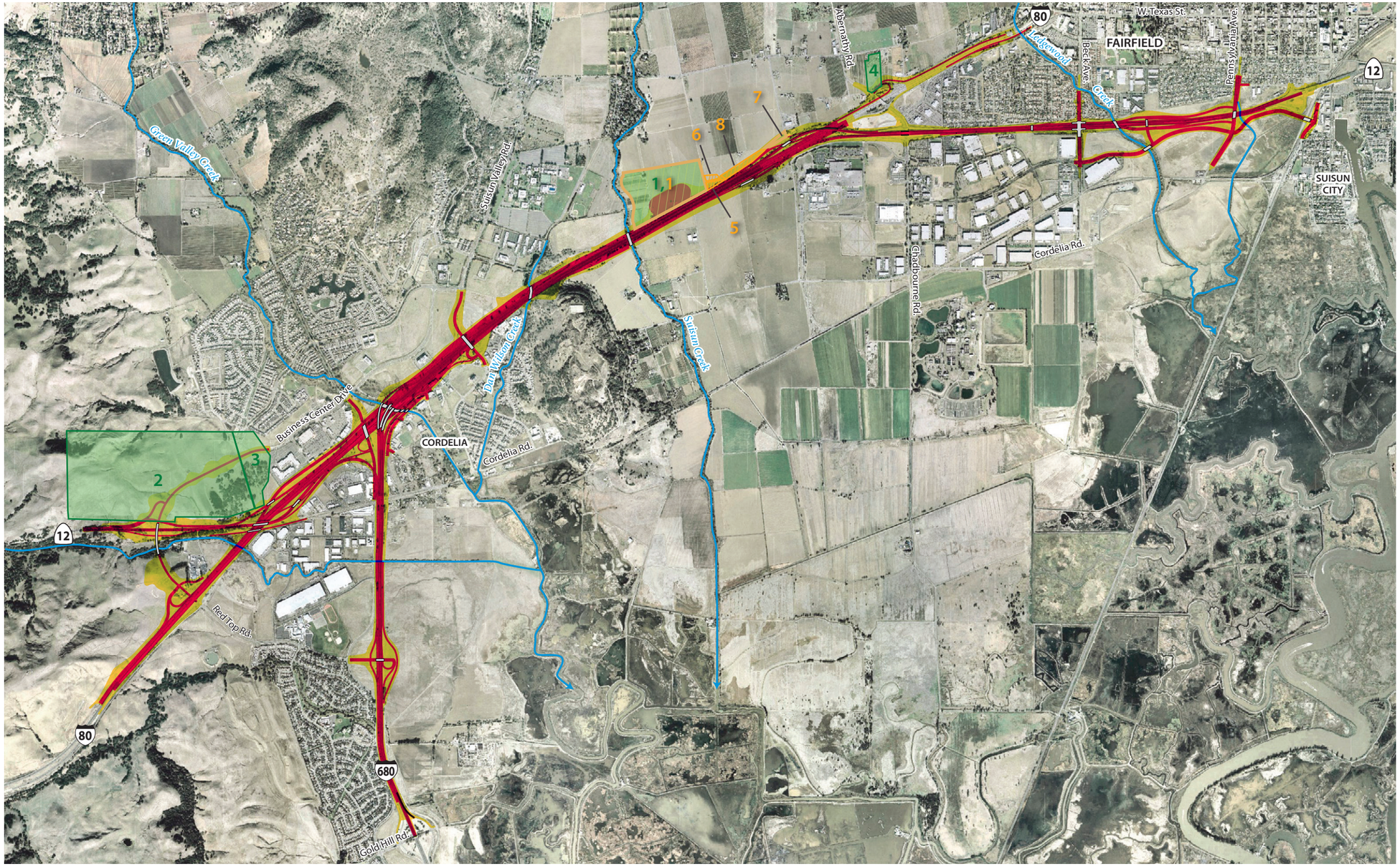

Figure 3.1.3-1
Lands under Williamson Contract and Conservation Easements

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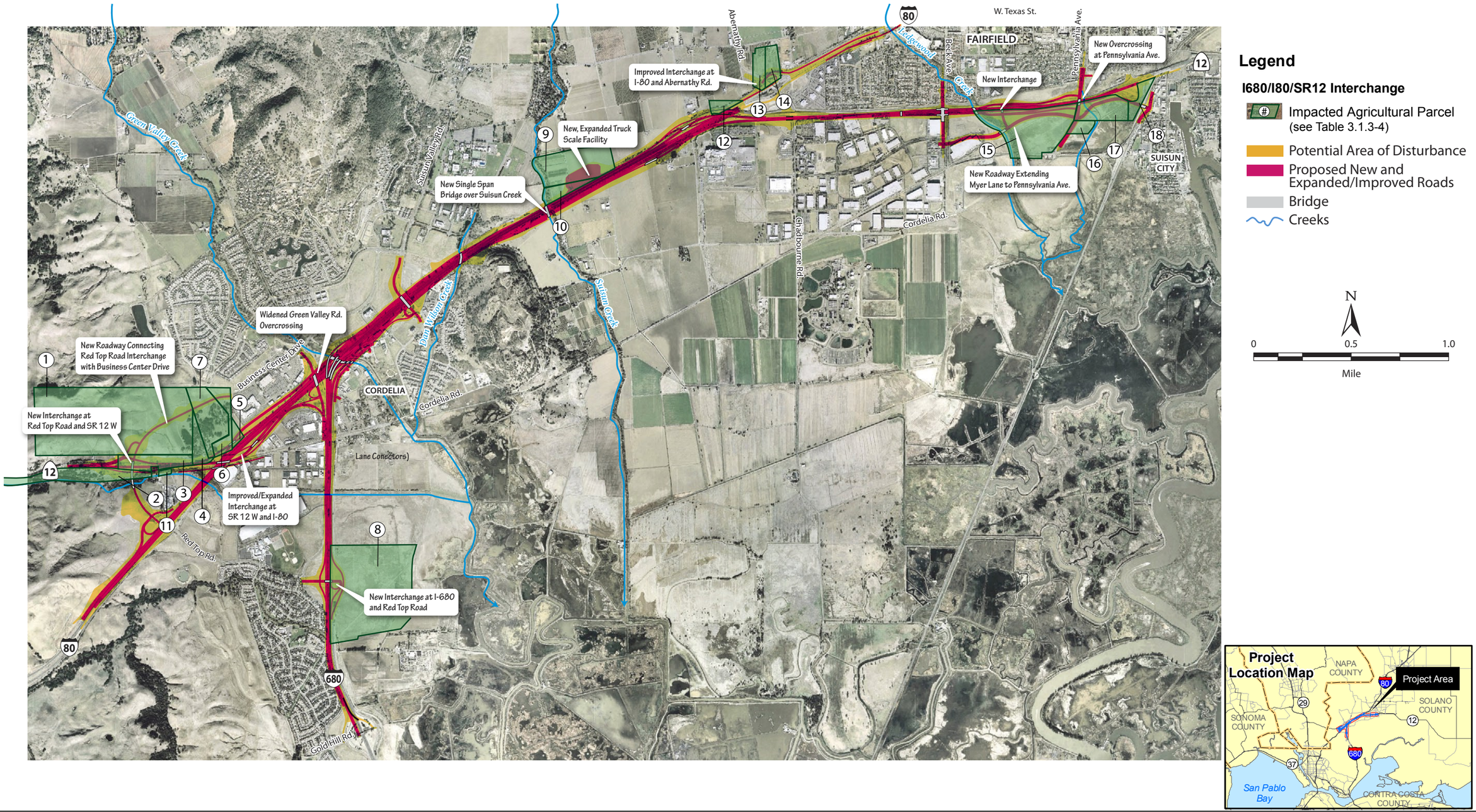

Figure 3.1.3-2
Alternative B: Impacted Agricultural Parcels

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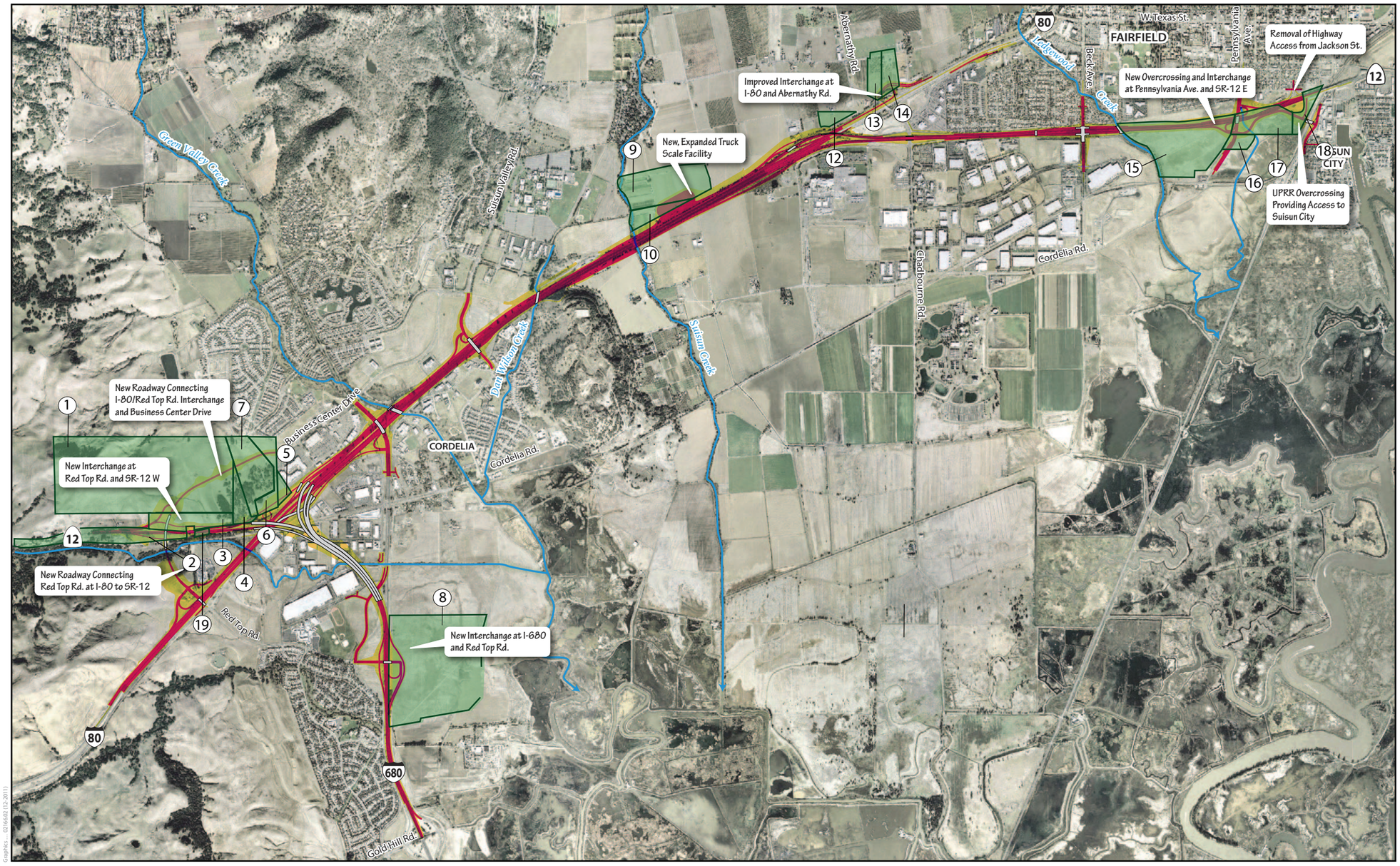

Legend

I680/I80/SR12 Interchange

- Impacted Agricultural Parcel (see Table 3.1.3-4)
- Potential Area of Disturbance
- Proposed New and Expanded/Improved Roads
- Bridge
- Creeks

N

0 0.5 1.0

Mile

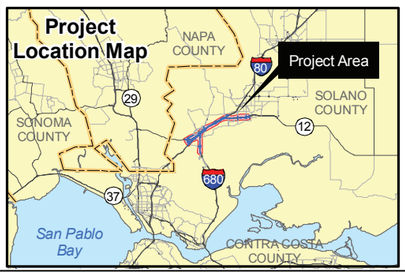

Figure 3.1.3-3
Alternative C: Impacted Agricultural Parcels

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3.1.4 Community Impacts

3.1.4.1 Community Character and Cohesion

Regulatory Setting

The National Environmental Policy Act of 1969 as amended (NEPA), established that the federal government use all practicable means to ensure that all Americans have safe, healthful, productive, and aesthetically and culturally pleasing surroundings (42 U.S.C. 4331[b][2]). The Federal Highway Administration in its implementation of NEPA (23 U.S.C. 109[h]) directs that final decisions regarding projects are to be made in the best overall public interest. This requires taking into account adverse environmental impacts, such as destruction or disruption of human-made resources, community cohesion, and the availability of public facilities and services.

Under the California Environmental Quality Act, an economic or social change by itself is not to be considered a significant effect on the environment. However, if a social or economic change is related to a physical change, then social or economic change may be considered in determining whether the physical change is significant. Since this project would result in physical change to the environment, it is appropriate to consider changes to community character and cohesion in assessing the significance of the project's effects.

Affected Environment

For the purposes of this analysis, the study area was defined by available statistical data describing Solano County, the cities of Fairfield and Suisun City, and eleven 2000 Census Tract Block Group areas that encompass the project area and its environs. The information below is summarized from the CIA prepared for the proposed project.

Solano County's land use pattern is one of city-centered growth focused around six urban areas separated by land designated for intensive and extensive agricultural uses. The six urban areas are Vallejo/Benicia, Cordelia, Fairfield/Suisun, Vacaville, Dixon, and Rio Vista. Approximately 45,000 acres in the county are designated for residential uses, of which 30,000 acres are in urban areas. In addition, 5,500 acres are designated for commercial development and 20,000 acres are designated for industrial uses. Of these designations, 11,400 acres are within urban areas. The majority of the county's land area, 314,200 acres, is devoted to extensive and intensive agriculture. An additional 119,500 acres are designated as multi-use marsh and watershed.

The study area is in the southwestern part of Solano County and occupies unincorporated land (primarily in the central segment of the proposed project), as well as portions of the cities of Fairfield (both western and eastern segments of the proposed project) and Suisun City (eastern segment of the proposed project). Much of the project area is in Fairfield, including its Cordelia community.

The primary land use in Fairfield is residential, followed by commercial and industrial uses. Travis Air Force Base, the city's largest employer, occupies most of the area adjacent to the eastern end of the city. Central Fairfield includes some of the oldest residential neighborhoods in Solano County. Various commercial corridors exist within the city, primarily centered along

major streets within central Fairfield and along portions of the I-80 and SR 12 corridors. Industrial uses are generally clustered in areas adjacent to the existing I-80/I-680/SR 12 interchange, south of SR 12 immediately west of Suisun City, and immediately west and north of Travis Air Force Base.

Suisun City was historically a regional transportation and commercial hub due to the city's location midway between the agricultural areas of the Central Valley, Sacramento, and San Francisco and its easy access to the San Francisco Bay System via the Suisun Channel. The city is separated from Fairfield by the UPRR alignment and SR 12E. The only currently operational passenger rail terminal in Solano County is in Suisun City. Land use in Suisun City is predominantly residential, with commercial and limited industrial uses centered around the downtown area and along major thoroughfares.

Western Segment

Land uses at the western end of this segment consist primarily of agricultural land used for grazing. A small highway-oriented commercial area (gas station, fast food) is located at the I-80/Red Top Road interchange. A dairy distribution facility and rural residential uses are located between I-80 and SR 12W and north of SR 12W. See Figures 3.1.4-1 and 3.1.4-2 for aerial views of the project area.

As I-80 and SR 12W converge, land uses change dramatically. To the north is a major retail shopping and commercial center, which includes a Costco, a Safeway, and other regional retailers. To the south, the predominant land use is industrial, with many warehouses and distribution businesses. Commercial uses such as gas stations, car dealerships, and smaller retail outlets are located in areas immediately visible from the I-80 and I-680 freeways.

Along I-680, land uses to the west are dominated by residential subdivisions, with commercial and retail uses at major intersections. Rodriguez High School fronts approximately half of the north side of Red Top Road between I-680 and Lopes Road. Land uses to the east include residential and retail uses in the community of Cordelia. In general, the area south of Cordelia Road and east of I-680 comprises agricultural and open space uses at the edge of the Suisun Marsh.

Land uses along I-80 between I-680 and Suisun Valley Road are characterized by a large commercial/office park to the north and smaller retail/highway-oriented commercial uses to the south, including motels, gas stations, and fast food outlets centered around the I-80/Suisun Valley Road interchange.

Central Segment

Along I-80, from Suisun Valley Road to SR 12E, land uses on the north side are characterized by vacant lands between Suisun Valley Road and Suisun Creek that are now under construction as a mixed-use development (Fairfield Corporate Commons Project) and the existing westbound truck scales facility. East of Suisun Creek, land uses are primarily agricultural with scattered residential and commercial uses (farm equipment sales). To the south, freeway commercial (hotel and RV sales), retail (fast food and gas stations), and a recreation center are located near the I-80/Suisun Valley Road interchange. Farther east, land uses are agricultural with scattered residential uses and the eastbound truck scales facility, which is planned to be relocated to the

east as part of a separate project. At the eastern end of the segment, land uses change to include a large industrial use (Budweiser brewery) that extends along SR 12E.

Eastern Segment

Land uses along the north side of SR 12E comprise commercial uses focused along Chadbourne Road, including several large auto dealerships. Farther east, land uses are dominated by residential neighborhoods with scattered commercial/retail uses along Beck and Pennsylvania Avenues. Along the south side of SR 12E, land uses primarily include industrial warehouses and distribution centers off Beck and Pennsylvania Avenues. Farther east of Pennsylvania Avenue to Suisun City, the predominant land use on the north side of SR 12E is residential, while the south side is predominantly undeveloped land. The portion of the project area within Suisun City consists primarily of older, small industrial and retail uses adjacent to the UPRR alignment.

Environmental Consequences

Impacts on communities arising from transportation projects are generally related to division of existing neighborhoods, or disruption of the perceived urban "fabric" of a neighborhood. This is a particularly sensitive issue in ethnic neighborhoods. However, transportation projects may also increase cohesion within neighborhoods by diverting vehicular traffic to other roadways and increasing the desirability of pedestrian activity through a neighborhood.

All the build alternatives would result in the expansion of existing freeways and highways in the project area. This expansion would result in impacts on individual parcels and displacement of a number of commercial, retail, and industrial businesses. However, these effects would not result in the separation or disruption of an existing neighborhood. Because the displaced businesses in these areas are predominantly highway and regional commercial or industrial enterprises, they are not inherently tied to the character of local neighborhoods, but rather are typically large corporate franchises such as fast food restaurants and gas stations. As such, their removal would not significantly affect the cohesiveness of the local community.

Alternative C may have a beneficial effect on the community of Cordelia, because this alternative would reconstruct the alignment of I-680 farther to the west to connect with I-80 and SR 12W, moving the I-680 freeway farther from established residential areas in Cordelia. Manufacturing, warehousing, and light industrial facilities in the western segment would primarily be displaced by the realignment of I-680 under Alternative C.

In the central segment, the predominant land use is agricultural. However, one residence would be displaced as a result of constructing the westbound truck scales relocation and one business would be displaced by the interchange improvements at Abernathy Road. The residence and the business are both surrounded by agricultural land, adjacent to I-80 and are not part of a larger neighborhood that would be affected by their removal. Because the land use pattern in the central segment consists of large agricultural parcels, the proposed project would not significantly affect the cohesiveness of the local community.

In the eastern segment, Alternatives B and C would displace a number of businesses in downtown Suisun City. Because these businesses are located on the western perimeter of the downtown, their displacement would not be divisive. Additionally, most of the businesses are industrial/manufacturing concerns. As such, they are not destinations for shoppers or pedestrians and do not contribute to the character of the downtown neighborhood. Therefore, it is reasonable to conclude that their displacement would not significantly affect Suisun City's downtown neighborhood.

Under the fundable first phases, the effects would be similar to those of the associated full build alternatives, but less extensive (see Tables 3.1.4-2 and 3.1.4-4).

The No-Build Alternative would not change the existing environment and therefore would not result in any effects on community character and cohesion.

Avoidance, Minimization, and/or Mitigation Measures

Because the proposed project would not significantly affect the character and/or cohesiveness of the local community, no avoidance, minimization, and/or mitigation measures would be required.

3.1.4.2 Relocations and Real Property Acquisition

Regulatory Setting

The Department's Relocation Assistance Program (RAP) is based on the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended) and Title 49 Code of Federal Regulations (CFR) Part 24. The purpose of RAP is to ensure that persons displaced as a result of a transportation project are treated fairly, consistently, and equitably so that such persons will not suffer disproportionate injuries as a result of projects designed for the benefit of the public as a whole. See Appendix D for a summary of the RAP.

All relocation services and benefits are administered without regard to race, color, national origin, or sex in compliance with Title VI of the Civil Rights Act (42 U.S.C. 2000d, et seq.). See Appendix C for a copy of the Department's Title VI Policy Statement.

Affected Environment

Existing land uses in the project area and surrounding region are discussed in detail in Section 3.1.1, "Land Use." Right-of-way will be acquired along the existing alignments of I-80/I-680/ SR 12 under Alternative B. Alternative C would require acquisition of right-of-way along these same roadways plus additional right-of-way to the west of I-680. The general locations of right-of-way acquisitions are discussed under Section 3.1.4.1, "Community Character and Cohesion." Tables 3.1.4.1 through 3.1.4.4 below identify the specific residences, and business that would be displaced by the proposed project.

Environmental Consequences

Displacement of Residences and Businesses

The methodology for determining affected land uses included overlaying the proposed right-of-way requirements for each alternative on a Solano County Assessor's Parcel Number (APN) map and on an aerial photograph. Maps depicting the roadway geometry and right-of-way regents used in this analysis were developed by the project engineers and are on file at the Department. Tables 4.1-1 and 4.1-2 of the project CIA provide a complete list of the parcels that would be affected by the alternatives.

Where the proposed right-of-way overlapped a parcel, that parcel was considered affected by the proposed project. For parcels that did not fall completely within the right-of-way lines, those where less than 50% of the total parcel area was overlapped by the proposed right-of-way were considered partial acquisitions unless the affected portion of the parcel contained the primary structure (business or residence) on the property. Where more than 50% of the parcel would be overlapped, the parcel was considered to be fully acquired by the project alternative.

A parcel is considered affected if land from that parcel is needed for either temporary construction activities or permanent roadway or associated facilities. Effects can range from partial acquisition of a parcel, in which the existing use would not be displaced and could continue without significant change, to full acquisition of the parcel and displacement of the existing land use.

Alternative B would affect approximately 228 parcels in total. Approximately 27 of the parcels would be full acquisitions and 201 would be partial acquisitions. Appendix I contains a complete list of affected parcels under Alternative B. The majority of the parcels consist of retail and commercial land uses, primarily south of I-80 between I-680 and Suisun Valley Road, which would be affected by the widening of the existing I-680/I-80 interchange complex and I-80 main line; and agricultural/grazing lands north of I-80 from Red Top Road to SR 12W and Business Center Drive, which would be affected by the extension of Red Top Road to Business Center Drive and the new Red Top Road/ SR 12W interchange. Based on a 2008 reconnaissance survey of the project area, an estimated 56 businesses (including vacant spaces) would be displaced.

Alternative B, Phase 1 would affect approximately 72 parcels. Appendix I contains a complete list of affected parcels under Alternative B, Phase 1. Five parcels would be full acquisitions and 67 parcels would be partial acquisitions. Based on a 2008 reconnaissance survey of the project area, an estimated 21 businesses (including vacant spaces) would be displaced.

Alternative C would affect approximately 176 parcels in total; 32 would be full acquisitions and roughly 144 would be partial acquisitions. Appendix I contains a complete list of affected parcels under Alternative C. The predominant land use of the parcels affected by the realignment of I-680 and the new I-680/I-80/SR 12W interchange that would be constructed under this alternative is industrial and warehousing, mainly located south of I-80 and west of I-680. Due to the realignment of Lopes Road to avoid a small area of landscaping beyond the outfield fence of the Rodriguez High School's softball field, no impacts would occur on this parcel. A portion of

the former Green Valley Middle School location owned by the Fairfield-Suisun Unified School District (FSUSD) would be acquired for the PG&E valve lot relocation; this site is currently vacant. Based on a 2008 reconnaissance survey of the project area, an estimated 49 businesses (including vacant spaces) would be displaced.

Alternative C, Phase 1 would affect approximately 63 parcels. Appendix I contains a complete list of affected parcels under Alternative C, Phase 1. Nine parcels would be full acquisitions and 54 parcels would be partial acquisitions. Due to the realignment of Lopes Road to avoid a small area of landscaping beyond the outfield fence of the Rodriguez High School's softball field, no impacts would occur on this parcel. A portion of the former Green Valley Middle School location owned by the Fairfield-Suisun Unified School District (FSUSD) would be acquired for the PG&E valve lot relocation; this site is currently vacant. Based on a 2008 reconnaissance survey of the project area, an estimated 22 businesses (including vacant spaces) would be displaced. All of the businesses displaced by these two alternatives are located in Fairfield.

All of the alternatives would result in the displacement of businesses. The majority of the businesses that would be displaced by the alternatives are established businesses (e.g., auto repair, furniture, appliances sales). Newer businesses (e.g., Starbucks, fast food outlets) that would be displaced are located in the vicinity of the I-80/Suisun Valley interchange. Most of the businesses that are considered to be declining and that would be displaced are located in the eastern segment of the proposed project in Suisun City.

Table 3.1.4-1 lists the 56 businesses displaced under Alternative B; Figure 3.1.4-1 shows their locations. Most displacements associated with Alternative B would occur in the western segment of the alignment along the south side of I-80. As discussed above, these businesses are predominantly highway-oriented service commercial uses in the Cordelia area. They include relatively new facilities, as well as older facilities dating to the 1970s or earlier.

Table 3.1.4-1. Alternative B Displaced Businesses

Map #	APN	Size of Parcel (acres)	Business	Reason for Displacement
Western Segment				
1	0045-300-070	0.44	Fairfield Suisun Unified School District (two buildings, vacant), Central Way	Widening of I-680/I-80 interchange
2	0045-300-080	1.70	California's Teacher's Association (one building), 4751 Central Way	Realignment of local roads
3	0045-300-350	0.01	Continental Auto Glass, 4737 Central Way Vacant Space, 4739 Central Way Cordelia Automotive, 4741 Central Way Warehouse Furniture, 4743 Central Way	Realignment of local roads
4	0045-300-370	0.20	Metro II, 4733 Central Way Anyone's Off-Road & Custom, 4733 Central Way Al's Tile and Marble Fino, 4733 Central Way	Realignment of local roads
5	0045-300-360	0.19	Room Express Furniture (one building), 4731 Central Way	Realignment of local roads
6	0045-300-200	0.001	Ponder Environmental Services, 125 Grobric Court	Realignment of local roads
7	0045-300-290	0.27	California Marine Sports, 101 Grobric Court	Realignment of local roads
8	0045-310-010	1.75	Pearson's Appliance & TV, 4685 Central Way	Realignment of local roads
9	0045-310-860	1.62	Jack in the Box (one building), 4490 Central Way Chevron Gas Station (one building), 4490 Central Way	Widening of I-80
10	0045-310-850	0.50	Starbucks (one building), 4470 Central Way	Widening of I-80
11	0045-340-110	0.17	Scandia Family Center (part of mini golf course), 4300 Central Way	Widening of I-80
12	0180-010-050	0.86	Sunnyside Farms (one building), 199 Red Top Road	I-80/Red Top Road interchange
13	0045-300-260	0.11	Statewide Safety & Signs Inc., 130 Grobric Court	Realignment of local roads
14	0148-260-040	0.51	Government Land (one building), 1827 SR 12	Widening of SR 12
15	0045-310-550	0.04	Golf Shop, 104 Commerce Court Campways, 104 Commerce Court	Realignment of local roads
16	0045-310-650	3.19	Davita Fairfield Dialysis, 4670 Central Way Boot Barn Western & Work Wear, 4670 Central Way Bischoff's Medical Supplies, 4670 Central Way Ultimate Water Sports, 4670 Central Way	Realignment of local roads
17	0045-310-660	2.71	Cordelia Junction Antiques Lounge	Realignment of local roads
18	0180-120-150	0.32	Ashley Furniture Homestore (one building), 4865 Auto Plaza Court	Widening of I-680/I-80 interchange
19	0180-110-240	3.36	ARCO Gas (one building), 4800 Auto Plaza Court	Widening of I-680/I-80 interchange
20	0045-300-030	0.19	Residential House Showroom (one building), 4912 Central Way	Widening of I-680/I-80 interchange
21	0045-300-040	0.19	SFR Land (one building, old shack), Central Way	Widening of I-680/I-80 interchange
22	0180-110-040	1.91	Saturn Dealership (one building), 4850 Auto Plaza Court	Widening of I-680/I-80 interchange
	0045-310-880	1.05	Leased Commercial Land, 103 Commerce Court Furniture Expo, 103 Commerce Court Frellen's Casual & Outdoor Furniture, 103 Commerce Court Vacant Space, 103 Commerce Court	Realignment of local roads

Map #	APN	Size of Parcel (acres)	Business	Reason for Displacement
Central Segment				
23	0027-271-060	11.05	Garage/Sheds/Barns/Home (seven buildings, one residential), 4018 Russell Road	Interchange improvements at Abernathy Road
24	0150-270-080	0.99	Suisun Family Fruit Growers (two buildings), 4163 Chadbourne Road	Interchange improvements at Abernathy Road
25	0150-240-020	0.18	Suisun Family Fruit Growers (two buildings), 4162 Chadbourne Road	Widening of I-80 and truck scales relocation
Eastern Segment				
26	0032-081-310	0.03	Suisun Roofing Supply (one building), 260 Benton Court	Road extension to downtown Suisun City
27	0032-081-060	0.21	Suisun Roofing Supply (one building), 263 Benton Court	Road extension to downtown Suisun City
28	0032-081-030	0.21	One Building, 241 Benton Court	Road extension to downtown Suisun City
29	0032-052-210	0.33	The Hitman, 229 Benton Court Clear Image, 225 & 227 Benton Court Marine Industrial Fire Safety, 223 Benton Court Castle Rock Construction, 221 Benton Court	Road extension to downtown Suisun City
30	0032-052-100	0.10	Xtreme Cyclez, 213 & 215 Benton Court Rich Campbell, 211 Benton Court Vacant Space, 209 Benton Court Iron Riders Inc., 207 Benton Court	Road extension to downtown Suisun City
31	0032-052-090	0.04	Kyron's Body Shop, 205 Benton Court Tweed Hut, 201 Benton Court	Road extension to downtown Suisun City
32	0032-052-120	0.04	Tidy Tails, 305 Spring Street Osaka Massage, 311 Spring Street Good Life Health Spa, 313 Spring Street	Road extension to downtown Suisun City
	0032-081-040	0.20	Vacant Space (two buildings), 247 Benton Court	Road extension to downtown Suisun City

Source: I-80/I-680/SR 12 Interchange Community Impact Assessment, 2008.
Note: Appendix I contains a complete list of affected parcels under Alternative B.

Table 3.1.4-2 lists the 21 businesses, all in Fairfield, which would be displaced as a result of Alternative B, Phase 1. Because this Alternative is a subset of Alternative B, the displacements under Alternative B, Phase 1 would be a subset of those under Alternative B, and the character of displacement would also be similar.

Table 3.1.4-2. Alternative B, Phase 1 Displaced Businesses

Map #	APN	Size of Parcel (Acres)	Business	Reason for Displacement
Western Segment				
1	0045-300-070	0.39	Fairfield Suisun Unified School District (two buildings, vacant), Central Way	Widening of I-680/I-80 interchange
2	0045-300-080	1.70	California's Teacher's Association (one building), 4751 Central Way	Realignment of local roads
3	0045-300-350	0.01	Continental Auto Glass, 4737 Central Way Vacant Space, 4739 Central Way Cordelia Automotive, 4741 Central Way Warehouse Furniture, 4743 Central Way	Realignment of local roads
4	0045-300-370	0.20	Metro II, 4733 Central Way Anyone's Off-Road & Custom, 4733 Central Way Al's Tile and Marble Fino, 4733 Central Way	Realignment of local roads
5	0045-300-360	0.19	Room Express Furniture (one building) 4731 Central Way	Realignment of local roads
6	0045-300-200	0.001	Ponder Environmental Services 125 Grobric Court	Realignment of local roads
7	0045-300-290	0.54	California Marine Sports 101 Grobric Court	Realignment of local roads
8	0045-310-010	1.75	Pearson's Appliance & TV 4685 Central Way	Realignment of local roads
9	0045-310-860	1.62	Jack in the Box (one building) 4490 Central Way Chevron Gas Station (one building) 4490 Central Way	Widening of I-80
10	0045-310-850	0.50	Starbucks (one building), 4470 Central Way	Widening of I-80
11	0045-340-110	0.17	Scandia Family Center (part of mini golf course), 4300 Central Way	Widening of I-80
33	0045-310-880	1.05	Leased Commercial Land, 103 Commerce Court Furniture Expo, 103 Commerce Court Frellen's Casual & Outdoor Furniture, 103 Commerce Court Vacant Space, 103 Commerce Court	Realignment of local roads

Source: I-80/I-680/SR 12 Interchange Community Impact Assessment, 2008.
Note: Appendix I contains a complete list of affected parcels under Alternative B, Phase 1.

Table 3.1.4-3 lists the 49 businesses displaced under Alternative C; Figure 3.1.4-2 shows their locations. Most displacements associated with Alternative C would occur in the western segment of the alignment, between the I-80 and I-680 corridors. In contrast to the highway-oriented businesses displaced under Alternative B, Alternative C would displace industrial and warehouse uses that lie west of the current SR 12 interchange.

Table 3.1.4-3. Alternative C Displaced Businesses

Map #	APN	Size of Parcel (Acres)	Business	Reason for Displacement
Western Segment				
1	0180-130-090	0.95	UMA Solar, 499A Edison Court Formaggi Di Ferrant, 499A2 Edison Court The Picture Company, 499B Edison Court California Imaging, 499C Edison Court Vacant Space, 499D Edison Court	Realignment of I-680
2	0180-130-080	1.68	Vacant Space, 495A Edison Court Vacant Space, 495D Edison Court SDH Enterprises, 495B&C Edison Court	Realignment of I-680
3	0180-130-070	1.21	Fire Department, 473 Edison Court O'Hara Metal, 473 Edison Court Clothes Recycle Center, 5005 Fulton Drive	Realignment of I-680
4	0180-130-050	1.85	Valley Rubber & Gasket, 5045 Fulton Drive Family Celebration Center, 5045 Fulton Drive	Realignment of I-680
5	0180-030-060	1.00	Marin Medical, 497A Edison Court Don's Transport/Liquid Trends Northbay, 497B Edison Court Brewer Metal Products, 497C Edison Court Super Store Industries, 497D & E Edison Court Euro-Machines, 497F & G Edison Court	Realignment of I-680
6	0180-140-180	1.48	Woodline Cabinets (one building), 5165 Fulton Drive	Realignment of I-680
7	0180-140-030	Unknown	Pacific Coast Steel (one building), 5160 Fulton Drive	Realignment of I-680
8	0180-140-060	2.00	Unknown (1 building), 355 Watt Drive	Realignment of I-680
9	0180-010-050	0.71	Sunnyside Farms (one building), 199 Red Top Road	I-80/Red Top Road realignment
10	0180-140-040	2.14	Beutter Corp., 5170 Fulton Drive Ciesco, 5170 Fulton Drive	Realignment of I-680
11	0045-310-860	0.34	Jack in the Box (one building), 4490 Central Way Chevron Gas Station (one building), 4490 Central Way	Widening of I-80
12	0045-340-110	0.51	Scandia Family Center (part of mini golf course), 4300 Central Way	Widening of I-80
Central Segment				
13	0027-271-060	11.05	Garage/Sheds/Barns/Home (seven buildings, one residential), 4018 Russell Road	Widening of I-80 and truck scales relocation
14	0150-270-080	0.99	Suisun Family Fruit Growers (two buildings), 4163 Chadbourne Road	Interchange improvements at Abernathy Road
15	0150-240-020	0.18	Suisun Family Fruit Growers (two buildings), 4162 Chadbourne Road	Interchange improvements at Abernathy Road
Eastern Segment				
16	0032-020-210	1.51	Fairfield Suisun Sewer Distribution, Unknown	Realignment of Jackson Street on ramp.
17	0032-052-100	0.10	Xtreme Cyclez, 213 & 215 Benton Court Rich Campbell, 211 Benton Court Vacant Space, 209 Benton Court Iron Riders Inc., 207 Benton Court	Road extension to downtown Suisun City
18	0032-052-090	0.04	Kyron's Body Shop, 205 Benton Court Tweed Hut, 201 Benton Court	Road extension to downtown Suisun City
19	0032-052-120	0.04	Tidy Tails, 305 Spring Street Osaka Massage, 311 Spring Street Good Life Health Spa, 313 Spring Street	Road extension to downtown Suisun City

Map #	APN	Size of Parcel (Acres)	Business	Reason for Displacement
20	0032-052-210	0.33	The Hitman, 229 Benton Court Clear Image, 225 & 227 Benton Court Marine Industrial Fire Safety, 223 Benton Court Castle Rock Construction, 221 Benton Court	Road extension to downtown Suisun City
21	0032-081-030	0.21	Unknown (one building), 241 Benton Court	Road extension to downtown Suisun City
22	0032-081-040	0.20	Vacant Space (two buildings), 247 Benton Court	Road extension to downtown Suisun City
23	0032-081-060	0.20	Suisun Roofing & Supply (one building), 263 Benton Court	Road extension to downtown Suisun City
24	0032-081-310	0.02	Suisun Roofing & Supply (one building), 260 Benton Court	Road extension to downtown Suisun City

Source: I-80/I-680/SR 12 Interchange Community Impact Assessment, 2008.
Note: Appendix I contains a complete list of affected parcels under Alternative C.

Table 3.1.4-4 lists the 22 businesses, all in Fairfield, which would be displaced as a result of Alternative C, Phase 1. Because this Alternative is a subset of Alternative C, the displacements under Alternative C, Phase 1 would be a subset of those under Alternative C, and the character of displacement would also be similar.

Table 3.1.4-4. Alternative C, Phase 1 Displaced Businesses

Map #	APN	Size of Parcel (Acres)	Business	Reason for Displacement
Western Segment				
1	0180-130-090	0.95	UMA Solar, 499A Edison Court Formaggi Di Ferrant,499A2 Edison Court The Picture Company, 499B Edison Court California Imaging, 499C Edison Court Vacant Space, 499D Edison Court	Realignment of I-680
2	0180-130-080	1.68	Vacant Space, 495A Edison Court Vacant Space, 495D Edison Court SDH Enterprises, 495B & C Edison Court	Realignment of I-680
3	0180-130-070	1.21	Fire Department, 473 Edison Court O'Hara Metal, 473 Edison Court Clothes Recycle Center, 5005 Fulton Drive	Realignment of I-680
4	0180-130-050	1.85	Valley Rubber & Gasket, 5045 Fulton Drive Family Celebration Center, 5045 Fulton Drive	Realignment of I-680
5	0180-030-060	1.00	Marin Medical, 497A Edison Court Don's Transport/Liquid Trends Northbay, 497B Edison Court Brewer Metal Products, 497C Edison Court Super Store Industries, 497D & E Edison Court Euro-Machines, 497F & G Edison Court	Realignment of I-680
6	0180-140-180	1.48	Woodline Cabinets (one building), 5165 Fulton Drive	Realignment of I-680
7	0180-140-030	1.98	Pacific Coast Steel (one building), 5160 Fulton Drive	Realignment of I-680
8	0180-140-060	0.05	Unknown (one building), 355 Watt Drive	Realignment of I-680
9	0180-010-050	0.71	Sunnyside Farms (two buildings), 199 Red Top Road	I-80/Red Top Road realignment

Source: I-80/I-680/SR 12 Interchange Community Impact Assessment, 2008.
Note: Appendix I contains a complete list of affected parcels under Alternative C, Phase 1.

As of October 2008, Fairfield had an estimated 260 acres of vacant commercial land and approximately 738 acres of vacant industrial land available within its borders. This includes approximately 177 acres of vacant commercially zoned land at the Cordelia/Green Valley intersection and 308 acres of vacant industrial land in the Cordelia Growth Center. The availability of vacant land in the area indicates there are substantial relocation resources available in the community. Tables 4.2-2a and 4.2-2b of the proposed project's CIA show the amount of vacant acres for commercial and industrial lands, respectively.

In 2001, Suisun City conducted a retail leakage analysis and economic base analysis, *Revenue Generation vs. Traditional Land Use Zoning,* to identify vacant sites that could be best used for commercial purposes. This report identified 15 vacant sites that would provide an estimated 35-year supply of vacant land that Suisun City could use to increase their retail and commercial sectors. Of these 15 sites, three would be suitable to use as land for the relocation of businesses that would be displaced under the alternatives. These three sites combined total approximately 16.34 acres and could be used for service commercial or light industrial purposes, which indicates substantial relocation resources are available within the local community. Figure 7.1a of the proposed project's CIA shows the locations of all 15 vacant sites. Based on this report it would appear that there are sufficient relocation resources located in close proximity to those business that would be displaced by the alternatives in Suisun City. Therefore the business displacement impacts of the proposed alternatives (including the fundable first phases) would not result in a adverse impact.

One residential displacement would occur under Alternatives B and C as a result of the westbound truck scales relocation. No residential displacements would occur under the fundable first phase of either of the alternatives. The California Department of Finance's 2009 housing vacancy estimate for Solano County indicates that there are substantial residential vacancies in the unincorporated county (6.48% vacancy rate) and in the city of Fairfield (6.54% vacancy rate) (State of California 2009). This indicates that there are sufficient opportunities for the occupants of this residence to find replacement housing in the vicinity. Therefore the residential displacement impact of the proposed alternatives (Alternatives B and C) would not result in a adverse impact.

The No-Build Alternative would not change the existing environment and so would not result in any displacements.

Avoidance, Minimization, and/or Mitigation Measures

All rights and services provided under Public Law 91-646, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, would be strictly adhered to. The rights of non-tenured occupants of displaced properties would be preserved. Department policy provides that persons displaced as a result of Department-sponsored transportation programs shall receive fair and humane treatment and shall not suffer unnecessarily as a result of projects designed for the benefit of the public. No residents would be required to relocate until comparable replacement housing has been made available to them.

To the extent feasible, Fairfield businesses displaced by the project will be relocated within the city of Fairfield. Because the proposed project would provide for the equitable relocation of occupants and businesses, and there are sufficient commercial opportunities and available land in

the area for the relocation of businesses and industry, no avoidance, minimization, and/or mitigation measures would be required.

3.1.4.3 Environmental Justice

Regulatory Setting

All projects involving a federal action (funding, permit, or land) must comply with Executive Order (E.O.) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, signed by President Clinton on February 11, 1994. This Executive Order directs federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law. Low income is defined based on the Department of Health and Human Services poverty guidelines. For 2011, this was $22,350 for a family of four.

All considerations under Title VI of the Civil Rights Act of 1964 and related statutes have also been included in this project. The Department's commitment to upholding the mandates of Title VI is evidenced by its Title VI Policy Statement, signed by the Director, which can be found in Appendix C of this document.

Affected Environment

This section uses the NEPA framework to assess whether the proposed project meets the goals and requirements of E.O. 12898, first by determining whether the proposed project meets the community participation goals and then by analyzing impacts on minority and low-income communities.

Disproportionately high and adverse impacts on minority and low-income populations are defined as an adverse effect that meets either of two criteria.

- It is predominantly borne by a minority population and/or a low-income population.
- It would be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that would be suffered by the non-minority population and/or non-low-income population.

Environmental Justice Communities are communities that meet at least one of the following criteria.

- The low-income population is greater than 25% of the total population of the community, or the minority population is greater than 50% of the total population of the community.
- The low-income or minority population is more than 10 percentage points higher than the city or county average.

To determine the presence of Environmental Justice communities within the project area, an assessment was undertaken of the existing population in the project area utilizing data collected for the 2000 U.S. Census. The project area is contained within 11 Census Tract Block Groups in Solano County:

- Census Tract 2522.01 Block Group 1.
- Census Tract 2522.01 Block Group 4.
- Census Tract 2522.02 Block Group 1.
- Census Tract 2522.02 Block Group 2.
- Census Tract 2523.05 Block Group 1.
- Census Tract 2523.05 Block Group 2.
- Census Tract 2524.02 Block Group 1.
- Census Tract 2524.02 Block Group 2.
- Census Tract 2524.02 Block Group 3.
- Census Tract 2527.02 Block Group 1.
- Census Tract 2527.02 Block Group 2.

Considered collectively, the population (as of 2000) in the 11 Census Tract Block Groups in which the project area is situated contained a lower percentage of minority groups than the county, Fairfield, and Suisun City. Of the total combined population, 60% is white, 18% is Hispanic or Latino, 10% is black, 12% is Asian, 1% is Hawaiian Native/Pacific Islander, and less than 1% is Native American. The Hispanic/Latino percentage is consistent with the ratio of Solano County and Fairfield–Suisun City and slightly lower than Fairfield.

When reviewed individually, three of the 11 Census Tract Block Groups were noted to have a minority (non-white) population greater than 50% of the total population of the community (Census Tract 2524.02 with Block Groups 2 and 3 and Census Tract 2527.02 with Block Group 2). Two of these same block groups also contain low income populations that comprise more than 25% of the total population of the community (Census Tract 2524.02 with Block Group 3 and Census Tract 2527.02 with Block Group 2). These Block Groups are generally located east of Chadbourne Road. The housing characteristics, racial characteristics, and income/poverty characteristics of the 11 Census Tract Block Groups are presented in Tables 3.1.4-5 through 3.1.4-7, respectively. Figure 3.1.4-3 illustrates the locations of these Census Tract Block Groups in relation to the proposed project.

Considering the individual minority groups within each census tract/block group, it was noted that the Hispanic/Latino ratio was more than ten percentage points higher in Census Tract 2524.02 Block Group 3 and Census Tract 2527.02 Block Group 2 than in the cities or county. The latter census tract/block group was also found to have a larger population of Asians than the cities or county.

Table 3.1.4-5. Project Area Housing Characteristics in 2000

	CT[a] 2522.01		CT 2522.02		CT 2523.05		CT 2524.02			CT 2527.02		City of Fairfield-Suisun City	Solano County	Total of All CT/ BG's
	BG[b] 1	BG 4	BG 1	BG 2	BG 1	BG 2	BG 1	BG 2	BG 3	BG 1	BG 2			
Total Housing Units	366	937	1,335	678	174	293	354	686	572	435	84	40,469	130,403	5,914
Average Household Size	2.83	3.03	3.30	3.31	2.52	2.75	3.25	3.29	2.50	2.38	3.73	3.02	2.9	3.33[c]
Owner-occupied Units	303	848	1,230	568	135	228	238	531	123	162	11	25,549	84,994	4,377
Renter-occupied Units	63	89	105	110	39	65	116	155	449	273	74	14,920	45,409	1,538
2-Person Household	124	327	261	136	72	87	82	154	91	93	9	10,347	33,062	1,436
3-Person Household	65	177	259	154	17	42	52	128	88	68	16	7,340	22,778	1,066
4-Person Household	56	203	352	154	22	41	68	143	70	41	13	7,375	21,946	1,163
5-Person Household	25	74	162	86	10	28	51	82	39	24	12	3,890	11,331	593
6-Person Household	14	32	60	32	7	12	16	37	16	6	8	1,634	4,777	240
Vacant Units	12	20	22	5	7	13	13	32	38	27	2	1,166	4,110	191

Source: U.S. Census Bureau 2000.

Note: Shading indicates blocks that meet Environmental Justice criteria.

[a] CT=Census Tract.

[b] BG=Block Group.

[c] Represents average household size.

Table 3.1.4-6. Project Area Racial Characteristics in 2000

	CT[a] 2522.01		CT 2522.02		CT 2523.05		CT 2524.02			CT 2527.02		City of Fairfield/ Suisun City	Solano County	Total of All CT/BG's
	BG[b] 1	BG 4	BG 1	BG 2	BG 1	BG 2	BG 1	BG 2	BG 3	BG 1	BG 2			
Total Population	1,035	2,838	4,471	2,254	469	805	1,152	2,260	1,526	1,036	313	126,603	394,542	18,159
White	833	1,936	2,522	1,611	334	534	571	1,027	634	717	118	69,718	222,387	10,837
Black/African American	45	279	546	155	6	103	134	313	347	84	39	19,667	58,827	2,051
American Indian and Alaska Native	7	12	28	24	2	7	15	23	16	9	6	965	3,110	149
Asian	60	354	738	180	41	54	117	356	113	50	85	15,250	50,299	2,148
Native Hawaiian and Other Pacific Islander	3	2	30	4	2	1	28	17	33	6	1	1,207	3,078	127
Some Other Race	52	73	265	138	36	67	188	337	253	99	47	10,852	31,612	1,555
Two or More Races	35	182	342	142	48	39	99	187	130	71	17	9,484	25,229	1,292
Hispanic/Latino	148	245	720	324	102	137	285	562	460	160	109	23,226	69,598	3,252
Non Hispanic/ Latino	887	2,593	3,751	1,930	367	668	867	1,698	1,066	876	204	103,377	324,944	14,907

Source: U.S. Census Bureau 2000.
Note: Shading indicates blocks that meet Environmental Justice criteria.
[a] CT=Census Tract.
[b] BG=Block Group.
[c] Represents average household size.

Table 3.1.4-7. Project Area Income and Poverty in 2000

	CT[a] 2522.01		CT 2522.02		CT 2523.05		CT 2524.02			CT 2527.02		City of Fairfield-Suisun City	Solano County	Total of All CT/BG's
	BG[b] 1	BG 4	BG 1	BG 2	BG 1	BG 2	BG 1	BG 2	BG 3	BG 1	BG 2			
Per Capita Income	$33,019	$34,762	$23,180	$20,380	$23,274	$24,754	$17,240	$19,176	$12,138	$18,224	$4,754	$21,001	$21,731	$20,991[e]
Median Household Income	$67,452	$89,093	$75,375	$70,982	$56,111	$65,208	$46,938	$57,384	$26,599	$34,417	$10,500	$53,646	$54,099	$54,551[e]
Population in Poverty[d]	32	259	61	69	46	17	96	138	449	82	137	10,488	31,344	1,386
Percentage in Poverty	3%	9%	1%	3%	9%	2%	8%	6%	30%	7%	56%	9%	8%	12%[e]

Source: U.S. Census Bureau 2000.
Note: Shading indicates blocks that meet Environmental Justice criteria.
[a] CT=Census Tract.
[b] BG=Block Group.
[c] Represents average household size.
[d] Below poverty level.
[e] Average.

Environmental Consequences

Although Environmental Justice communities exist in the project area, they would not be subject to an adverse impact greater than experienced by the non-Environmental Justice communities. The build alternatives would result in the expansion of existing freeways and highways in the project. Project impacts, such as increases in noise levels and temporary construction-period impacts (e.g., dust and noise impacts) would be borne by the both Environmental Justice communities and non-Environmental Justice communities along the alignment. However, as the project's purpose is to relieve congestion and improve traffic flow on these freeways and highways, this would directly benefit the same communities. Environmental effects of the project that would be borne by Environmental Justice communities within the project area would not be more severe or greater in magnitude than the effects borne by non-Environmental Justice communities.

Further, most of the displacements of businesses and expansion of road facilities would take place in the non–Environmental Justice communities in the Cordelia area (Census Tract 2522.01 Block Groups 1 and 4 and Census Tract 2522.02 Block Groups 1 and 2). The effects of the proposed project as a whole are spread over both Environmental Justice and non–Environmental Justice communities, with most of the displacements in non–Environmental Justice block groups.

The greatest number of displacements would occur as a result of Alternative B. Of the 34 total displacements (one residential, 33 businesses) under Alternative B, nine would be in the Environmental Justice block groups. The residence is not within any Environmental Justice block group. Under Alternative B, Phase 1 fewer displacements would result (12 businesses, no residences). Displacements in the Environmental Justice Block Groups are among industrial and commercial businesses, as is the case in the non–Environmental Justice Block Groups.

Of the 26 total displacements (one residential, 25 businesses) under Alternative C, ten would be in the Environmental Justice Block Groups (the residence is not in any of those Block Groups). Alternative C, Phase 1 would result in fewer displacements in Environmental Justice Block Groups (nine businesses; no residences). Displacements in the Environmental Justice Block Groups are among industrial and commercial businesses; as is the case in the non–Environmental Justice Block Groups.

The project alternatives would not result in the displacement of any residences within any Block Groups meeting the Environmental Justice criteria. Furthermore, the displacement of businesses would be spread across a large area including both Environmental Justice and non–Environmental Justice Block Groups, and would include primarily industrial and commercial uses. Therefore, the proposed project would not impose a disproportionate impact on a low-income or minority community.

The No-Build Alternative would not change the existing environment and so would have no effect on Environmental Justice communities.

Avoidance, Minimization, and/or Mitigation Measures

Based on the above discussion and analysis, Alternative B; Alternative C; Alternative B, Phase 1; and Alternative C, Phase1 would not cause disproportionately high and adverse effects on any minority or low-income populations as per E.O. 12898 regarding Environmental Justice. Therefore, no avoidance, minimization, and/or mitigation measures would be required.

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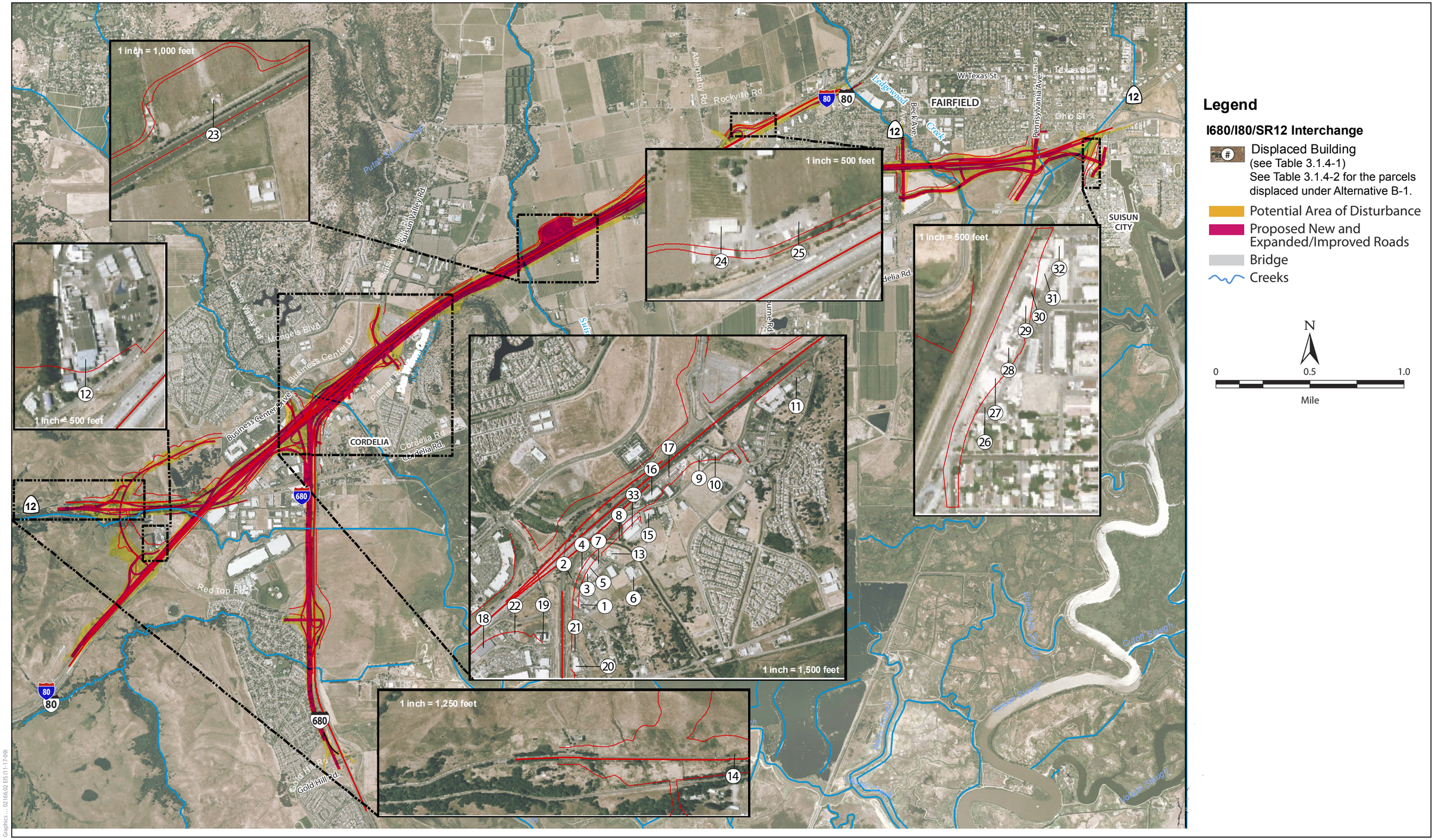

Figure 3.1.4-1
Alternative B Building Displacements

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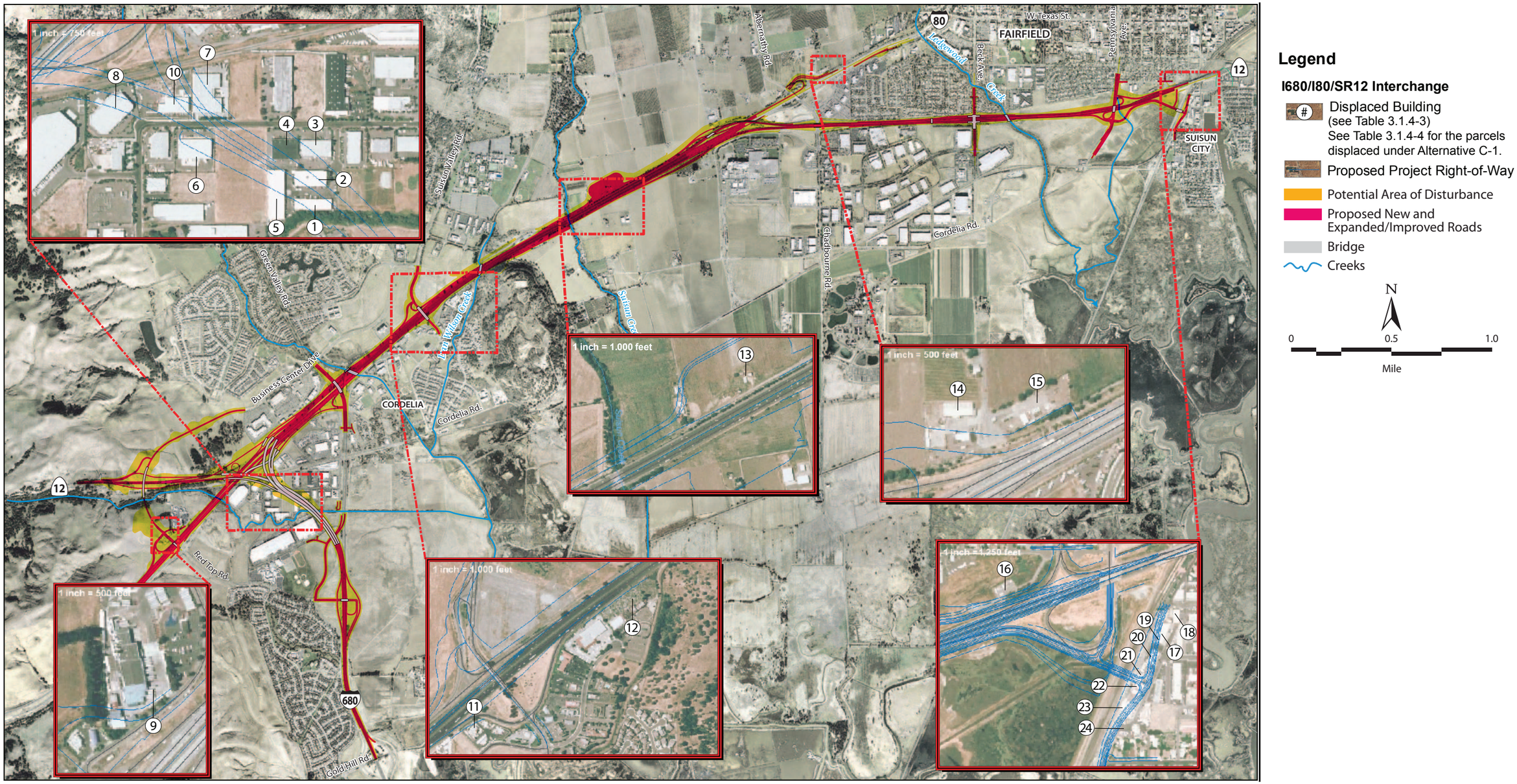

Figure 3.1.4-2
Alternative C Building Displacements

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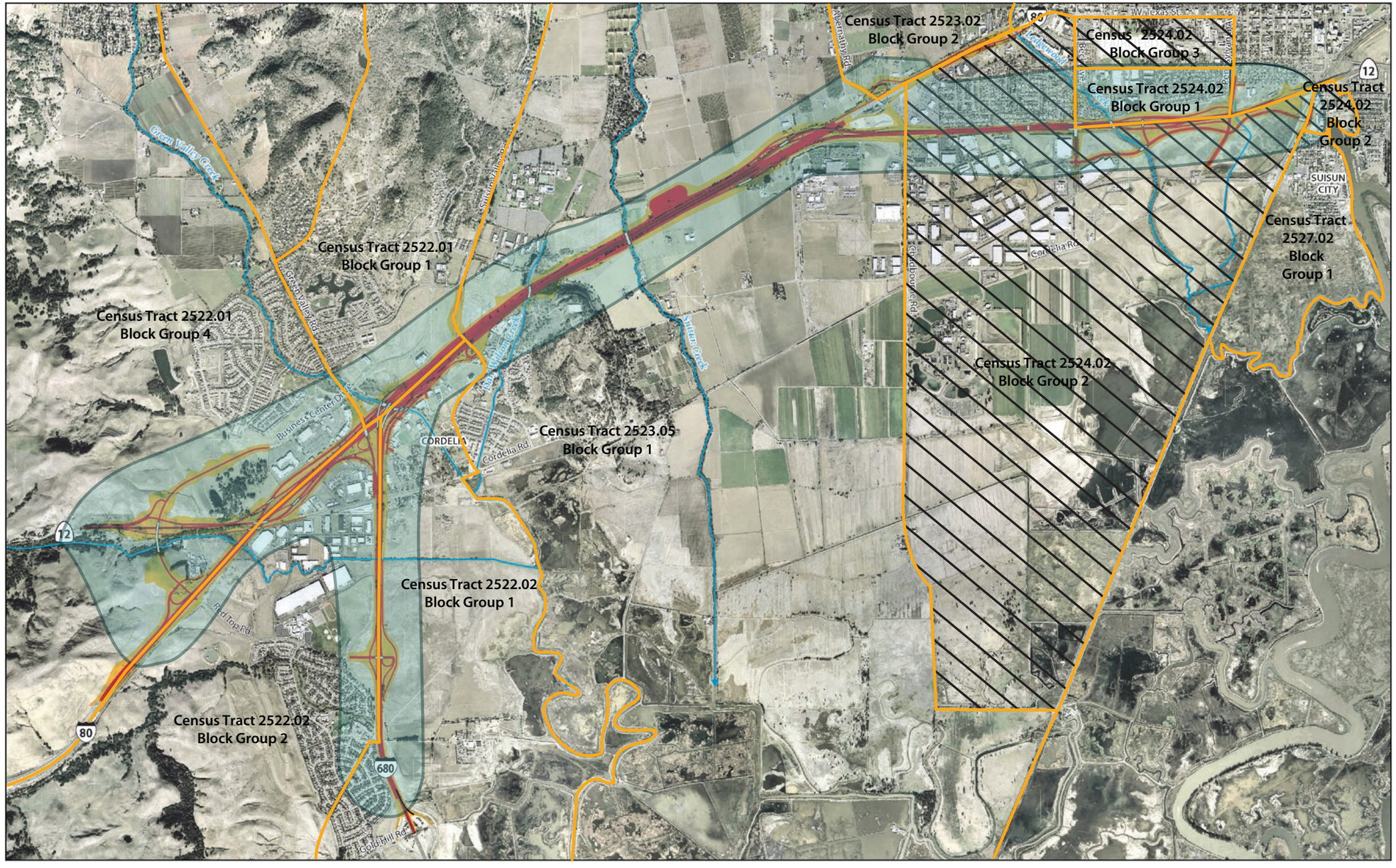

Legend

I680/I80/SR12 Interchange

- Proposed Study Area
- Census Block Group
- Meets Environmental Justice Community Criteria
- Proposed New and Expanded/Improved Roads
- Bridge
- Creeks

1234.01 Census Tract Number

N

0 0.5 1.0

Mile

Graphics... 02166.02 EIS (11-17-09)

Figure 3.1.4-3
Census Tract Block Groups

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3.1.5 Utilities and Emergency Services

Affected Environment

This section describes the existing utilities and emergency services within the proposed project right-of-way and that cross the project area. The information below is summarized from the CIA prepared for the proposed project.

Water Service

Water service within the project area is provided by the Solano County Water Agency (SCWA) and the Suisun Solano Water Agency (SSWA). The county has four main sources of water: the Solano Project, the North Bay Aqueduct (NBA), groundwater reservoirs, and Sacramento River entitlements. The SCWA stores and distributes water to 29 urban and agricultural water suppliers in northern California, the San Francisco Bay Area, the San Joaquin Valley, the central coast, and southern California.

The project area is also located within the service area of the Solano Irrigation District (SID). The SID owns and operates facilities within the project area that delivers agricultural water to customers north and south of the project area. The SID also provides water to Fairfield for street landscaping and commercial property landscape irrigation.

Within the city of Fairfield, water is treated at two water treatment plants and distributed by a municipal water distribution system to more than 20,000 service connections via more than 270 miles of water mains.

The SSWA, composed of the SID and Suisun City, operates a treatment plant located outside the project area that delivers potable water to the Suisun City.

The most significant utility infrastructure in the project area is the State Department of Water Resources (DWR) water pipeline, the NBA. The NBA runs underground from Barker Slough in the Sacramento–San Joaquin River Delta to Cordelia Forebay, just outside of the city of Vallejo. The pipeline varies in diameter, ranging from 72 inches at Barker Slough to 54 inches at Cordelia Forebay. A portion of the NBA runs just north of and parallel to I-80 between Abernathy Road and Suisun Creek.

Wastewater Service

A portion of the project area is located within the Fairfield-Suisun Sewer District (FSSD) service area. The FSSD performs wastewater collection, treatment, and water recycling services for all areas within the boundaries of the cities of Fairfield and Suisun City. FSSD facilities include a wastewater treatment plant, 12 wastewater pump stations, force mains, trunk main collection facilities, and 70 miles of sewer networked throughout Fairfield and Suisun City.

The FSSD wastewater treatment plant occupies a 150-acre parcel off Chadbourne Road, southwest of the I-80/SR 12 interchange in Fairfield. The wastewater treatment plant currently has a capacity of 17.5 million gallons per day (mgd) of average dry weather wastewater flow and a capacity of 34.8 mgd during wet weather. On average, the wastewater plant treats 16 mgd.

Plans are currently under development to expand the wastewater treatment plant, which would result in an ultimate capacity of 25 mgd under dry weather conditions.

The majority of treated effluent produced by the wastewater treatment plant is discharged to the Boynton Slough. Approximately 10% of the treated effluent is recycled and used for agricultural irrigation or distributed in the city of Fairfield for street landscaping and commercial property landscape irrigation.

The portions of the project area located in unincorporated Solano County and outside the boundaries of the FSSD service area generally contain no wastewater infrastructure. Wastewater needs in these locations are met by septic systems installed by individual land owners.

Electricity and Natural Gas

Solano County is provided with electric and natural gas service by PG&E. PG&E's service area covers most of central and northern California, and the company maintains 123,054 circuit miles of electrical distribution lines, 18,610 circuit miles of interconnected transmission lines, 40,123 miles of natural gas distribution pipelines, and 6,136 miles of natural gas transportation pipelines. PG&E currently maintains natural gas pipelines and electrical transmission lines throughout Solano County, adjacent to the I-80 corridor.

PG&E facilities in the area include a valve lot (gas transmission facility) and a number of natural gas and power lines. Four 115 kV power lines cross the project area, the Vaca-Dixon-Ignacio Line 1 and Line 2, the Suisun Tap 115–kV line and the Vaca-Suisun-Jameson tower line. PG&E natural gas lines are located within the project area, primarily in the vicinity of the I-80/Green Valley Road and SR 12E/Pennsylvania Avenue interchanges.

Telecommunications Systems

Telephone communication service for Solano County is provided by AT&T, one of the country's largest telecommunications providers. AT&T offers local phone service, long-distance phone service, and high-speed internet service. Major telephone transmission lines traverse Solano County, primarily following road rights-of-way and rail lines. Both overhead and underground lines and conduit carrying telecommunications lines are located within the project area.

Schools

There is one elementary school and one high school located near the project area. Nelda Mundy Elementary School is located at 570 Vintage Valley Drive, north of I-80 and the project area. Rodriguez High School is located at 5000 Red Top Road, just west of I-680 within the project area.

The former Green Valley Middle School is located at 3630 Ritchie Road in Fairfield, south of the I-80 and the project area. The school was relocated in 2004 to an area north of I-80 and the former school site is currently vacant. A portion of this vacant parcel is proposed as the new site for the PG&E valve lot relocation that would occur as part of this project.

Solano Community College is located just north of the project area at 4000 Suisun Valley Road. In addition to Solano Community College, other institutions of higher learning in the project area are the University of Phoenix at 5253 Business Center Drive and Chapman University at 4820 Business Center Drive.

Police and Fire

The California Highway Patrol (CHP) has jurisdiction over I-80, I-680, and SR 12 for matters involving both traffic and emergency services. The Solano County CHP office is located at 3050 Travis Boulevard in Fairfield.

Those portions of the project area located in unincorporated Solano County are under the jurisdiction of the Solano County Sheriff. The Solano County Sheriff's Department office is located at 530 Union Avenue in Fairfield.

Those portions of the project area within Fairfield city limits are under the jurisdiction of the Fairfield Police Department. The Fairfield Police Department is located at 1000 Webster Street in Fairfield City Hall. The Suisun City Police Department provides service to those areas located within Suisun City. The police department is located at 701 Civic Center Boulevard in downtown Suisun City.

The portion of the project area located in unincorporated Solano County is served by the Suisun Fire Protection District (SFPD). SFPD headquarters are located at 445 Jackson Street in Fairfield and serves 1,136 properties within a 136-square-mile area. The SFPD currently employs one fire chief, two fire captains, and 45 volunteer firefighters.

Those portions of the project area located within the city of Fairfield fall under the jurisdiction of the Fairfield Fire Department. The Fairfield Fire Department serves approximately 105,000 citizens with six fire stations and 68 firefighters.

In the western portion of the project area, the Cordelia Fire Protection District (CFPD) provides fire and emergency medical services to areas of unincorporated Solano County, including the communities of Green Valley, Rockville, Cordelia, and the Lower Suisun Valley. The CFPD provides service to approximately 5,000 residents within a service area of 56 square miles and currently employs four full-time employees, 12 extra-help firefighters, 13 volunteer firefighters, and between 21 and 26 resident firefighters.

Within Suisun City, fire and emergency services are provided by the Suisun City Fire Department, located at 621 Pintail Drive. The department employs a full-time fire chief and two full-time fire captains. The remainder of the department's staff is volunteer and includes a deputy fire chief, two battalion chiefs, six fire captains, three lieutenants, and approximately 22 volunteer firefighters.

Environmental Consequences

Potential Effect to Utilities

As part of both alternatives, utilities within the project area will be relocated, realigned, or extended as necessary to accommodate project construction and operation. Utilities that will be affected include water, electrical, gas, cable/fiber, and telephone lines. Water lines include those owned by the cities of Fairfield, Vallejo, and Benicia; the California Department of Water Resources; and the Suisun-Solano Water Authority. Irrigation and non-potable water and agricultural drains owned by the Solano Irrigation District are located within the project area. These water facilities, as well as sewer facilities owned by the cities of Fairfield and Suisun City and by the Fairfield-Suisun Sewer District, would be realigned or extended, as necessary.

Locations of PG&E–owned electrical and gas lines within the project area for each alternative are addressed specifically in the project description in Chapter 2. The precise field location of high risk utilities will be identified during final design in accordance with the Department's procedures. The PG&E valve lot would be relocated to a vacant parcel owned by the Fairfield-Suisun Unified School District (FSUSD) at the former Green Valley Middle School location at 3630 Ritchie Road in Fairfield.

The relocation, extension, or realignment of utilities under all build alternatives would result in temporary construction impacts and may result in minor interruption of service. To minimize this potential, the Department will enter into agreements with the utility providers, including PG&E, AT&T, and the cities of Fairfield, Benicia, and Vallejo.

Under the No-Build Alternative, no construction would take place and no utilities would be relocated. Therefore, there would be no potential to affect utilities.

Potential Effects on Police, Fire, and Emergency Service Providers during Construction

Potential short-term impacts on police, fire, and emergency service providers may result from construction-related activities under all build alternatives. Potential impacts include increased emergency response times within the project area caused by congestion during project construction and temporary lane closures. Lane closures are expected to be of short duration and to occur in off-peak hours. The effect is expected to be minimal. In addition, as part of its standard procedure, the Department will prepare a Transportation Management Plan, discussed below.

Alternative C and Alternative C, Phase 1 would displace the Fairfield Fire Department station located at 473 Edison Court in the west end of the project area. This fire station is located in an industrial building and serves the Cordelia area. The fire station at Edison Court was opened as a temporary fire station in a warehouse building. The Fairfield Fire Department Strategic Plan (2007) calls for the construction of two permanent fire stations in the Cordelia area to replace the temporary station located on Edison Court (City of Fairfield 2007). As discussed in Section 3.1.4, page 3.1.4-11, there is sufficient commercial and industrial land available to accommodate the displaced uses including the fire station and the avoidance, minimization and mitigation measures described therein would also apply to the Fairfield Fire Department fire station.

Under the No-Build Alternative, no construction would occur and therefore no effect to emergency services would occur as a result of construction.

Avoidance, Minimization, and/or Mitigation Measures

Minimize Disruption of Utilities Services

The Department will enter into agreements with providers of utilities located within the project area that would be relocated, realigned, or extended as part of project construction or operation. The construction efforts will be coordinated to minimize interruption of service and to continue operation after the proposed project is complete.

Prepare Transportation Management Plan (TMP)

Before initiating construction, a TMP will be prepared and provided to all emergency service providers in the area. The TMP will be developed with input (regarding detours, truck routes, notifications, etc.) from emergency services providers, the FSUSD, and others. The TMP will serve to notify all emergency service providers in the project area of the project construction schedule and the time and location of lane closures. The TMP will identify anticipated dates and hours of construction, as well as anticipated limits on access. Notice will be provided at least one week before construction begins. To the extent possible, emergency vehicles will be allowed through roadway segments temporarily closed for construction purposes.

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3.1.6 Traffic and Transportation/Pedestrian and Bicycle Facilities

Regulatory Setting

The Department, as assigned by the Federal Highway Administration (FHWA), directs that full consideration should be given to the safe accommodation of pedestrians and bicyclists during the development of federal-aid highway projects (see 23 CFR 652). It further directs that the special needs of the elderly and the disabled must be considered in all federal-aid projects that include pedestrian facilities. When current or anticipated pedestrian and/or bicycle traffic presents a potential conflict with motor vehicle traffic, every effort must be made to minimize the detrimental effects on all highway users who share the facility.

In July 1999, the U.S. Department of Transportation (USDOT) issued an Accessibility Policy Statement pledging a fully accessible multimodal transportation system. Accessibility in federally-assisted programs is governed by the USDOT regulations (49 CFR part 27) implementing Section 504 of the Rehabilitation Act (29 U.S.C. 794). The FHWA has enacted regulations for the implementation of the 1990 Americans with Disabilities Act (ADA), including a commitment to build transportation facilities that provide equal access for all persons. These regulations require application of the ADA requirements to Federal-aid projects, including Transportation Enhancement Activities.

Affected Environment

The information presented here has been summarized from technical reports prepared for the proposed project. These reports, listed below, are available for review at the Department District 4 office and are hereby incorporated by reference.

- *I-80/I-680/SR 12 Interchange PR/ED: Existing Conditions VISSIM Model Calibration/Validation Technical Memorandum* (October 8, 2003).
- *I-80/I-680/SR 12 Interchange PR/ED: Existing Conditions VISSIM Model Calibration/Validation for the Project Expansion Area Technical Memorandum* (February 14, 2005).
- *I-80/I-680/SR 12 Interchange PR/ED: Existing Weekday (Tuesday through Thursday) Traffic Operating Conditions for the Expanded Project Area—Technical Memorandum* (February 2005).
- *I-80/I-680/SR 12 Interchange PR/ED: Design Year 2035 Demand Forecasts at Project Gateways Technical Memorandum* (July 14, 2006).
- *I-80/I-680/SR 12 Interchange PR/ED: Updated Validation of the VISSIM Traffic Operations Model to 2007—2008 Conditions Technical Memorandum* (October 30, 2008).
- *I-80/I-680/SR 12 Interchange PR/ED: Final Traffic Operations Report* (August 2010) (referred to below as the Final Traffic Operations Report or FTOR).
- *I-80/I-680/SR 12 Interchange Project: Addendum to Traffic Operations Report for Alternative C, Phase 1, Revised for Additional Freeway-to-Freeway Connector Ramps* (November 23, 2010).

The traffic study area includes components of the regional freeway system and ramp terminal intersections, as well as key parallel and connecting arterials within the I-80/I-680/SR 12 project area, as shown in Figure 2-1. Specifically, the analysis of potential project impacts focused on freeway auxiliary lanes, and connecting ramps and collector distributor roadways on Interstate 80 (I-80) between Red Top Road and Abernathy Road, Interstate 680 (I-680) between Gold Hill Road and I-80, State Route 12 West (SR 12) from Red Top Road and I-80, and State Route 12 East from I-80 and Pennsylvania Avenue.

The project study corridor exhibits a directional commute pattern from Solano County, Yolo County, and Sacramento County to the Bay Area employment centers of Contra Costa County, Alameda County, Santa Clara County, the City and County of San Francisco, and San Mateo County. This corridor also serves as a major gateway for goods movement, which accounts for a high percentage of truck traffic. In addition, truck scales are located in both the eastbound (EB) and westbound (WB) directions of I-80 between I-680 and SR 12E. Lastly, this corridor is a major recreational route for activities in the Sacramento Valley, Sierra Nevada, and Nevada.

The Solano Comprehensive Transportation Plan (Solano Transportation Authority 2005) calls for maintenance of level of service (LOS) E on roadways of regional significance, including freeways. LOS E represents at-capacity operation for freeway analysis. When traffic volumes exceed capacity, stop-and-go conditions result, and operations are designated as LOS F.

For freeway mainline segments, weave segments, and ramp merge and diverge areas, the LOS is related to the vehicle density in vehicle miles per lane and is calculated for the a.m. and p.m. commute peak hours. For intersection operations, the LOS is related to the average control delay per vehicle during the a.m. and p.m. commute peak hours. Tables 3.1.6-1 and 3.1.6-2 provide the LOS thresholds for freeway and intersection analysis, respectively.

Other *measures of effectiveness* (MOEs) used in the traffic analysis include vehicle hours of travel (VHT), defined as the total number of vehicle hours traveled per hour within the study area; vehicle hours of delay (VHD), defined as the number of vehicle hours of delay per hour resulting from congestion within the study area; vehicle miles traveled (VMT), defined as the total number of vehicle miles traveled during the peak hours in the study area; and the average travel times for trips within the study area.

Table 3.1.6-1. Freeway Mainline, Weaving, and Ramp Junction LOS Criteria

Level of Service[a]	Maximum Density (passenger cars per mile per lane)	
	Basic Freeway Sections	Freeway Weaving Segments and Ramp Junctions
A	11	10
B	18	20
C	26	28
D	35	35
E	45	>35
F	45	Demand exceeds capacity

Source: Transportation Research Board 2000.
[a] Freeway mainline LOS based on a 65 mph free-flow speed.

Table 3.1.6-2. Intersection LOS Definitions for Highway Capacity Manual Methodology

Level of Service	Description of Traffic Conditions	Average Control Delay per Vehicle (seconds)
Signalized (Signal-Controlled) Intersections		
A	Insignificant delays: No approach phase is fully used, and no vehicle waits longer than one red indication	≤10
B	Minimal delays: An occasional approach phase is fully used, and drivers begin to feel restricted	>10–20
C	Acceptable delays: Major approach phase may become fully used, and most drivers feel somewhat restricted	>20–35
D	Tolerable delays: Drivers may wait through more than one red indication; queues may develop but dissipate rapidly, without excessive delays	>35–55
E	Significant delays: Volumes are approaching capacity, vehicles may wait through several signal cycles, and long vehicle queues form upstream	>55–80
F	Excessive delays: Conditions are at capacity, with extremely long delays; queues may block upstream intersections	>80
Unsignalized Intersections		
A	No delay for stop-controlled approaches	≤10
B	Operations with minor delay	>10–15
C	Operations with moderate delays	>15–25
D	Operations with some delays	>25–35
E	Operations with high delays and long queues	>35–50
F	Operation with extreme congestion, with very high delays and long queues unacceptable to most drivers	>50

Source: Transportation Research Board 2000.

Pedestrians and Bicyclists

The Department, as assigned by FHWA, directs that full consideration should be given to the safe accommodation of pedestrians and bicyclists during the development of federal-aid highway projects (see 23 CFR 652). It further directs that the special needs of the elderly and the disabled must be considered in all federal-aid projects that include pedestrian facilities. When current or anticipated pedestrian and/or bicycle traffic presents a potential conflict with motor vehicle traffic, every effort must be made to minimize the detrimental effects on all highway users who share the facility.

In July 1999, the USDOT issued an Accessibility Policy Statement pledging a fully accessible multimodal transportation system. Accessibility in federally-assisted programs is governed by the USDOT regulations (49 CFR part 27) implementing Section 504 of the Rehabilitation Act (29 U.S.C. 794). The FHWA has enacted regulations for the implementation of the 1990 Americans with Disabilities Act, including a commitment to build transportation facilities that provide equal access for all persons. These regulations require application of the ADA requirements to Federal-aid projects, including Transportation Enhancement Activities.

The Department is committed to carrying out the ADA by building transportation facilities that provide equal access for all persons. The same degree of convenience, accessibility, and safety available to the general public will be provided to persons with disabilities.

Economic and Societal Trends

The I-80/I-680/SR 12 interchange is a point at which two major interstate freeways and one state highway converge. When it was constructed in the 1960s, the interchange location was in a

relatively rural setting immediately surrounded by agricultural lands with mountains to the north and the vast Suisun Marsh to the south.

Since the 1960s the Bay Area and Northern California region experienced rapid population growth. The Bay Area's population has grown by more than 86% during this time and Solano County's population has more than tripled. This tremendous amount of growth has resulted in substantial increases in regional traffic passing through the interchange area as well as substantial changes in the land uses immediately surrounding the interchange.

Regional truck scales facilities are also located within the I-80/I-680/SR 12 interchange. The location of the truck scales is ideal for monitoring and enforcing truck weight and safety requirements because it provides one location that can monitor truck traffic on I-80, I-680, and SR 12. However, the volume of trucks that need to be weighed and inspected has increased dramatically since the 1960s. Trucks must exit, then re-enter the freeway within the I-80/I-680/SR 12 interchange area after inspection at the truck scales facility. The exiting and entering of a large volume of trucks creates a severe weaving problem, which is made worse by the size, limited maneuverability, and lower speeds of large trucks. Improvement of the EB truck scales have been addressed in a separate project.

The I-80/I-680/SR 12 interchange is vital to the mobility of both the local area and the entire northern California region because it serves a multitude of destinations. It is a critical corridor for local and regional commute travel. Over the past ten years, commute travel through the area has increased substantially in response to the growing Bay Area economy and expansion of employment centers, which has pushed commuters further east as they search for affordable housing. By 2030, commute traffic is projected to constitute between 40% and 75% of the total number of vehicles traveling through the project area.

Existing (2004) Traffic Operations

The extent of facilities studied in the traffic operations analyses are listed below:

- I-80 between Red Top Road and Air Base Parkway.
- I-680 between Gold Hill Road and I-80.
- SR 12W (Jameson Canyon Road) between Red Top Road and I-80.
- SR 12E between I-80 and Civic Center Drive.
- Arterial and local roadways including Abernathy Road, Beck Avenue, Business Center Drive, Central Way, Cordelia Road, Green Valley Road, Lopes Road, Mangels Boulevard, Pennsylvania Avenue, Pittman Road, Red Top Road, Ramsey Road, Rockville Road, Suisun Valley Road, West Texas Street, and other connecting roadways.

The existing conditions analysis presents the physical and operational characteristics of the roadway system in the vicinity of the proposed project in fall 2004. This information provides context for the purpose and need to construct improvements. It should be noted that when the existing conditions traffic counts were taken a fifth auxiliary lane had opened to traffic on WB I-80 between the SR 12E connector and the I-680 southbound connector. However, the fifth EB lane had not yet opened and therefore is not included in the existing conditions analysis. Also not

included is the WB Jameson Canyon Road (SR 12W) truck climbing lane that had not yet been completed. Both improvements have improved traffic operations, and while they are not included in the 2004 existing conditions analysis, they are included in 2015 and 2035 No-Build analyses.

Note that while this report refers to existing conditions in the original 2004 baseline, updated 2007/2008 a.m. and p.m. peak hour volumes were collected from the Department PEMS system and were used to re-validate the existing conditions VISSIM traffic operations model to account for changes in traffic volumes and freeway design (i.e., the EB I-80 auxiliary lane and the opening of the new Benicia-Martinez Bridge south on I-680). A description of the re-validation effort is included in the FTOR.

System-Wide Measures of Effectiveness

With a large, complex freeway improvement project such as this, system-wide MOEs—such as VMT, VHD, and average travel speed—are particularly useful for comparison of existing conditions with future no-build and project alternatives. The system-wide MOEs under existing conditions are summarized in Table 3.1.6-3 for the a.m. and p.m. peak hours and illustrated in Figures 3.1.6-1 through 3.1.6-3.

The p.m. peak hour represents the heaviest congestion period within the project study area. For example, the p.m. peak hour has 10% higher VMT, 20% higher VHT, and 72% more VHD. These ratios are even higher when comparing the 3-hour peak periods with the p.m. MOEs exceeding the a.m. MOEs by 17%, 27%, and 73%, respectively. The average travel speed is 46 mph during the a.m. peak hour on WB I-80 (from Waterman/Air Base Parkway to Red Top Road), and 33 mph during the p.m. peak hour on EB I-80 (from Red Top Road to Waterman/Air Base Parkway).

Table 3.1.6-3. Existing (Year 2004) System-Wide Measures of Effectiveness[a]

MOE	A.M. Peak Hour	P.M. Peak Hour
Vehicle Miles of Travel (Vehicle Miles/Hour)	316,220	334,755
Vehicle Hours of Delay (Hours of Delay/Hour)	1,140	1,885
Estimated Duration of Congestion (Hours) [b]	1–2 hours	1.5–2.5 hours
Average Freeway Travel Speed	46 mph (WB Peak Direction)	33 mph (EB Peak Direction)

Source: Final Traffic Operations Report.

[a] The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway/Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area.

[b] Duration of congestion is estimated based on field conditions.

System Operations, Travel Speeds, and Bottlenecks

The existing operating conditions within the project study area were analyzed using 13 model runs of the calibrated peak period VISSIM models and existing a.m. and p.m. peak hour traffic volumes. The volumes are shown in Appendix A of the FTOR. The peak hours in the project study area are generally from 7:30 to 8:30 a.m. and 4:30 to 5:30 p.m.

The FTOR includes the existing (2004) travel speeds on the freeway system for the a.m. and p.m. peak hours, respectively. Travel times for key gateway-to-gateway pairs are also shown on the figures. Table 3-2 in the FTOR shows the service levels, based on vehicle density, for all freeway segments (mainline, weave, on-ramp merge, and off-ramp diverge areas).

A.M. Peak Hour Operations (2004)

The overall I-80 freeway section operates at LOS B at this location; however, the queue results in LOS F operations in the shoulder lane. The bottleneck that used to exist at the WB I-80 to southbound (SB) I-680 connector ramp was eliminated with the completion of the two-lane connector (2004). On WB I-80 during the a.m. peak hour, the grade on SR 12W exiting I-80 and heading toward Napa causes a slowdown on WB I-80. Heavy trucks are not able to keep up speeds on SR 12W, causing queuing onto I-80. The slowdown is generally in lanes 4 and 5 (the outside lanes closest to the shoulder),[1] but the effect of this, plus the combined effect of trucks entering from the truck scales and weaving vehicles headed to the Suisun Valley Road off-ramp or southbound I-680 connector, results in slow-moving queues in lanes 4 and 5, while traffic operations are generally better in lanes 1, 2, and 3. The slow-moving queue in lanes 4 and 5 typically extends from the SR 12W WB off-ramp to SR 12E.

P.M. Peak Hour Operations (2004)

During the p.m. peak hour, a bottleneck develops on EB I-80 at the truck scales on-ramp where slow-moving trucks attempt to accelerate to freeway travel speeds. Vehicle speeds generally begin to increase beyond the truck scales toward the I-80/SR 12E interchange. The bottleneck constrains the amount of traffic that can be delivered downstream, thereby resulting in improved LOS operations immediately downstream of the bottleneck. Vehicle queues resulting from the EB bottleneck at the truck scales on-ramp typically extends as far west as SR 12W and 800 feet south of the Central Way off-ramp on northbound (NB) I-680.

Another bottleneck that develops during the p.m. peak hour is EB I-80 between the Travis Boulevard on-ramp and the Air Base Parkway off-ramp. This bottleneck results in vehicle queues that extend back to the West Texas interchange, resulting in LOS F operations between the Beck Avenue EB on-ramp and the Travis Boulevard EB on-ramp.

The signalized intersections on SR 12E at Beck Avenue and Pennsylvania Avenue also cause some queuing on EB SR 12E, but the queues do not generally extend back onto EB I-80.

A.M. Peak Hour Operations (2007)

As described above, the existing conditions baseline for this study is 2004, but the existing conditions traffic operations model was re-validated to 2007 conditions to supplement the 2004 information and provide assurance that the model still validated more recent conditions. This process is described in Appendix D of the FTOR. The re-validation process for the a.m. peak hour showed that gateway and internal traffic volumes had not changed significantly between 2004 and 2007; therefore, a complete revised simulation was not prepared. Accordingly, the 2004 a.m. peak hour conditions described above are similar to the a.m. conditions in 2007.

P.M. Peak Hour Operations (2007)

Because volumes had changed significantly in the p.m. peak hour between 2004 and 2007, a new simulation was prepared as part of the re-validation effort for the p.m. peak hour. (Refer to Appendix D of the FTOR for more information). p.m. peak hour conditions in 2007 did not change significantly in the non-peak direction (westbound/southbound), and improved somewhat in the peak direction (northbound/eastbound) due to the provision of the fifth lane on EB I-80

[1] Lane numbering starts with the leftmost lane as lane 1.

between I-680 and SR 12E (which was not included in the 2004 analysis). Even with the opening of the new Benicia-Martinez Bridge to the south on I-680, which added about 500 vehicles at the southern gateway to the project limits on northbound I-680, conditions were better on the I-680/I-80 connector and downstream on I-80, due to the two-lane connector and the fifth lane between I-680 and SR 12E.

Intersection Operations—A.M. Peak Hour

The intersection lane configuration, control type, and peak hour volumes for existing conditions are described in Appendix B of the FTOR.

The operations of all study intersections are summarized in Table 3-3 of the FTOR. For all intersections, the average control delay and LOS for the entire intersection are reported. As shown in the table, 22 of the 24 ramp terminal study intersections operate at LOS E conditions or better during the a.m. peak hour. Only the Red Top Road/EB I-80 ramps (all-way stop-controlled) and Lopes Road/SB I-680 on-ramp/EB I-80 off-ramp (all-way stop-controlled) intersections operate at unacceptable LOS F conditions. All other study intersections operate at LOS D or better during the a.m. peak hour.

Intersection Operations—P.M. Peak Hour

During the p.m. peak hour, only the Lopes Road/SB I-680 on-ramp/EB I-80 off-ramp (all-way stop-controlled) ramp terminal intersection operates at unacceptable LOS F conditions. All other study intersections operate at LOS D or better during the p.m. peak hour, except the Ramsey Road/Bridgeport Avenue intersection, which operates at unacceptable LOS E. Due to the heavy congestion on the NB I-680 to EB I-80 ramp, it is estimated that approximately 75% of the Gold Hill Road off-ramp traffic volume is associated with vehicles diverting from I-680 and I-80 to Lopes Road/Ramsey Road/Cordelia Road to bypass the heavy congestion on the freeway mainline.

The intersection of Central Way/I-680 NB off-ramp operates at acceptable LOS C conditions, but the stop-controlled off-ramp operates at marginal LOS D/E. It is estimated that approximately 90% of the off-ramp traffic volume, like that on the Gold Hill Road off-ramp, is associated with vehicles diverting from NB I-680 to Central Way/Pittman Road. However, because the volumes on Central Way are fairly low, this intersection would not meet the Departments' peak hour volume signal warrant.

At the all-way stop-controlled intersection of Lopes Road/SB I-680 on-ramp/EB I-80 off-ramp, the heavy traffic volume on NB Lopes Road (more than 600 vehicles) and a total intersection volume exceeding 1,780 vehicles results in long delays and poor operating conditions for NB Lopes Road. As a result of the heavy traffic volumes on all three approaches, this intersection meets the Department's peak hour signal warrant criteria during both a.m. and p.m. peak hour conditions. Subsequent to completion of the existing conditions analysis, a signal was installed at this location.

Traffic Safety

The Department maintains statistics for all State highway facilities for three types of accident rates: the total accident rate, accidents involving fatalities and accidents involving fatalities or injuries. Within the project limits most freeway segments of I-80 experience a higher total accident rate and higher fatal or injury accident rate compared to the average statewide rate for similar types of facilities (Table 3.1.6.4). Half of the segments experience a higher than average fatal accident rate than the average statewide rate. Within the project limits of SR 12 East half of the sections experience higher than average total and fatal accident rates compared to the average statewide rate for similar types of facilities and most sections experience a higher than average accident rate for fatal plus injury accidents compared to the average statewide rate for similar facilities.

In reviewing the accident summary records 65% of the accidents occurred on I-80 during commute periods, with over 50% of the accidents being rear-end collisions. On SR 12 East over 50% of the accidents occurred during the commute periods, with over 60% of the accidents being rear-end collisions. On SR 12 West 70% of the accidents occurred during the commute periods, with 48% of the accidents being rear-end collisions. This combination of high accident rates during commute periods and a high percentage of rear-end type collisions is likely related to the congestion observed in these sections.

The effect of slow moving trucks decelerating into, or accelerating out of, the westbound truck scales combined with already congested lanes is described in the 2009 FTOR. Increased vehicle traffic, and in particular increased truck volumes, will exacerbate the accident rate based on the general correlation between increased volumes and congestion and increased accident rates.

Table 3.1.6-4. Accident History, January 1, 2006 to December 31, 2008

Location	Post Mile	Number of Accidents			Actual Accident Rate (Accidents per Million Vehicle Miles)			Average Accident Rate (Accidents per Million Vehicle Miles)		
		Total	Fatal	F+I	Total	Fatal	F+I	Total	Fatal	F+I
Western Segment										
I-80—westerly project limit to Red Top Road undercrossing	10.89 to 11.39	88	1	30	1.36	0.015	0.46	0.81	0.008	0.25
I-80—Red Top Road undercrossing to SR 12W/I-80 connector structure	11.39 to 11.98	69	0	22	0.90	0.000	0.29	0.81	0.008	0.25
I-80—SR 12W/I-80 undercrossing to Green Valley Road overcrossing	11.98 to 12.74	155	0	41	1.20	0.000	0.32	0.93	0.009	0.29
I-80—Green Valley Road overcrossing to I-680/I-80 connector structure	12.74 to 13.09	121	1	30	1.73	0.014	0.43	1.04	0.010	0.32
I-680—0.5 mile south of Gold Hill Road overcrossing to I-80/I-680 connector	9.5 to 13.1	94	0	29	0.48	0.000	0.15	0.97	0.010	0.31
SR 12W—0.5 mile west of Red Top Road to SR 12W/I-80 connector	1.75 to 2.76	42	0	16	1.19	0.000	0.45	1.28	0.030	0.58
I-80—I-680/I-80 connector structure to Suisun Valley Road overcrossing	13.09 to 13.49	141	1	31	1.65	0.012	0.36	1.08	0.011	0.33
Central Segment										
I-80—Suisun Valley Road overcrossing to SR 12E/I-80 connector structure	13.49 to 15.81	472	0	137	0.89	0.000	0.26	1.05	0.011	0.33
I-80—SR 12E/I-80 connector structure to Abernathy Road overcrossing	15.81 to 16.17	62	1	23	0.86	0.014	0.32	1.04	0.010	0.32
Eastern Segment										
I-80—Abernathy Road overcrossing to West Texas Street undercrossing	16.17 to 17.20	173	2	39	0.84	0.010	0.19	1.03	0.010	0.32
SR 12E—SR 12E/I-80 connector to Chadbourne Road undercrossing	1.85 to 2.22	8	0	1	0.55	0.000	0.07	0.71	0.007	0.23
SR 12E—Chadbourne Road undercrossing to Beck Avenue	2.22 to 3.20	63	1	31	1.23	0.019	0.60	1.13	0.011	0.42
SR 12E—Beck Avenue to Pennsylvania Avenue	3.20 to 4.07	64	1	32	1.51	0.024	0.75	1.55	0.018	0.63
SR 12E—Pennsylvania Avenue to Civic Center Boulevard	4.07 to 4.74	70	0	33	1.99	0.000	0.94	1.11	0.011	0.39

Source: California Department of Transportation 2006–2008.
Notes: Shading denotes locations that exceed the statewide average accident rate.
F+I = fatal plus injury.
Source: California Department of Transportation 2004–2006.
Notes: Shading denotes locations that exceed the statewide average accident rate.
F+I = fatal plus injury.

Bicycle Circulation System

Existing and planned bicycle facilities are provided throughout the study area. Below is a description of the three types of bicycle facilities, based on the Fairfield General Plan.

- Class I Bikeway (Bicycle Path)—Separate off-street bike paths or trails for bicycles only. Multi-use trails are off-street paths that are shared by pedestrians.
- Class II Bikeway (Bicycle Lane)—Provides a restricted right-of-way and is designated for the use of bicycles with a striped lane on a street or highway. Vehicle parking and vehicle/pedestrian cross-flow is permitted.
- Class III (Bicycle Route)—Provides for a right-of-way designated by signs and/or pavement markings for shared use with motor vehicles.

The Fairfield General Plan (2004) contains a map of existing and planned bikeways throughout the City. In the interchange vicinity, the North Connector Corridor Transportation for Livable Communities Concept Plan (August 2007) provides a more recent and updated plan for bicycle and pedestrian connections within the North Connector Corridor, between Jameson Canyon Road at Red Top Road and Abernathy Road. Figure 3.1.6-4 illustrates the components of the Concept Plan.

Existing bicycle facilities within the project limits include:

- The Fairfield Linear Park Pathway (multi-use, no horses) adjacent to and immediately north of I-80 between immediately east of the WB I-80 truck scales and Travis Boulevard; also between West Texas Street and Travis Boulevard on the south side of I-80 (northeast/southwest orientation).
- Class II Bicycle Lanes on SR 12 West between Red Top Road and points west.
- Bicycle path from Green Valley Road to the vicinity of the SR 12 West/Red Top Road intersection.
- Class II Bicycle Lanes on Lopes Road between Gold Hill Road and Red Top Road.
- Class I Multi-Use Path (no horses) along creek between Lopes Road and Watt Drive (north of Fermi Drive and south of Fulton Drive), and between Red Top and Gold Hill Road just west of the residential neighborhoods.
- Red Top Road—Planned Class II Bicycle Lanes.

Pedestrian Circulation System

The pedestrian network in the study area consists primarily of sidewalks along streets as well as crosswalks at the major intersections. ADA–compliant sidewalks are generally not provided at the grade-separated crossings of the study freeways and highways (I-80, SR 12, and I-680) in the project study area. Pedestrian overpasses are also not provided in the project study area. At-grade intersections are provided along SR 12; these are discussed below.

SR 12W

No crosswalk is provided at the unsignalized, side-street stop-controlled Red Top Road/SR 12W intersection. An existing multi-use trail terminates immediately east of this intersection north of SR 12W.

SR 12E

Crosswalks are provided across SR 12E at the Beck Avenue and Pennsylvania Avenue signalized intersections. The SR 12E/Beck Avenue intersection does not provide a marked crosswalk or pedestrian signal across Beck Avenue, resulting in no marked crossing or pedestrian signal at the northwest or southwest corner. The SR 12E/Pennsylvania Avenue intersection does not provide a marked crosswalk or pedestrian signal from the northeast corner across either Pennsylvania Avenue or SR 12E.

Transit System

A variety of transit services are provided in the project study area, including bus and passenger rail service.

Bus service to the project study area is provided by Fairfield and Suisun Transit, operated by the Cities of Fairfield and Suisun City; NorthBay Transit Group (unincorporated Solano County Paratransit service provider); the Rio Vista Delta Breeze operated by the City of Rio Vista; and BayLink, operated by the City of Vallejo. Figure 3.1.6-5 depicts the passenger bus services in the area.

Fairfield and Suisun Transit

Fairfield and Suisun Transit (FAST) is run by the Cities of Fairfield and Suisun City, which operate intra-city and inter-city fixed-route bus services Monday through Saturday. FAST provides service to Sacramento, Davis, Dixon, Vacaville, Benicia, Vallejo, and Bay Area Rapid Transit (BART). The fare system is based on the number of zones that are crossed, with a local fare of $1.50 and a maximum fare of $6.75 ($0.75 to $3.25 for seniors and the disabled). The existing FAST fixed transit route in the study area is summarized in Table 3.1.6-5, and illustrated in Figure 3.1.6-5. Besides fixed-route transit services, FAST also offers Flex buses, Paratransit, and a reduced-fare taxi program for seniors.

NorthBay Transit Group (Solano Paratransit)

The Solano Transportation Authority conducted a transit consolidation study, which resulted in the dissolution of the Solano Paratransit effective July 1, 2009. The agency had previously operated paratransit services within the unincorporated areas of Solano County. Paratransit services are now operated by the NorthBay Transit Group.

Rio Vista Delta Breeze

The Rio Vista Delta Breeze is run by the City of Rio Vista. The Delta Breeze operates inter-city service between Fairfield, Suisun City, the Suisun-Fairfield Amtrak Station, and Rio Vista on Route 50. Route 50 will deviate anywhere within the city limits of Fairfield and Suisun City. Inter-city fare is $5.00, including seniors. Route deviations cost an extra $0.50. Route 50 is summarized in Table 3.1.6-5.

Table 3.1.6-5. Existing Bus Routes in Project Study Area

Route	Service Area	Approximate Frequency		
		Peak Period	Off-Peak	Saturday
Fairfield and Suisun Transit (FAST)—Local Routes				
1A/1B	Central Fairfield Loop Route—North Texas St., Travis Blvd., Pennsylvania Ave, Fairfield Civic Center, Westfield Mall	45 min	45 min.	45 min.
2	Westfield Mall, Travis Blvd., Texas St., Tabor Ave., Sunset Ave., Pintail Dr.	30 min.	30 min.	30 min.
3A/3B	Outer Fairfield Loop—Westfield Mall, Travis Blvd., Oliver Rd., Waterman Blvd., Atlantic St., Texas St., Fairfield Transportation Center	60 min.	60 min.	60 min.
4	FLEX Bus Service—North Texas St., Dickson Hill Rd., Cement Hill Rd., Clay Bank Rd., Tabor Ave.	30 min.	60 min.	30 min. peak, 60 min. off-peak
5	Westfield Mall, Pennsylvania Ave., Suisun City Hall, Amtrak, Buena Vista Ave, SR 12E	30 min.	30 min.	60 min.
6	Westfield Mall, Travis Blvd., Sunset Ave., Pintail Dr., Walters Rd., Emperor Dr.	30 min.	30 min.	60 min.
7	Westfield Mall, Pennsylvania Ave., West Texas St., Beck Ave., Courage Dr., Chadbourne Rd., Rockville Rd., Suisun Valley Rd., Central Rd., Lopes Rd., Cordelia Villages	60 min.	60 min.	120 min.
Fairfield and Suisun Transit (FAST)—Regional Routes				
20	Fairfield Transportation Center, Westfield Mall, I-80, Vacaville Davis Street Park and Ride, Ulatis Cultural Center in Vacaville	60 min.	60 min.	60 min.
30	Fairfield Transportation Center, Westfield Mall, I-80, Vacaville Davis Street Park and Ride, Dixon Market Lane Park and Ride, UC Davis, Downtown Sacramento (Sacramento served Mon–Fri only).	3 a.m.peak,1 midday, 3 p.m. peak buses		3 hrs. (3 buses total)
40	Vacaville Davis Street Park and Ride, I-80, Fairfield Transportation Center, I-680, Benicia, Pleasant Hill BART, Walnut Creek BART	4 a.m. peak, 5 p.m. peak buses		N/A
90	Amtrak, SR 12W, Fairfield Transportation Center, I-80, El Cerrito BART	15 min.	60 min.	N/A
Rio Vista Delta Breeze				
50	Fairfield Transportation Center, Westfield Mall, Amtrak, SR 12E, Rio Vista, Lodi	2 hrs. (6 total buses)		N/A
BayLink				
85	Westfield Mall, Solano Community College, Mangels Blvd, I-80, Vallejo, Vallejo Ferry Terminal	30 min.[a]	60 min.	2 hrs.[b]

Source: Based on information presented in operator's Web site.

[a] 30 minute headway only during the a.m. peak period, 60 minute headways during the p.m. peak period.

[b] Operates on Saturdays, Sundays, and holidays.

BayLink

BayLink buses are operated by Vallejo Transit. Vallejo Transit operates inter-city service between Fairfield and Vallejo on Route 85. Inter-city fare is $5.00 ($2.50 for seniors and the disabled). Route 85 is summarized in Table 3.1.6-5. BayLink also provides ferry service between Vallejo and San Francisco.

Passenger Rail Service

Amtrak provides passenger rail service and the Capitol Corridor provides commuter rail service in the study area. The rail line runs southeast-northwest in the study area.

Amtrak currently provides daily service along the California Zephyr route between Emeryville and Chicago, and daily service along the Coast Starlight route between Los Angeles and Seattle. The Capitol Corridor operates between San Jose, Oakland, Martinez, Fairfield/Suisun City, Davis, Sacramento, and Auburn. The Capitol Corridor serves the Suisun-Fairfield Station with 20 trains per weekday and 15 trains per day on weekends and holidays in each direction. The

Suisun-Fairfield Amtrak Station is located in Suisun City on Main Street under the SR 12E overcrossing. Transit access to and from the station is provided by FAST and the Rio Vista Delta Breeze.

Environmental Consequences

This section describes the impacts of the project on traffic operations, pedestrian and bicycle facilities, and transit service in the construction year (2015) and the design year (2035). The scenarios considered in this analysis are listed below.

- Alternative B (2035).
- Alternative C (2035).
- Alternative B, Phase 1 (2015, 2035).
- Alternative C, Phase 1 (2015, 2035).
- No-Build Alternative (2015, 2035).

The alternatives are described in the Chapter 2, "Project Alternatives;" the analyzed scenarios are described in Chapter 4 of the FTOR.

Methods—Future Conditions Analysis

Traffic Forecasts

The 2035 travel demand forecasts were developed using the STA's Solano-Napa Travel Demand Model. The travel demand forecasts were documented in a Technical Memorandum dated July 14, 2006, which was reviewed and approved by the Department District 4 Office of Advanced Planning. The Technical Memorandum is included in Appendix C of the FTOR. The construction-year (2015) forecasts were developed by estimating the gateway demand at each of the five entrances to the system, using a straight-line interpolation between the existing (2004) volumes and future (2035) demand volumes; checking to ensure that the resulting gateway volumes were not constrained by gateway capacity; and interpolating the 2015 volumes for each origin zone within the VISUM model and determining the appropriate routes for the trips using the VISUM model with some manual adjustments.

Traffic Operations Analysis

The constrained traffic forecasts and freeway system traffic operations analysis were performed with the VISUM/VISSIM forecasting and traffic operations tools. The VISUM/VISSIM tools and the validation of the original models are described in the Final Technical Memorandum, *I-80/I-680/SR 12 Interchange Project PR/ED: VISSIM Model Calibration and Validation for the Project Expansion Area, February 14, 2005.* The intersection operations analysis utilizes the 2000 HCM operations methodology, and was performed with VISSIM for the ramp terminal intersections, and with Synchro for the non–ramp-terminal intersections.

Evaluation Criteria for Environmental Consequences

The criteria presented below were used in the determination of environmental consequences.

Traffic Operations

Environmental consequences are identified related to the proposed project's effect on bottlenecks within the project study area; the proposed project's effect on system-wide delay, average travel speed, VMT, and duration of congestion; and the proposed project's effect on intersection LOS at the ramp terminal intersections and non-ramp terminal intersections in the study area.

Pedestrian and Bicycle Circulation

An environmental consequence is identified if the proposed project's implementation would disrupt or interfere with existing or planned bicycle or pedestrian facilities.

Transit Service

An environmental consequence is identified if implementation of the proposed project would disrupt or interfere with existing or planned transit operations or facilities of Solano Regional Transit.

Summary of Environmental Consequences

Six summary tables, Tables 3.1.6-6 through 3.1.6-11, and two summary bar charts, Figures 3.1.6-6 and 3.1.6-7, are provided to support the traffic impact discussions below. Additional supporting tables and figures provided in the FTOR are referenced as needed below. They include detailed freeway LOS tables, intersection LOS tables, travel speed and travel time graphics, and bar chart travel time comparisons between conditions in 2015 and 2035.

Table 3.1.6-6. Construction-Year 2015—A.M. Peak Hour Conditions System Wide Measures of Effectiveness[a]

MOE	Route	No Project	Alternative B Phase 1	Alternative C Phase 1
Vehicle-Miles of Travel (Vehicle-Miles/Hour)	System-wide	449,870	451,325 (<1%)	448,800 (<1%)
Vehicle-Hours of Delay (Hours of Delay/Hour)	System-wide	1,075	840 (-22%)	1,105 (+3%)
Average Network Speed	System-wide	51.2 mph	52.6 mph (+3%)	51.0 mph (<1%)
% of Demand Served (Total Peak Hour Demand)	System-wide	97% (16,815)	98% (16,815)	97% (16,815)
Bottlenecks and queues	I-80 WB	None	None	None
	I-80 EB	None	None	None
	SR 12 West WB	None	None	None
	SR 12 West EB	None	None	None
	SR 12 East WB	At Beck; queue extends east of Civic Center	At Pennsylvania; queue extends to Jackson Street	Same as No Project
	SR 12 East EB	None	None	None
	I-680 NB	None	None	None
	I-680 SB	None	None	None
Duration of Congestion	System-wide	Congestion would remain at near existing conditions, lasting approximately 1.5 hours.	Congestion would remain at near existing conditions, lasting approximately 1 hour.	Congestion would remain at near existing conditions, lasting approximately 1.5 hours.
Maximum Individual Delay	WB I-80 to SB I-680[b]	25 seconds	None	40 seconds
	WB I-80[b]	30 seconds	25 seconds	25 seconds
	SR-12 East to WB I-80[b]	7 minutes	1 minute	6 minutes
Speed	WB I-80 to SB I-680[c]	62 mph	64 mph	63 mph
	WB I-80[c]	63 mph	64 mph	64 mph
	SR-12 East to WB I-80[c]	33 mph	61 mph	34 mph
Flows (volume)	SB I-680[d]	3,305	3,272	3,378
	WB I-80[d]	5,466	5,511	5,227
	WB SR-12 East[d]	2,202	2,393	2,532

Source: Fehr & Peers, August 2010.

[a] The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area.

[b] Maximum Individual Delay (when compared to a free flow speed of 65 mph) from east of Air Base Parkway on I-80 to south of Gold Hill Road on I-680; from east of Air Base Parkway on I-80 to west of Red Top Road on I-80; and from east of Main Street on SR 12 East to west of Red Top Road on I-80.

[c] Travel speed from east of Air Base Parkway on I-80 to south of Gold Hill Road on I-680; from east of Air Base Parkway on I-80 to west of Red Top Road on I-80; and from east of Main Street on SR 12 East to west of Red Top Road on I-80.

[d] Flow is on SB I-680 between I-80 and Gold Hill Road; on WB I-80 between SR 12 West and Red Top Road; and on SR 12 East between Chadbourne Road and I-80.

Table 3.1.6-7. Construction-Year 2015—P.M. Peak Hour Conditions System Wide Measures of Effectiveness[a]

MOE	Route	No Project	Alternative B Phase 1	Alternative C Phase 1
Vehicle-Miles of Travel (Vehicle-Miles/Hour)	System-wide	480,410	531,935 (+11%)	516,055 (+7%)
Vehicle-Hours of Delay (Hours of Delay/Hour)	System-wide	5,100	2,150 (-58%)	3,100 (-39%)
Average Network Speed	System-wide	36.2 mph	47.6 mph (+32%)	43.3 mph (+20%)
% of Demand Served (Total Peak Hour Demand)	System-wide	85% (20,255)	95% (20,255)	90% (20,255)
Bottlenecks and queues	I-80 WB	None	None	None
	I-80 EB	At 12 East Connector (due to queue from 12 East EB bottleneck); queue extends to Green Valley Road	None	At 12 East Connector (due to queue from 12 East EB bottleneck); queue extends to I-680 Connector
	SR 12 West WB	None	None	None
	SR 12 West EB	None	None	None
	SR 12 East WB	At Pennsylvania; queue extends to Jackson Street	None	Same as No Project
	SR 12 East EB	At Pennsylvania; queue extends beyond I-80 Connector and onto I-80 EB	At Pennsylvania; queue extends to I-80 Connector	At Pennsylvania; queue extends beyond I-80 Connector and onto I-80 EB
	I-680 NB	At I-80 connector (due to queue from 12 East EB bottleneck); queue extends beyond Gold Hill Road	None	None
	I-680 SB	None	None	None
Duration of Congestion	System-wide	Congestion would significantly increase compared to existing conditions, lasting beyond 3 hours	Congestion would decrease to near existing conditions, lasting approximately 1.5 hours.	Congestion would decrease to near existing conditions, lasting approximately 2 hours.
Maximum Individual Delay	NB I-680 to EB I-80[b]	26 minutes	1 minute	5 minutes
	EB I-80[b]	4 minutes	None	3 minutes
	SR-12 West to EB I-80[b]	4 minutes	None	3 minutes
Speed	NB I-680 to EB I-80[c]	17 mph	63 mph	49 mph
	EB I-80[c]	45 mph	65 mph	50 mph
	SR-12 West to EB I-80[c]	43 mph	62 mph	48 mph
Flows (volume)	NB I-680[d]	2,168	4,037	4,327
	EB I-80[d]	7,272	8,679	7,937
	SR 12 West[d]	1,548	1,385	1,334

Source: Fehr & Peers, August 2010.

[a] The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area.

[b] Maximum Individual Delay (when compared to a free flow speed of 65 mph) from south of Gold Hill Road on I-680 to east of Air Base Parkway on I-80; from west of Red Top Road on I-80 to east of Air Base Parkway on I-80; and from west of Red Top Road on SR 12 West to east of Air Base Parkway on I-80.

[c] Travel speed from south of Gold Hill Road on I-680 to east of Air Base Parkway on I-80; from west of Red Top Road on I-80 to east of Air Base Parkway on I-80; and from west of Red Top Road on SR 12 West to east of Air Base Parkway on I-80.

[d] Flow is on NB I-680 between Gold Hill Road and I-80; on EB I-80 between Travis Boulevard and Air Base Parkway; and on EB SR 12 West between Red Top Road and I-80.

Table 3.1.6-8. Design-Year 2035—AM Peak Hour Conditions System Wide Measures of Effectiveness[a]

MOE	Route	No Project	Alternative B Phase 1	Alternative C Phase 1[b]	Full-Build Alternative B	Full-Build Alternative C
Vehicle-Miles of Travel (Vehicle-Miles/Hour)	System-wide	539,445	564,605 (+5%)	546,625 (+1%)	575,300 (+7%)	577,480 (+7%)
Vehicle-Hours of Delay (Hours of Delay/Hour)	System-wide	3,695	1,845 (-54%)	3,020 (-18%)	1,335 (-64%)	1,260 (-66%)
Average Network Speed	System-wide	41.8 mph	48.9 mph (+17%)	44.2 mph (+6%)	52.4 mph (+25%)	52.7 mph (+26%)
% of Demand Served (Total Peak Hour Demand)	System-wide	90% (21,570)	95% (21,570)	94% (21,570)	98% (21,570)	98% (21,570)
Bottlenecks and queues	I-80 WB	Between Suisun Valley Road and Truck Scales; queue extends to SR 12 East connector	None	None	None	None
	I-80 EB	None	None	None	None	None
	SR 12 West WB	At Red Top Road; queue extends to I-80 connector	Same as No Project	None	None	None
	SR 12 West EB	None	None	None	None	None
	SR 12 East WB	At Beck; queue extends beyond Civic Center Drive	At Pennsylvania; queue extends beyond Civic Center Drive	Same as No Project	None	None
	SR 12 East EB	At Pennsylvania; queue extends to Chadbourne	None	Same as No Project	None	None
	I-680 NB	None	None	None	None	None
	I-680 SB	None	None	None	None	None
Duration of Congestion	System-wide	Congestion would significantly increase compared to existing conditions, lasting approximately 3 hours.	Congestion would decrease to near existing conditions, lasting approximately 1.5 hours.	Congestion would significantly increase compared to existing conditions, lasting approximately 2.5 hours.	Congestion would decrease to near existing conditions, lasting approximately 1.5 hours.	Congestion would decrease to near existing conditions, lasting approximately 1.5 hours
Maximum Individual Delay	WB I-80 to SB I-680[c]	2 minutes	1 minute	2 minutes	5 seconds	20 seconds
	WB I-80[c]	2 minutes	1 minute	1 minute	None	None
	SR-12 East to WB I-80[c]	12 minutes	2 minutes	9 minutes	None	None
Speed	WB I-80 to SB I-680[d]	53 mph	58 mph	60 mph	58 mph	59 mph
	WB I-80[d]	54 mph	60 mph	62 mph	60 mph	61 mph
	SR-12 East to WB I-80[d]	26 mph	51 mph	28 mph	61 mph	62 mph
Flows (volume)	SB I-680[e]	3,699	3,816	3,929	4,618	4,372
	WB I-80[e]	6,121	6,558	6,074	6,462	6,602
	WB SR-12 East[e]	2,139	3,064	2,466	4,115	3,909

Source: Fehr & Peers, August 2010.

[a] The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area.

[b] Alternative C-1 operations would be more comparable to that of Alternative B-1 once subsequent phases of improvements, namely the extension of a sixth eastbound mixed-flow lane on I-80 from the Suisun Valley Road off-ramp to the Eastbound Truck Scales off-ramp, and the elimination of the SR 12/Pennsylvania Avenue intersection, are implemented.

[c] Maximum Individual Delay (when compared to a free flow speed of 65 mph) from east of Air Base Parkway on I-80 to south of Gold Hill Road on I-680; from east of Air Base Parkway on I-80 to west of Red Top Road on I-80; and from east of Main Street on SR 12 East to west of Red Top Road on I-80.

[d] Travel speed from east of Air Base Parkway on I-80 to south of Gold Hill Road on I-680; from east of Air Base Parkway on I-80 to west of Red Top Road on I-80; and from east of Main Street on SR 12 East to west of Red Top Road on I-80.

[e] Flow is on SB I-680 between I-80 and Gold Hill Road; on WB I-80 between SR 12 West and Red Top Road; and on SR 12 East between Chadbourne Road and I-80.

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Table 3.1.6-9. Design-Year 2035—P.M. Peak Hour Conditions System Wide Measures of Effectiveness[a]

MOE	Route	No Project	Alternative B Phase 1	Alternative C Phase 1[b]	Full-Build Alternative B	Full-Build Alternative C
Vehicle-Miles of Travel (Vehicle-Miles/Hour)	System-wide	413,160	575,815 (+39%)	480,410 (+16%)	660,290 (+60%)	660,555 (+60%)
Vehicle-Hours of Delay (Hours of Delay/Hour)	System-wide	19,065	10,155 (-47%)	16,095 (-16%)	5,420 (-72%)	5,995 (-69%)
Average Network Speed	System-wide	15.9 mph	28.9 mph (+82%)	19.8 mph (+25%)	40.1 mph (+152%)	38.5 mph (+142%)
% of Demand Served (Total Peak Hour Demand)	System-wide	54% (26,910)	75% (26,910)	64% (26,910)	89% (26,910)	90% (26,910)
Bottlenecks and queues	I-80 WB	At Suisun Valley Road; queue extends beyond Air Base Parkway	At Suisun Valley Road; queue extends to Travis Boulevard	At Suisun Valley Road; queue extends to Abernathy	None	None
	I-80 EB	At 12 East Connector (due to queue from 12 East EB bottleneck); queue extends beyond Red Top Road	Same as No Project	Same as No Project	At Air Base Parkway (outside project limits); queue extends to just east of SR 12 West connector	At Air Base Parkway (outside project limits); queue extends to Red Top Road
	SR 12 West WB	None	None	None	None	None
	SR 12 West EB	At I-80 Connector (due to queue from 12 East EB bottleneck); queue extends beyond Red Top Road	Same as No Project	Same as No Project	At I-80 Connector (due to I-80 EB bottleneck); queue extends west of Red Top Road	At I-80 Connector (due to I-80 EB bottleneck); queue extends west of Red Top Road
	SR 12 East WB	At I-80 connector (due to I-80 congestion); queue extends beyond Civic Center Drive	None	At Pennsylvania queue extends beyond Civic Center Drive	None	None
	SR 12 East EB	At Pennsylvania; queue extends beyond I-80 Connector and onto I-80 EB	Same as No Project	Same as no Project	None	None
	I-680 NB	At I-80 connector (due to queue from 12 East EB bottleneck); queue extends beyond Gold Hill Road	At Gold Hill On-ramp, queue extends to Gold Hill Off-ramp	Same as No Project	At Gold Hill On-ramp, queue extends to Gold Hill Off-ramp	At I-80 connector (due to queue from 12 East EB bottleneck); queue extends beyond Gold Hill Road
	I-680 SB	None	None	None	None	
Duration of Congestion	System-wide	Congestion would significantly increase compared to existing conditions, lasting beyond 6 hours	Congestion would significantly increase compared to existing conditions, lasting approximately 4.5 hours	Congestion would significantly increase compared to existing conditions, lasting beyond 5 hours	Congestion would significantly decrease, lasting approximately 3 hours	Congestion would significantly decrease, lasting approximately 3 hours
Maximum Individual Delay	NB I-680 to EB I-80[c]	72 minutes	5 minutes	55 minutes	10 minutes	12 minutes
	EB I-80[c]	21 minutes	7 minutes	19 minutes	10 minutes	9 minutes
	SR-12 West to EB I-80[c]	91 minutes	30 minutes	63 minutes	12 minutes	10 minutes
Speed	NB I-680 to EB I-80[d]	12 mph	35 mph	8 mph	32 mph	26 mph
	EB I-80[d]	31 mph	39 mph	25 mph	28 mph	27 mph
	SR-12 West to EB I-80[d]	19 mph	28 mph	8 mph	25 mph	25 mph
Flows (volume)	NB I-680[e]	1,223	4,189	1,549	4,565	4,063
	EB I-80[e]	6,974	8,531	6,422	9,705	10,141
	SR-12 West[e]	234	858	342	2,163	2,908

Source: Fehr & Peers, August 2010.

[a] The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area.

[b] Alternative C-1 operations would be more comparable to that of Alternative B-1 once subsequent phases of improvements, namely the extension of a sixth mixed-flow eastbound lane on I-80 from the Suisun Valley Road off-ramp to the Eastbound Truck Scales off-ramp, and the elimination of the SR 12/Pennsylvania Avenue intersection, are implemented.

[c] No Project and Phase 1 Alternatives: Maximum Individual Delay (when compared to a free flow speed of 65 mph) from back of queue (upstream), which is outside the study area limit, to study area limit (downstream). Full Build Alternatives: Maximum Individual Delay (when compared to a free flow speed of 65 mph) from east of Air Base Parkway on I-80 to south of Gold Hill Road on I-680; from east of Air Base Parkway on I-80 to west of Red Top Road on I-80; and from east of Main Street on SR 12 to west of Red Top Road on I-80.

[d] Travel speed from south of Gold Hill Road on I-680 to east of Air Base Parkway on I-80; from west of Red Top Road on I-80 to east of Air Base Parkway on I-80; and from west of Red Top Road on SR 12 West to east of Air Base Parkway on I-80.

[e] Flow is on NB I-680 between Gold Hill Road and I-80; on EB I-80 between Travis Boulevard and Air Base Parkway; and on EB SR 12 West between Red Top Road and I-80.

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Table 3.1.6-10. Design-Year 2035—Peak Hour Travel Times[a]

MOE	Route	No Project	Alternative B Phase 1	Alternative C Phase 1	Full-Build Alternative B	Full-Build Alternative C
AM Peak Hour						
Travel Times Peak Direction	WB I-80 to SB I-680	11:15	9:55	10:25	9:20	9:35
	WB I-80	10:00	9:00	8:45	7:05	8:10
	WB SR-12 East to WB I-80	19:50	9:50	17:05	6:30	7:40
Travel Times Off-Peak Direction	NB I-680 to EB I-80	9:25	9:20	9:55	8:55	8:30
	EB I-80	8:20	8:10	8:20	7:55	7:15
	EB SR-12 West to EB I-80	8:20	8:15	8:35	7:55	7:40
PM Peak Hour						
Travel Times Peak Direction[b]	NB I-680 to EB I-80	81:45	12:40	63:55[c]	17:45	20:00
	EB I-80	28:10	15:15	27:30[c]	18:35	17:15
	EB SR-12 West to EB I-80	99:20	38:35	71:40[c]	19:45	18:30
Travel Times Off-Peak Direction	WB I-80 to SB I-680	21:05	10:35	11:35	8:25	9:25
	WB I-80	20:10	9:55	10:05	6:30	8:10
	WB SR-12 East to WB I-80	178:00	11:50	17:00	6:15	7:35

Source: Fehr & Peers, August 2010.

[a] The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area. Travel times are measured between the study area limits on each route, except as noted in footnote b.

[b] For No Project and Phase 1 Alternatives in the PM peak hour, peak direction, travel times are measured from back of queue (upstream), which is outside the study area limit, to the study area limit (downstream). This is because, for these cases only, queues extend upstream of the study area limits.

[c] Alternative C-1 operations would be more comparable to that of Alternative B-1 once subsequent phases of improvements are constructed. See report text, pages xxii – xxiii, for further discussion.

Table 3.1.6-11. Construction-Year 2015—Peak Hour Travel Times[a]

MOE	Route	No Project	Alternative B Phase 1	Alternative C Phase 1
AM Peak Hour				
Travel Times Peak Direction	WB I-80 to SB I-680	9:40	9:10	9:55
	WB I-80	8:30	8:25	8:25
	WB SR-12 East to WB I-80	15:35	9:45	14:25
Travel Times Off-Peak Direction	NB I-680 to EB I-80	9:00	8:55	9:30
	EB I-80	8:05	8:00	8:15
	EB SR-12 West to EB I-80	8:05	8:05	8:25
PM Peak Hour				
Travel Times Peak Direction	NB I-680 to EB I-80	34:00	9:10	13:05
	EB I-80	11:45	8:10	10:40
	EB SR-12 West to EB I-80	11:55	8:15	11:00
Travel Times Off-Peak Direction	WB I-80 to SB I-680	9:40	8:55	9:35
	WB I-80	8:30	8:10	8:10
	WB SR-12 East to WB I-80	10:55	9:05	9:55

Source: Fehr & Peers, August 2010.

[a] The study area extends on I-80 from west of Red Top Road to east of Air Base Parkway / Waterman and on I-680 south of Gold Hill Road to I-80. The study area also includes SR 12 east of Pennsylvania Road and west of Red Top Road and all local arterials within the project study area. Travel times are measured between the study area limits on each route.

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Effects on System-Wide MOEs

Alternative B (2035)

Alternative B would result in significant benefits to all three MOEs in the a.m. peak hour. Corridor-wide mobility would improve, with VMT increasing by approximately 7%, while VHD would decrease by nearly 70%. Average network travel speeds would increase more than 25%, from 42 mph under the 2035 No-Build scenario to approximately 53 mph with Alternative B (Figure 3.1.6-6).

Alternative B would provide even greater benefits to all three MOEs in the p.m. peak hour. Corridor-wide mobility would improve, with VMT increasing by 60%, while VHD would decrease by approximately 70%. Average network travel speed would increase more than 140% from 16 mph to approximately 40 mph (Figure 3.1.6-7).

Alternative B would provide a substantial improvement over the No-Build condition, clearing bottlenecks within the I-80 portion of the project corridor during the morning peak hour and substantially reducing queues in the evening peak hour. Alternative B would provide nearly a 70% reduction in VHD during the a.m. and p.m. peak hours. This alternative would provide travel time savings of 30%, on average, for the major travel routes through the project area in the a.m. peak hour, and 65% savings in the p.m. peak hour. The proposed project would clear all mainline sections of deficiencies experienced in the No-Build condition in the a.m. peak, although some deficiencies would remain in the p.m. peak hour. These deficiencies, however, are mainly due to the downstream bottleneck at Air Base Parkway, which is outside the project area.

Alternative B, Phase 1 (2015)

In the a.m. peak hour, Alternative B, Phase 1 would have very little effect on mobility, with an increase in VMT of less than 2,000 vehicle-miles (less than 0.5%), compared to No-Build conditions. However, Alternative B, Phase 1 would improve system-wide operations, resulting in a decrease in VHD of nearly 22% and an increase in average network travel speed of about 3% (from 51 mph under No-Build conditions to approximately 53 mph with Alternative B, Phase 1). (Figure 3.1.6-6).

In the p.m. peak hour, Alternative B, Phase 1 would improve corridor-wide mobility, increasing VMT by 11% while decreasing VHD by approximately 58%. Average network travel speed would increase by 32% (from 36 mph under No-Build conditions to approximately 48 mph with Alternative B, Phase 1) (Figure 3.1.6-7).

Alternative B, Phase 1 would provide an improvement over the No-Build condition, reducing the extent of queue from the bottleneck on SR 12E during the morning and evening peak hours. Alternative B would provide an approximately 20% reduction in VHD during the a.m. peak hour and a 60% reduction in VHD during the p.m. peak hour. This alternative would provide travel time savings of 10%, on average, for the major travel routes through the project area during the a.m. peak hour, and 35% savings during the p.m. peak hour. Only the WB SR 12E on-ramp from Jackson Street would continue to operate unacceptably during the a.m. peak hour, but this is due to the queue spillback from the SR 12E/Pennsylvania Avenue intersection. During the p.m. peak hour, only EB SR 12E between the truck scales and Beck Avenue would continue to operate

unacceptably. Overall, this would be a beneficial effect. No minimization or mitigation measures are required.

Alternative B, Phase 1 (2035)

In the a.m. peak hour, relative to the 2035 No-Build scenario, Alternative B, Phase 1 would improve corridor-wide mobility by increasing VMT approximately 5%, while decreasing VHD by about 50%. Average network travel speeds would increase 17% (from 42 mph under No-Build conditions to approximately 49 mph) (Figure 3.1.6-6).

In the p.m. peak hour, relative to the 2035 No-Build scenario, Alternative B, Phase 1 would improve corridor-wide mobility by increasing VMT by 39%, while decreasing VHD by 47%. Average network travel speed would increase by 82% (from 16 mph to 29 mph) (Figure 3.1.6-7).

Alternative B, Phase 1 would improve corridor-wide mobility in the a.m. peak hour by increasing VMT approximately 5%, while decreasing VHD by nearly 100%, relative to the 2035 No-Build condition. Average network travel speeds would increase 17%. In the p.m. peak hour, Alternative B, Phase 1 would improve corridor-wide mobility by increasing VMT by 39%, while decreasing VHD by 47%. Average network travel speed would increase by 82%. This would be a beneficial effect.

Alternative C (2035)

Alternative C would result in significant benefits to all three MOEs in the a.m. peak hour. Corridor-wide mobility would improve, with VMT increasing by approximately 7%, while VHD would decrease by nearly 70%. Average network travel speeds would increase more than 25%, from 42 mph under the 2035 No-Build scenario to approximately 53 mph under Alternative C (Figure 3.1.6-6).

Alternative C would provide even greater benefits to all three MOEs in the p.m. peak hour. Corridor-wide mobility would improve, with VMT increasing by 60%, while VHD would decrease by approximately 70%. Average network travel speed would increase more than 140%, from 16 mph to approximately 40 mph (Figure 3.1.6-7).

Alternative C would provide a substantial improvement over the No-Build condition, clearing bottlenecks within the I-80 portion of the project corridor during the a.m. peak hour and substantially reducing queues in the p.m. peak hour. Alternative C would provide nearly a 70% reduction in VHD during the a.m. and p.m. peak hours. This alternative would provide travel time savings of almost 25%, on average, for the major travel routes through the project area in the a.m. peak hour, and 65% savings in the p.m. peak hour. The proposed project would clear the mainline sections of all deficiencies experienced under the No-Build condition during the a.m. peak hour, although some deficiencies would remain in the p.m. peak hour due to the downstream bottleneck at Air Base Parkway, which is outside the project area. Overall, this would be a beneficial effect. No minimization or mitigation measures are required.

Alternative C, Phase 1 (2015)

In the a.m. peak hour, Alternative C, Phase 1 would have little effect on mobility relative to the 2015 No-Build condition. VMT would decrease slightly (approximately 1,000 vehicle miles or less than 0.5%) compared to No-Build conditions. Alternative C, Phase 1 would result in a

minimal improvement to system-wide operations over No-Build conditions, resulting in an increase in VHD of only 3% and no change in average network travel speed (Figure 3.1.6-6).

In the p.m. peak hour, Alternative C, Phase 1 would improve corridor-wide mobility relative to the 2015 No-Build condition, increasing VMT by 7% while decreasing VHD by approximately 39%. Average network travel speed would increase by 20% (from 36 mph to approximately 43 mph) (Figure 3.1.6-7).

Alternative C, Phase 1 would provide an improvement over the 2015 No-Build conditions, reducing the extent of queue from the bottleneck on SR 12E during the a.m. and p.m. peak hours. Alternative C, Phase 1 would provide no reduction to VHD during the a.m. peak hour, but would provide a 40% reduction during the p.m. peak hour. This alternative would provide negligible travel time savings during the a.m. peak hour, but would provide a 5% savings during the p.m. peak hour. Only WB SR 12E from east of Main Street to Pennsylvania Avenue would continue to operate unacceptably during the a.m. peak hour, due to the queue spillback from the SR 12E/Pennsylvania Avenue intersection. During p.m. peak hour EB, queue spillback from the Beck Avenue and Pennsylvania Avenue intersections on SR 12E would still extend back to I-680, but the extent of queue would be less than under No-Build conditions. Overall, this would be a beneficial effect. No minimization or mitigation measures are required.

Alternative C, Phase 1 (2035)

Alternative C, Phase 1 would improve corridor-wide mobility in the a.m. peak hour by increasing VMT approximately 1%, while decreasing VHD by 18%. Average network travel speeds would increase 6% (from 42 mph to approximately 44 mph) (Figure 3.1.6-6, Tables 3.1.6-8 and 3.1.6-9).

Alternative C, Phase 1 would improve corridor-wide mobility in the p.m. peak hour by increasing VMT by 16%, while decreasing VHD by 16%. Average network travel speed would increase 25% (from 16 mph to 20 mph) (Figure 3.1.6-7, Tables 3.1.6-8 and 3.1.6-9). In the a.m. peak hour, Alternative C, Phase 1 would improve corridor-wide mobility by increasing VMT approximately 1%, while decreasing VHD by 18%. Average network travel speeds would increase 6% (from 42 mph to approximately 44 mph). In the p.m. peak hour, Alternative C, Phase 1 would improve corridor-wide mobility by increasing VMT by 16%, while decreasing VHD by 16%. Average network travel speed would increase 25% (from 16 mph to 20 mph).

This would be a beneficial effect.

No-Build (2015)

In the a.m. peak hour, the level of congestion and delays that occurs under existing conditions would continue to occur under No-Build conditions in 2015. The projected increase in vehicular traffic is offset by the programmed and funded projects for the study area, except on WB SR 12E where severe congestion at the Beck Avenue and Pennsylvania Avenue intersections would continue to meter the amount of traffic that can access WB I-80. Despite increase in traffic during the a.m. peak hour, VHD would decrease slightly, and the average network travel speed would increase by 11% relative to existing conditions (Figure 3.1.6-6).

In the p.m. peak hour, congestion on EB SR 12E between the Pennsylvania Avenue and Beck Avenue intersections would result in a bottleneck that would constrain the amount of traffic that can exit the project study area on SR 12E east of Main Street and on I-80 east of Air Base Parkway. In addition, heavy traffic volumes on EB I-80 and NB I-680 would result in approximately 5,000 VHD (Figure 3.1.6-7).

In the a.m. peak hour, conditions would not worsen substantially relative to the existing (2004) condition. However, in the p.m. peak hour, VHD would increase by more than 100%; the duration of congestion would increase from 1.5–2 hours to more than 3 hours; many EB travel times would more than double, and the bottlenecks on SR 12E at Pennsylvania Avenue and at the SR 12E/EB I-80 connector would result in queues backing up onto I-80 as far as Green Valley Road.

No-Build (2035)

In the a.m. peak hour, significant congestion and delays would occur within the project study area, affecting accessibility and mobility throughout Solano County. Because the I-80/I-680/SR 12 interchange serves as a major freeway connector from the San Francisco Bay Area and Sacramento, the No-Build conditions would significantly affect the entire region. Severe congestion on WB SR 12E at the Beck Avenue and Pennsylvania Avenue intersections would meter the amount of traffic that can access WB I-80. Nevertheless, severe congestion at the I-80/I-680 interchange would result in nearly 3,700 VHD and average travel speeds of 40 mph. Relative to existing conditions, VHD would increase by 224% (Figure 3.1.6-6).

In the p.m. peak hour, severe congestion on EB SR 12E between the Pennsylvania Avenue and Beck Avenue intersections would result in a major bottleneck constraining the amount of traffic that can exit the project study area on SR 12E east of Main Street and on I-80 east of Air Base Parkway. In addition, heavy traffic volumes on EB I-80 and NB I-680 would result in approximately 19,000 VHD. The average travel speed would drop to 16 mph (Table 3.1.6-6).

Traffic congestion and delays would increase significantly by 2035 without the proposed project, increasing VHD more than 200% during the a.m. peak hour and 900% during the p.m. peak hour. The I-80/I-680/SR 12 interchange would not provide sufficient capacity to serve the projected 2035 traffic volumes, resulting in severe congestion and oversaturated stop-and-go operations during both the a.m. and p.m. peak hours. Queues would extend through much or all of the project area, and the average travel speed would drop to 42 (mph) during the a.m. peak hour and 16 mph during the p.m. peak hour. Without the improvements, the peak period would last 3–4 hours during the a.m. and 6–7 hours during the p.m.

Effect on Travel Times

Alternative B (2035)

The benefits of Alternative B during the a.m. peak hour include WB travel time savings of 20%–40%. EB travel time savings would be in the 5%–20% range.

The benefits of Alternative B during the p.m. peak hour include EB travel time savings of 35%–85%. It should be noted that one travel route would actually experience an increase in travel time of about 10% (EB I-80 west of Red Top Road to EB I-80 east of Air Base Parkway). The reason

for this increase is the increased number of vehicles served by the proposed project coupled with the removal of the bottleneck on SR 12E. With more vehicles arriving at the downstream bottleneck at Air Base Parkway outside the project area, the travel routes east of SR 12E would experience an increase in travel time due to the additional delay. In the WB direction, Alternative B would result in travel time savings of 60%–70%.

Alternative B, Phase 1 (2015)

The benefits of Alternative B, Phase 1 during the a.m. peak hour include substantial WB travel time savings for trips originating from WB SR 12E, with travel time savings of more than 35%. WB I-80 to SB I-680 travel time would improve slightly, with a travel time savings of 5%. All other travel time routes would remain consistent with No-Build conditions, increasing or decreasing by less than 30 seconds.

The benefits of Alternative B, Phase 1 (2015) during the p.m. peak hour include EB travel time savings of 30%–75%. The travel time savings would result in travel times comparable to, or even better than, existing travel times. Those travel time routes that would be better than existing conditions include EB I-80 from Red Top Road to Air Base Parkway and all routes beginning on NB I-680, EB SR 12W, and WB SR 12E. Alternative B, Phase 1 would result in WB travel time savings of 4%–20%. The improved travel times on WB SR 12E are due to the replacement of the Beck Avenue at-grade intersection on SR 12E with a grade-separated interchange, and improvements to the Pennsylvania Avenue intersection.

Alternative B, Phase 1 (2035)

The benefits of Alternative B, Phase 1 in 2035 during the a.m. peak hour include substantial WB travel time savings for trips originating from WB SR 12E, with travel time savings of 45%–50%. WB I-80 travel time would improve by approximately 10% compared to No-Build conditions. All other travel routes would remain consistent with No-Build conditions.

The benefits of Alternative B, Phase 1 during the p.m. peak hour would include EB travel time savings of up to 70%. All WB travel time routes would improve by more than 50%.

Alternative C (2035)

The benefits of Alternative C during the a.m. peak hour include WB travel time savings of 20–60%. EB travel time savings would be 10%–15%.

The benefits of Alternative C during the p.m. peak hour include EB travel time savings of 40–80%. One travel route—EB I-80 west of Red Top Road to EB I-80 east of Air Base Parkway—would experience an increase in travel time of approximately 2%, for similar reasons as the increase under Alternative B. WB travel time savings would be 50%–60%.

Alternative C, Phase 1 (2015)

During the a.m. peak hour, Alternative C, Phase 1 (2015) would result in minimal improvement to WB travel, with increases or decreases of less than 30 seconds compared to No-Build conditions. It should be noted that one travel time route (WB I-80 to WB SR 12W) would increase by more than 10%. This is due to the relocation of Red Top Road 1,500 feet west of the current intersection location, creating a slightly longer travel path. Travel times from WB SR 12E to WB I-80 and SB I-680 would decrease slightly by 7% and 5%, respectively, because of

the improvements to freeway flows in the right two lanes on WB I-80 west of the SR 12E connector.

The benefits of Alternative C, Phase 1 during the p.m. peak hour include EB travel time savings of 10%–60%. The travel time savings would result in travel times comparable to, or even better than, existing travel times. Those travel time routes that would be better than existing conditions include those starting on NB I-680. Alternative C, Phase 1 would result in reductions for most WB travel times; however, travel times for the two routes that end on WB SR 12 would increase slightly. The increased travel time would be due to the relocation of interchanges (the current at-grade intersection at Red Top Road on SR 12W would be replaced with a grade-separated interchange located approximately 1,500 feet west of the existing intersection location), resulting in longer travel distances.

Alternative C, Phase 1 (2035)
During the a.m. peak hour, Alternative C, Phase 1 would result in WB travel time savings of 5% to 20% compared to 2035 No-Build conditions. EB travel times would be similar to No-Build conditions, increasing by 30 seconds or less. The increase in travel time on EB SR 12E is due to an increase in demand served, and therefore more vehicles arriving at the bottleneck, while the increase in travel times on EB I-80 is due to the lengthening of some travel time paths due to the location of new interchanges.

During the p.m. peak hour, Alternative C Phase I would result in travel time savings in the peak eastbound direction of 3 percent (from 28:10 to 27:30) on eastbound I-80, 28 percent (from 99:20 to 71:40) for eastbound SR 12 West to eastbound I-80, and 22 percent (from 81:45 to 63:55) for northbound I-680 to eastbound I-80. In the westbound (non-peak) direction, travel time savings would approach 70 percent compared to No Project conditions, for all traffic. The 70 percent savings is the weighted average of the travel time savings for over the vehicles travelling on the major routes in the non-peak direction, weighted by the number of vehicles taking each of the three primary routes. Individual route travel time savings are 50 percent (from 20:10 to 10:05) for westbound I-80, 46 percent (from 21:05 to 11:35) for westbound I-80 to southbound I-680, and 90 percent (from 178:00 to 17:00) for westbound SR 12 East to westbound I-80.

Additional findings regarding the operation of Alternative C-1 in 2035: Alternative C Phase 1 will operate at levels more comparable to Alternative B Phase 1 with the addition of subsequent phases of improvements. The subsequent phase defined below, as well as others, comprise the additional improvements planned as a part of the Full Build Alternative C. It is estimated that the significant travel time savings achieved by Alternative C Phase I in 2015 will begin to erode between 2025 and 2030. Subsequent-phase improvements would need to be implemented in that time frame in order to sustain the operational benefits of this alternative.

An assessment was performed to determine the subsequent phases of improvements required to achieve comparable operations to Alternative B Phase 1. The assessment indicates that an additional I-80 eastbound mainline lane between the Suisun Valley Road off-ramp and the Eastbound Truck Scales off-ramp, combined with the elimination of the at-grade intersection of Pennsylvania Avenue at SR 12 East, would significantly improve 2035 PM peak hour eastbound travel times through the project corridor. Table 3.1.6-12 shows the 2025 estimated travel times,

and the 2035 travel times for Alternative C Phase I alone, and Alternative C Phase I with these subsequent improvements.

Table 3.1.6-12. Alternative C Phase 1 Travel Times PM Peak Hour, 2025 and 2035[a]

Segments	2025 Travel Times	2035 Travel Times	
		With Subsequent Improvements	Without Subsequent Improvements
NB I-680 to EB I-80	29:20	16:05	63:55
EB I-80	27:30	17:50	27:30
EB SR 12 West to EB I-80	27:31	43:25	71:30

Source: Fehr & Peers, August 2010.
[a] Travel times are measured from back of queue (upstream), which is outside the study area limit, to study area limit (downstream). The downstream study area limit is on I-80 east of Air Base Parkway / Waterman.

No-Build (2015)
Under the No-Build alternative, congestion and delays on SR 12E and SR 12W would result in long travel times and low travel speeds on those facilities in the a.m. peak hour. Moderate amounts of congestion and delay on the other facilities would result in somewhat slower than free-flow travel times and speeds on those facilities.

In the p.m. peak hour, EB congestion under No-Build conditions would result in oversaturated stop-and-go conditions. This would cause several major eastbound travel routes to exceed 30 minutes, including one route exceeding 60 minutes.

No-Build (2035)
Under 2035 No-Build conditions, significant congestion and delays would result in long travel times and low travel speeds on all major facilities through the project study area in the a.m. and p.m. peak hours. Severe EB congestion in the p.m. peak hour would result in seven major travel routes exceeding 45 minutes (including five exceeding 60 minutes) as a result of oversaturated stop-and-go conditions.

Effects on Freeway Operations

A.M. Peak Hour

Alternative B (2035)
During the a.m. peak hour, all freeway segments within the project study area would operate at LOS E or better under Alternative B. Only seven locations would operate at capacity (LOS E), and none of those locations would cause queue spillback into adjacent locations. Those locations are listed below.

- WB I-80 east of Waterman Boulevard/Air Base Parkway.
- WB I-80 mainline between Waterman Boulevard/Air Base Parkway and Travis Boulevard.
- WB I-80 off-ramp to Abernathy Road.
- NB I-680 off-ramp to Gold Hill Road.

- SB I-680 on-ramp from Gold Hill Road.
- WB SR 12E off-ramp to Main Street.
- WB SR 12E on-ramp from Jackson Street.

During the a.m. peak hour, the HOV lanes on EB and WB I-80 and on the direct connectors between I-80 and I-680 would operate at free-flow speed. The HOV lane on WB I-80 would approach capacity near the I-680/SR 12W interchange due to the HOVs accessing the direct HOV connector to I-680 and due to the HOVs bypassing the slight congestion in the adjacent mixed-flow lanes.

Alternative B, Phase 1 (2015)

In the a.m. peak hour, with construction of Alternative B, Phase 1, the bottleneck on SR 12E would be partially relieved due to the replacement of the at-grade intersection at Beck Avenue with grade-separated interchange and improvements at the Pennsylvania Avenue intersection. The additional vehicles on WB SR 12E would reduce speeds and increase congestion, but SR 12E would still operate acceptably. The signalized intersection on SR 12E at Pennsylvania Avenue would continue to meter the amount of WB traffic on SR 12E, but to a lesser extent than under No-Build conditions. Without the bottleneck on SR 12E at Beck Avenue, WB SR 12E and WB I-80 would serve higher demand in 2015.

Alternative B, Phase 1 would improve WB I-80 by increasing its capacity approaching the I-680 and SR 12W connectors. These improvements would reduce the congestion between the truck scales and Suisun Valley Road and would serve the additional traffic released from WB SR 12E. All freeway segments within the project study area would operate at LOS D conditions or better during the a.m. peak hour, except EB SR 12E approaching the Pennsylvania Avenue intersection. Only one location, the WB SR 12E on-ramp from Jackson Street, would operate over capacity (LOS F) as a result of the Pennsylvania Avenue intersection bottleneck on WB SR 12E.

During the a.m. peak hour, the HOV lanes on EB and WB I-80 and on the direct connectors between I-80 and I-680 would operate at free-flow speeds. The HOV lane on WB I-80 between SR 12E and SR 12W would approach capacity due to HOVs accessing the direct HOV connector to I-680 and due to HOVs bypassing the high traffic volume in the adjacent mixed-flow lanes.

Alternative B, Phase 1 (2035)

With construction of Alternative B, Phase 1, the bottleneck on SR 12E would be partially relieved by the replacement of the at-grade intersection at Beck Avenue with a grade-separated interchange and improvements at the Pennsylvania Avenue intersection. Alternative B, Phase 1 improvements would also improve WB I-80 operations by increasing its capacity approaching the I-680 and SR 12W connectors. These improvements would reduce the congestion between the truck scales and Suisun Valley Road and would serve the additional traffic released from WB SR 12E. The Red Top Road/North Connector/SR 12W intersection would continue to back up onto WB I-80 and cause slowing on the connector and slowing in the right two lanes of I-80 approaching the connector; average speeds on this section of I-80 would remain in the 50–59 mph range. All freeway segments within the project study area would operate at LOS E

conditions or better during the a.m. peak hour, except on WB SR 12E approaching the Pennsylvania Avenue intersection.

With construction of Alternative B, Phase 1, 10 freeway segments within the project study area would operate at capacity (LOS E), but would not cause queue spillback into adjacent locations:

- WB I-80 mainline between Waterman Boulevard/Air Base Parkway and Travis Boulevard.
- WB I-80 on-ramp from Travis Boulevard.
- WB I-80 weave between Travis Boulevard Loop and Oliver Road.
- WB I-80 mainline between SR 12E connector and truck scales.
- WB I-80 connector from SR 12E.
- NB I-680 off-ramp to Gold Hill Road.
- NB I-680 on-ramp from Gold Hill Road.
- SB I-680 on-ramp from Gold Hill Road.
- WB SR 12E off-ramp to Main Street.
- WB SR 12E weave between Beck Avenue and Abernathy Road.

During the a.m. peak hour, the HOV lanes on EB I-80 and on the direct connectors between I-80 and I-680 would operate at free-flow speeds. The HOV lane on WB I-80 would operate at free-flow speeds, except between SR 12E and the I-680/SR 12W interchange, which would operate near capacity due to HOVs accessing the direct HOV connector to I-680 and due to HOVs bypassing the high traffic volume in the adjacent mixed-flow lanes.

Alternative C (2035)

During the a.m. peak hour, all freeway mainline and weaving sections within the project study area would operate at LOS E conditions or better under Alternative C. Only eight locations would operate at capacity (LOS E), and none of those locations would cause queue spillback into adjacent locations. These locations are:

- WB I-80 east of Waterman Boulevard/Air Base Parkway.
- WB I-80 mainline between Waterman Boulevard/Air Base Parkway and Travis Boulevard.
- WB I-80 weave between Travis Boulevard Loop and Oliver Road.
- WB I-80 off-ramp to Abernathy Road.
- NB I-680 off-ramp to Gold Hill Road.
- NB I-680 on-ramp from Gold Hill Road.
- SB I-680 on-ramp from Gold Hill Road.
- WB SR 12 E off-ramp to Main Street.

During the a.m. peak hour, the HOV lanes on EB and WB I-80 and on the direct connectors between I-80 and I-680 would operate at free-flow speeds.

Alternative C, Phase 1 (2015)

Alternative C, Phase 1 would improve a.m. peak hour operations by adding capacity to WB I-80, but would not alleviate either the Beck Avenue or Pennsylvania Avenue intersection bottlenecks on WB SR 12E in 2015. The combination of added capacity on WB I-80 and continuation of the bottleneck on WB SR 12E would result in a reduction in congestion on WB I-80.

Alternative C, Phase 1 would also improve SR 12W, including replacing the at-grade intersection at Red Top Road with a grade-separated interchange approximately 1,500 feet west of the current location. This would reduce congestion and queuing on SR 12W and reduce the queue spillback to I-80, improving operations on WB I-80 approaching the SR 12W connector.

All the freeway mainline and weaving sections within the project study area, except for those on WB SR 12E, would operate at LOS D conditions or better during the a.m. peak hour. Locations east of Beck Avenue on WB SR 12E would continue to experience LOS F conditions. Only three locations would operate over capacity (LOS F) as a result of the Beck Avenue and Pennsylvania Avenue intersection bottlenecks on WB SR 12E.

During the a.m. peak hour, the HOV lanes on EB and WB I-80 and on the direct connectors between I-80 and I-680 would operate at free-flow speeds.

Alternative C, Phase 1 (2035)

Alternative C, Phase 1 would improve operations by adding capacity to WB I-80, but would not alleviate either the Beck Avenue or Pennsylvania Avenue intersection bottlenecks on WB SR 12E. The improvements, however, would reduce congestion and queuing on WB I-80 on several segments, including between the SR 12E connector and the I-680 and SR 12W connectors.

Alternative C, Phase 1 would also improve SR 12W, including replacing the at-grade intersection at Red Top Road/North Connector with a grade-separated interchange approximately 1,500 feet west of the current location. This would reduce congestion and queuing on SR 12W and reduce the queue spillback to I-80, improving operations on WB I-80 approaching the SR 12W connector.

All the freeway mainline and weaving sections within the project study, except for those on WB SR 12E, would operate at LOS E conditions or better during the a.m. peak hour. Locations east of Pennsylvania Avenue on WB SR 12E would continue to experience LOS F conditions. Only three locations would operate over capacity (LOS F) as a result of the Beck Avenue and Pennsylvania Avenue intersection bottlenecks on WB SR 12E.

With construction of Alternative C, Phase 1, eight freeway segments within the project study area would operate at capacity (LOS E), but would not cause queue spillback into adjacent locations. Those locations are listed below.

- WB I-80 weave between Travis Boulevard Loop and Oliver Road.
- WB I-80 mainline between SR 12E connector and truck scales.

- WB I-80 weave between truck scales and Suisun Valley Road.
- NB I-680 off-ramp to Gold Hill Road.
- NB I-680 on-ramp from Gold Hill Road.
- NB I-680 off-ramp to Red Top Road.
- NB I-680 mainline between Gold Hill Road and Red Top Road
- SB I-680 on-ramp from Gold Hill Road.

During the AM peak hour, the HOV lanes on EB and WB I-80 and on the direction connectors between I-80 and I-680 would operate at free-flow speeds.

No-Build (2015)
During the a.m. peak hour, under No-Build 2015 conditions, WB I-80 would experience heavy traffic flows, but would not reach capacity until the weave between the truck scales on-ramp and the Suisun Valley Road off-ramp. The congestion is mostly due to motorists positioning themselves for the upcoming SB I-680 and WB SR 12W connectors conflicting with trucks merging onto the freeway from the truck scales. However, the average speed over all lanes in this location would be in the 60+ mph range. In addition, the existing signalized intersections on SR 12E at Pennsylvania Avenue and Beck Avenue would meter the amount of SB traffic entering I-80. Without the additional bottlenecks on SR 12E, WB I-80 would experience more congestion in 2015.

During the a.m. peak hour, the HOV lanes on EB and WB I-80 would operate at free-flow speeds.

No-Build (2035)
During the a.m. peak hour, under 2035 No-Build conditions, slow-moving traffic in the rightmost lanes would occur on WB I-80 at the SR 12W connector due to the Red Top Road/SR 12W intersection backing up onto WB I-80 and due to WB SR 12W operating at saturated conditions. The resulting queue would extend back to east of the I-680 NB connector. A bottleneck would also develop between the truck scales and Suisun Valley Road, resulting in speeds of less than 30 mph across all lanes at this location. This bottleneck is due to traffic from SR 12E and the truck scales weaving with traffic headed to Suisun Valley Road, I-680, and SR 12W. The resulting queue would extend to the SR 12E connector on WB I-80. In addition to the queuing on I-80, the existing signalized intersections on SR 12E at Pennsylvania Avenue and Beck Avenue would meter the amount of WB traffic entering I-80. Without the additional bottlenecks on SR 12E, the congestion on WB I-80 would be more severe.

Under the No-Build Alternative, twelve freeway segments within the project study area would operate at capacity (LOS E), but would not cause queue spillback into adjacent locations. Those locations are:

- WB I-80 on-ramp from Waterman Boulevard/Air Base Parkway.
- WB I-80 mainline between Waterman Boulevard/Air Base Parkway and Travis Boulevard.

- WB I-80 on-ramp from Travis Boulevard.
- WB I-80 weave between Travis Boulevard Loop and Oliver Road.
- WB I-80 mainline between Suisun Valley Road and Green Valley Road.
- NB I-680 off-ramp to Gold Hill Road.
- NB I-680 on-ramp from Gold Hill Road.
- NB I-680 mainline between Gold Hill Road and Central Way.
- NB I-680 off-ramp to Central Way.
- NB I-680 connector to I-80 Westbound.
- SB I-680 on-ramp from Gold Hill Road.
- SB I-680 mainline south of Gold Hill Road.

During the a.m. peak hour, the HOV lanes on EB and WB I-80 would operate at free-flow speeds.

P.M. Peak Hour

Alternative B (2035)
During the p.m. peak hour, the queuing on WB I-80 would be eliminated, and vehicles would travel at free-flow speeds under Alternative B. The bottleneck on EB I-80 would move from the present location at the SR 12E connector to the lane drop east of Air Base Parkway, which is at capacity for a four-lane freeway. The extent of the queuing would be considerably less than under the No-Build scenario, only extending back to the SR 12W merge onto I-80, and not extending onto NB I-680. Another bottleneck would occur northbound on I-680 at the Gold Hill Road on-ramp, where the demand at this location would exceed the capacity.

Only two freeway segments within the project study area would operate at capacity (LOS E), with neither of these locations causing queue spillback into adjacent locations. Those locations are:

- NB I-680 off-ramp to Gold Hill Road.
- EB SR 12E on-ramp from Civic Center Boulevard.

During the p.m. peak hour, the HOV lanes on the direct connectors between I-80 and I-680 would operate at free-flow speeds. The HOV Lane on WB I-80 would operate near free-flow speed. The HOV lane would approach capacity on WB I-80 near the I-680/SR 12W interchange due to the HOVs accessing the direct HOV connector to I-680 and due to the HOVs bypassing the high traffic volumes in the adjacent mixed-flow lanes. The HOV lane on EB I-80 would operate just below free-flow speed, but at more than double the average speed of the adjacent mixed-flow lanes. The EB HOV lane would operate at capacity between I-680 and SR 12E and would operate near capacity east of SR 12E due to HOVs bypassing the congestion in the adjacent mixed-flow lanes and due to HOVs directly accessing the HOV lane from the I-680 HOV connector.

Alternative B, Phase 1 (2015)

During the p.m. peak hour, with construction of Alternative B, Phase 1, the queuing on WB I-80 would be eliminated, and vehicles would travel at free-flow speeds in 2015. The bottleneck on EB SR 12E would be partially relieved with the replacement of the Beck Avenue at-grade intersection with a grade-separated interchange and improvements to the Pennsylvania Avenue intersection. The extent of queuing due to the bottleneck on EB SR 12E would be substantially reduced, but not entirely eliminated. The EB queue from Pennsylvania Avenue would extend to the EB I-80 connector, but would not spill back onto EB I-80. All other queues on EB I-80 would be eliminated and vehicles would travel at free-flow speeds.

With construction of Alternative B, Phase 1, one freeway segment within the project study area, NB I-680 off-ramp to Gold Hill Road, would operate at capacity (LOS E) but would not cause queue spillback into adjacent locations.

During the p.m. peak hour, the HOV lanes on EB and WB I-80 and on the direct connectors between I-80 and I-680 would operate at free-flow speeds.

Alternative B, Phase 1 (2035)

With construction of Alternative B, Phase 1, the length of the queue on WB I-80 between the truck scales and Suisun Valley Road would be significantly reduced (from beyond the project study area east of Air Base Parkway to Travis Boulevard), resulting in an increase in volume served from 48% under No-Build conditions to 79% (a 65% increase). The queue spillback from I-80 to WB SR 12E would also be reduced significantly.

The bottleneck on EB SR 12E would be slightly reduced by the replacement of the Beck Avenue at-grade intersection with a grade-separated interchange and with improvements to the Pennsylvania Avenue intersection. However, the at-grade intersection at Pennsylvania Avenue would still result in long queues on SR 12E.

The queue from Pennsylvania Avenue on EB SR 12E would also continue to spill back to EB I-80 and still extend beyond the project study area on EB I-80 west of Red Top Road. However, the severity of the congestion on EB I-80 would be significantly reduced so that twice as many vehicles would be served as under No-Build conditions. The demand served on I-80 between Suisun Valley Road and the truck scales would double from 35% to 70% served compared to the No-Build condition. The queue would also continue to spill back onto WB SR 12W beyond the project study area. However, with the Alternative B, Phase 1 improvements, the queue would no longer spill back onto NB I-680 because that connector would merge from the left side instead of the more heavily queued right side of EB I-80.

Because of the increased traffic flow on EB I-80, freeway segments downstream of the SR 12E connector would operate near or over capacity. EB I-80 would develop a new bottleneck at the weave between Abernathy Road and West Texas Street, where the demand at this location exceeds the capacity. The queue from this bottleneck would spill back to the SR 12E connector on EB I-80 and contribute to the queuing from SR 12E.

NB I-680 would develop a new bottleneck at the Gold Hill Road on-ramp that would spill back to the Gold Hill Road off-ramp because of over-capacity operations.

With construction of Alternative B, Phase 1, two freeway segments within the project study area would operate at capacity (LOS E), but would not cause queue spillback into adjacent locations. Those locations are:

- EB I-80 on-ramp from Air Base Parkway/Waterman Boulevard.
- EB SR 12E on-ramp from Civic Center Boulevard.

During the p.m. peak hour, the HOV lanes on WB I-80 and on the direct connectors between I-80 and I-680 would operate at free-flow speeds. The WB HOV lane would be affected by the queues in the adjacent mixed-flow lanes, prohibiting vehicles from exiting the HOV lane. The HOV lane on EB I-80 would operate at a speed 40% higher than the average speed on the adjacent mixed-flow lanes. The EB HOV lane would operate near capacity near the SR 12E off-ramp due to HOVs bypassing the congestion in the adjacent mixed-flow lanes.

Alternative C (2035)

During the p.m. peak hour, the queuing on WB I-80 would be eliminated and vehicles would travel at free-flow speeds. However, as with Alternative B, the bottleneck on EB I-80 would move from the present location at the SR 12E connector to the lane drop east of Air Base Parkway, which would be at capacity for a four-lane freeway. The extent of the queuing, however, would be considerably less than under No-Build conditions, extending to just west of Red Top Road on I-80, just west of Red Top Road on SR 12W, and south of Gold Hill Road on I-680. (By comparison, the No-Build extent of queue would be far outside the study area).

Even though several freeway sections under both Alternatives B and C would continue to operate at LOS F within the project study area, this condition would not be attributable to deficiencies of the proposed project. This condition would be attributable to the bottleneck at Air Base Parkway that backs up into the project study area. With the proposed project, the demand served is much greater than under the No-Build condition (i.e., 80%–100% of the demand is served). Overall, relieving the major bottlenecks during the evening peak hour would provide major system-wide benefits, as well as improve freeway mainline operations.

During the p.m. peak hour, the HOV lanes on WB I-80 and on the direct connectors between I-80 and I-680 would operate at free-flow speeds. The HOV lane on EB I-80 would operate at nearly double the average speed of the adjacent mixed-flow lanes. The EB HOV lane would operate at capacity between I-680 and Abernathy Road and near capacity east of Abernathy Road due to HOVs bypassing the congestion in the adjacent mixed-flow lanes and due to HOVs directly accessing the HOV lane from the I-680 HOV connector.

Alternative C, Phase 1 (2015)

With construction of Alternative C, Phase 1, the queuing on WB I-80 would be eliminated and vehicles would travel at free-flow speeds. The bottleneck on EB SR 12E, however, would continue to result in congestion spilling back onto EB I-80. The addition of the third lane on EB SR 12E would increase the queuing capacity and throughput on SR 12E, but would only slightly improve the amount of traffic served at the Beck Avenue and Pennsylvania Avenue intersections. The queue from SR 12E would continue to spill back to the connector ramp from NB I-680, a spillback comparable to the extent of the queue under No-Build conditions. This queue would

also cause congestion along Abernathy Road and other local streets because vehicles would not be able to enter I-80 and SR 12E heading east.

The bottleneck on SR 12E would constrain the amount of traffic exiting the project area on EB I-80 and thus the freeway downstream of SR 12E would operate at LOS D or better, similar to No-Build conditions. The number of vehicles served would improve slightly under Alternative C, Phase 1 (55%–70% of the demand), compared to No-Build conditions.

Under Alternative C, Phase 1, WB SR 12E would continue to experience congestion and queuing as far back as Jackson Street, similar to No-Build conditions, due to the at-grade intersections.

With construction of Alternative C, Phase 1, two freeway segments within the project study area would operate at capacity (LOS E), but would not cause queue spillback into adjacent locations. Those locations are:

- NB I-680 off-ramp to Gold Hill Road.
- NB I-680 on-ramp from Gold Hill Road.

During the p.m. peak hour, the HOV lanes on WB I-80 and on the direct connectors between I-80 and I-680 would operate at free-flow speeds. The HOV lane on EB I-80 would operate just under free-flow speeds due to the queues in the adjacent mixed-flow lanes prohibiting vehicles from exiting the HOV lane.

Alternative C, Phase 1 (2035)

With construction of Alternative C, Phase 1, the length of the queue on WB I-80 that starts at the weave between the truck scales and Suisun Valley Road would significantly reduce from beyond the project study area east of Air Base Parkway to Abernathy Road. The severity of the congestion on WB I-80 would also reduce significantly, and the volume served would increase from 48% to 82% (a 70% increase) over the No-Build condition. The queue spillback from I-80 to WB SR 12E queue would also be reduced significantly.

The bottleneck on EB SR 12E would continue to result in severe congestion spilling back to EB I-80. The addition of the third lane on EB SR 12E would increase the queuing capacity of SR 12E and would slightly increase the amount of traffic served at the Beck Avenue and Pennsylvania Avenue intersections. The queue from SR 12E would spill back to beyond the project study area on EB I-80, NB I-680 and EB SR 12W. However, the length of the upstream queues would be shortened relative to the No Build alternative. The queuing would also cause congestion to spill back to adjacent ramp terminal intersections, as vehicles would not be able to enter I-80 and SR 12E. Most local streets would also become congested due to queue spillback from the freeway and motorists diverting to alternative routes.

The bottlenecks on EB SR 12E would continue to constrain the amount of traffic exiting the project area on EB I-80; consequently, the freeway downstream of SR 12E would operate at LOS D or better, as it would under No-Build conditions.

During the p.m. peak hour, the direct HOV connector from WB I-80 to SB I-680 would operate at free-flow speeds. The HOV lane on WB I-80 between Abernathy Road and Suisun Valley

Road would operate just below free-flow speed due to the queues in the adjacent mixed-flow lanes prohibiting vehicles from exiting the HOV lane. The HOV lane on EB I-80 west of SR 12E and the direct HOV connector from NB I-680 to EB I-80 would experience intermittent congestion due to the queue in the adjacent mixed-flow lanes prohibiting vehicles from exiting the HOV lanes. Despite these slowdowns, the speed of the EB I-80 HOV lane would be more than double the speed of the adjacent mixed-flow lanes.

Additionally, in 2035, Alternative C Phase 1 will operate at levels more comparable to Alternative B Phase 1 with the addition of subsequent phases of improvements. The subsequent phase, defined below, as well as others, comprise the additional improvements planned as a part of the Full Build Alternative C. It is estimated that the significant travel time savings achieved by Alternative C, Phase 1 in 2015 will begin to erode between 2025 and 2030. Subsequent-phase improvements would need to be implemented in that time frame in order to sustain the operational benefits of this alternative.

An assessment was performed to determine the subsequent phases of improvements required to achieve comparable operations to Alternative B, Phase 1. The assessment indicates that an additional I-80 eastbound mainline lane between the Suisun Valley Road off-ramp and the Eastbound Truck Scales off-ramp, combined with the elimination of the at-grade intersection of Pennsylvania Avenue at SR 12E, would significantly improve 2035 PM peak hour eastbound travel times through the project corridor. Table 3.1.6-13 (Table E-7 from the FTOR) shows the 2025 estimated travel times, and the 2035 travel times for Alternative C, Phase 1 alone, and Alternative C, Phase 1 with these subsequent improvements.

Table 3.1.6-13. Alternative C Phase 1 Travel Times PM Peak Hour, 2025 and 2035[a]

Segments	2025 Travel Times	2035 Travel Times	
		With Subsequent Improvements	Without Subsequent Improvements
NB I-680 to EB I-80	29:20	16:05	63:55
EB I-80	27:30	17:50	27:30
EB SR 12 West to EB I-80	27:31	43:25	71:30

Source: Fehr & Peers, August 2010

[a] Travel times are measured from back of queue (upstream), which is outside the study area limit, to study area limit (downstream). The downstream study area limit is on I-80 east of Air Base Parkway / Waterman.

This assessment will be considered by the STA in determining the timing of individual construction packages that make up the project's phases.

No-Build (2015)

During the p.m. peak hour, under No-Build conditions, a bottleneck would occur on EB SR 12E at the Beck Avenue and Pennsylvania Avenue at-grade intersections. The demand exceeding the capacity of these two intersections would constrain the amount of traffic that can exit the project study area (EB SR 12E east of Main Street and I-80 east of Air Base Parkway), resulting in congestion queuing back onto EB I-80 as far as the Green Valley Road on-ramp, on NB I-680 beyond Gold Hill Road, and on WB SR 12E to Jackson Street. This queue would also cause congestion along Abernathy Road and other local streets because vehicles are unable to enter EB SR 12E. This bottleneck would constrain the amount of traffic exiting the project area on EB I-

80; consequently, the freeway downstream of SR 12E would operate at LOS D or better. However, the number of vehicles served would be considerably less than the demand (only 55%–65% of the demand would be served).

On WB I-80 a bottleneck would develop between the truck scales and Suisun Valley Road under the No Build alternative. This would cause some local slowing across all lanes, but would not result in queue spillback.

During the p.m. peak hour, the HOV lane on WB I-80 would operate at free-flow speeds. The HOV lane on EB I-80 would operate at a speed nearly 40% higher than the average speed of the adjacent mixed-flow lanes. The EB HOV lane would operate at capacity between I-680 and SR 12E due to HOVs bypassing the severe congestion in the adjacent mixed-flow lanes.

No-Build (2035)

During the p.m. peak hour, under 2035 No-Build conditions, a bottleneck would occur on WB I-80 between the truck scales and Suisun Valley Road. As a result, a queue would extend east of Waterman Boulevard/Air Base Parkway on I-80 and east of Main Street on SR 12E.

More importantly, a bottleneck would develop on EB SR 12E at the Beck Avenue and Pennsylvania intersections, extending from these intersections back onto I-80 and outside the study area on I-80, I-680, and SR 12W. The bottleneck would constrain the amount of traffic that can exit SR 12E east of Main Street, and the queue behind it would constrain the amount of traffic that can exit I-80 east of Air Base Parkway. Because the bottleneck on EB SR 12E would constrain the amount of traffic that can travel beyond the SR 12E connector, the number of vehicles served on EB I-80, east of the connector, would be considerably less than the demand (only 40%–60% of the demand). The result of this bottleneck is that freeway operations downstream of this location on I-80 would be LOS D or better. This queue would also cause congestion along Chadbourne Road/Abernathy Road because vehicles would not be able to enter EB SR 12E.

During the p.m. peak hour, the HOV lane on WB I-80 would operate just under free-flow speed, but at more than double the average speed of the adjacent mixed-flow lanes. The WB HOV lane would not approach capacity, but would be affected by the queues in the mixed-flow lanes prohibiting vehicles from exiting the HOV lane. The speeds on the EB I-80 HOV lane would be nearly double the average speed of the adjacent mixed-flow lanes. The EB HOV lane would operate at capacity near the SR 12E off-ramp due to HOVs bypassing the severe congestion in the mixed-flow lanes.

Effects on Intersection Operations

Alternative B (2035)

With construction of Alternative B, all ramp terminal intersections would operate acceptably under 2035 a.m. peak hour conditions, except the Lopes Road/Gold Hill Road intersection, which would operate at unacceptable LOS E conditions. In the p.m. peak hour, only four non-ramp terminal intersections would continue to operate unacceptably, compared to 14 ramp terminal intersections and eight non-ramp terminal intersections operating unacceptably in the

2035 No-Build p.m. peak hour. Implementation of avoidance and minimization measures to design and construct intersection improvement would result in improved conditions.

Alternative B, Phase 1 (2015)

Construction of Alternative B, Phase 1 would replace the Beck Avenue intersection with a grade-separated interchange and would include improvements to the Pennsylvania Avenue intersection, but LOS F conditions would continue at the Pennsylvania Avenue intersection in the a.m. peak hour. Despite the worsening in LOS at Pennsylvania Avenue, the WB SR 12E volume leaving the Pennsylvania Avenue intersection would increase from 84% of demand served under No-Build conditions to 94% of demand served under Alternative B, Phase 1 in 2015.

Two non-ramp terminal intersections would continue to operate unacceptably under the Alternative B, Phase 1 a.m. peak hour conditions, as under the 2015 No-Build condition.

In the p.m. peak hour, all ramp terminal intersections would operate at LOS E or better, except the Beck Avenue/I-80 EB on-ramp/West Texas Street intersection. Operations at the Central Way/Cordelia Road intersection would improve to LOS A (relative to the unacceptable 2015 No-Build LOS), but three other non-ramp terminal intersections would continue to operate unacceptably, as under the 2015 No-Build p.m. peak hour condition.

Improvements to the SR 12E/Beck Avenue interchange would shift congestion to SR 12E/Pennsylvania Avenue, which would operate at LOS F in the a.m. peak hour. In the p.m. peak hour, five intersections would improve from LOS F under the 2015 No-Build conditions to LOS E or better under Alternative B, Phase 1. Overall, with implementation of avoidance and minimization measures to design and construct intersection improvements, there would be no adverse effect.

Alternative B, Phase 1 (2035)

Alternative B, Phase 1 would replace the Beck Avenue intersection with a grade-separated interchange, resulting in LOS D conditions in the a.m. peak hour at the Pennsylvania Avenue/SR 12E intersection. The Red Top Road/Jameson Canyon Road (SR 12W) would improve to LOS E conditions in the a.m. peak hour, relative to the 2035 No-Build scenario. LOS F conditions would continue at the Red Top Road/I-80 EB ramps intersection. The Central Way/Cordelia Road intersection would improve to acceptable conditions; however, Green Valley Road/Business Center Drive would degrade to LOS E conditions due to a change of the traffic patterns in the area. Unacceptable conditions would continue at the three other non-ramp terminal intersections.

With the construction of Alternative B, Phase 1, eight of the 14 deficient ramp terminal intersections under No-Build conditions would improve to acceptable LOS E or better conditions or, in the case of the Central Way/I-680 NB off-ramp, the intersection would be removed. Operations at the Abernathy/I-80 EB ramps and West Texas Street/I-80 EB off-ramp ramp terminal intersections would degrade to unacceptable LOS F conditions due to changes in traffic patterns.

In the a.m. peak hour, four intersections (three ramp terminal intersections and one non-ramp terminal intersection) would improve from LOS F under the 2035 No-Build scenario to LOS E

or better with Alternative B, Phase 1. In the p.m. peak hour, seven intersections (all ramp terminal intersections) would improve from LOS F under the 2035 No-Build scenario to LOS E or better with Alternative B, Phase 1. Two intersections—Abernathy/I-80 EB ramps and West Texas Street/I-80 EB off-ramp—are projected to worsen from LOS E to LOS F as the result of trip pattern changes. Overall, with implementation of avoidance and minimization measures to design and construct intersection improvements, there would be no adverse effect.

Alternative C (2035)

With construction of Alternative C, all ramp terminal and non-ramp terminal intersections would operate acceptably under 2035 a.m. peak hour conditions. In the p.m. peak hour, only three non-ramp terminal intersections would continue to operate unacceptably. Overall, with implementation of avoidance and minimization measures to design and construct intersection improvements, there would be no adverse effect.

Alternative C, Phase 1 (2015)

During the a.m. peak hour, the SR 12E/Beck Avenue intersection would continue to operate at LOS F, as it would under 2015 No-Build conditions. The two non-ramp terminal intersections that operate unacceptably under the 2015 No-Build scenario would operate acceptably, at LOS D, under Alternative C, Phase 1.

During the p.m. peak hour, two of the five ramp terminal intersections that operate unacceptably under the 2015 No-Build condition would improve to LOS C or better; the other three would continue to operate at unacceptable LOS F conditions. In addition, two of the four non-ramp terminal intersections that operate unacceptably under the 2015 No-Build condition would improve to LOS C, and the other two would remain at unacceptable LOS F.

In the a.m. peak hour, two non-ramp terminal intersections would improve from LOS F under the 2015 No-Build condition to LOS D under Alternative C, Phase 1; in the p.m. peak hour, two ramp terminal intersections and two non-ramp terminal intersections would improve from LOS F under the 2015 No-Build condition to LOS C or better under Alternative C, Phase 1. This would be a beneficial effect.

Alternative C, Phase 1 (2035)

Alternative C, Phase 1 would improve operations at the Red Top Road/I-80 EB ramps to acceptable LOS C conditions. Also, this alternative would replace the Red Top Road/Jameson Canyon Road (SR 12W) intersection with a grade-separated interchange that would operate acceptably. LOS F conditions would continue at two other ramp terminal intersections, as under the 2035 No-Build scenario. Operations at the Lopes Road/Gold Hill Road and the Central Way/Cordelia Road intersections would improve to acceptable conditions; however, Green Valley Road/Business Center Drive would degrade to LOS E conditions due to a change of traffic patterns in the area. Unacceptable conditions would continue at two other non-ramp terminal intersections, as under the 2035 No-Build scenario.

In the a.m. peak hour, three intersections (two ramp terminal intersections and one non-ramp terminal intersection) would improve from LOS F to LOS E or better under Alternative C, Phase 1. In the p.m. peak hour, five intersections (four ramp terminal intersections and one non-ramp terminal intersection) would improve from LOS F under the 2035 No-Build scenario to LOS E

or better under Alternative C, Phase 1. One intersection (Oliver Road/I-80 WB on-ramp/Rockville Road) would worsen to LOS F under Alternative C, Phase 1, and one new intersection (Red Top Road/SR 12W EB ramps) is projected to operate at LOS F. Overall, with implementation of avoidance and minimization measures to design and construct intersection improvements, there would be no adverse effect.

No-Build (2015)

Table 6-8 in the FTOR shows that during the a.m. peak hour, the WB I-80 congestion would result in one ramp terminal intersection and two non-ramp terminal intersections operating at unacceptable LOS F conditions under No-Build conditions.

Table 6-9 in the FTOR shows that with the bottleneck locations discussed in the previous section, five of the 24 ramp terminal intersections would operate at unacceptable LOS F conditions in the p.m. peak hour under 2015 No-Build conditions. Additionally, four other study intersections would operate unacceptably in the p.m. peak hour.

Under the No-Build Alternative, in the a.m. peak hour, three intersections are projected to operate at LOS F. In the p.m. peak hour, nine intersections are projected to operate at LOS F.

No-Build (2035)

During the a.m. peak hour condition, the WB I-80 congestion would result in four ramp terminal intersections operating at unacceptable LOS F conditions. Additionally, four non-ramp terminal intersections would operate unacceptably under No-Build conditions.

During the p.m. peak hour, 14 of the 24 ramp terminal intersections would operate at unacceptable LOS F conditions. Additionally, eight non-ramp terminal intersections would operate unacceptably under No-Build conditions.

A total of eight study intersections (four ramp terminal intersections and four non-ramp terminal intersections) would operate unacceptably in the a.m. peak hour, and 22 study intersections (14 ramp terminal intersections and eight non-ramp terminal intersections) would operate unacceptably in the p.m. peak hour. This compares to only two of the study intersections operating unacceptably under existing conditions.

Effects on Safety

Both project alternatives will improve safety by reducing congestion and by braiding on- and off-ramps and reducing weaving. Additionally, the relocation of the I-80/I-680 interchange under Alternative C and Alternative C, Phase 1 would further improve safety by increasing the distance between interchanges allowing more room for traffic to weave. Both alternatives will further improve safety because the westbound truck scales would be relocated and braided ramps would reduce the effects of slow moving trucks and truck weaving on congestion and safety.

Under the No-Build Alternative congestion would continue to increase and no changes would be made to on- and off-ramps to reduce weaving.

Effects on Pedestrian and Bicycle Facilities

Both project alternatives may require special design or construction measures to ensure that the existing facilities can be maintained, and that planned new pedestrian and bicycle facilities (Figure 3.1.6-4) can be provided as envisioned. Compliance with Department policy and implementation of avoidance and minimization measures to accommodate existing and planned bicycle and pedestrian facilities will ensure that there is no adverse effect.

Further, as a result of reducing peak hour trips with the implementation of Alternative C and Alternative C, Phase 1, traffic operations adjacent to Rodriguez High School are expected to remain the same or improve with the project. Generally with increased traffic, there is a corresponding increase in congestion-related (rear-end type) accidents. A decrease in congestion, and expected with the project, would generally result in fewer congestion-related accidents which would improve safety.

The No-Build Alternative includes certain improvement projects that are expected to be constructed prior to the proposed project. These projects are described in Chapter 4 of the FTOR. Certain of these projects may require special design or construction measures to ensure that the existing facilities can be maintained, and that planned new pedestrian and bicycle facilities (Figure 3.1.6-4) can be provided as envisioned.

Effects on Transit Routes and Service

The improved traffic operations under both project alternatives, relative to No-Build conditions in the same year, would reduce delays for buses and paratransit vehicles. Implementation of avoidance and minimization measures to adjust transit routes and stops as needed, will ensure that there is no adverse effect.

Further, as a result of reducing peak hour trips with the implementation of Alternative C and Alternative C, Phase 1, traffic operations adjacent to Rodriguez High School are expected to remain the same or improve with the project. Generally with increased traffic, there is a corresponding increase in congestion-related (rear-end type) accidents. A decrease in congestion, and expected with the project, would generally result in fewer congestion-related accidents. Red Top Road, the frontage to Rodrigues High School, is expected to be a safer facility for pedestrians and bicyclists with the construction of Alternative C and Alternative C, Phase 1 than compared to the No-Build Alternative.

The substantially worsened traffic congestion in the p.m. peak hour under 2015 and 2035 No-Build conditions will incur delays to buses and paratransit vehicles, potentially resulting in additional operating costs to transit agencies to provide more service vehicles, drivers, and support functions.

Construction Period Disruption of Vehicle, Pedestrian, and Bicycle Circulation

Construction of either project alternatives would entail additional truck and construction worker traffic, temporary lane closures and detours, and various construction-related activities that would increase congestion to varying degrees throughout the construction period. Implementation of avoidance and minimization measures to develop and implement the TMP will ensure that there is no adverse effect.

Alternative B, Alternative C, and Alternative C, Phase 1 may require closing the existing bicycle path from Green Valley Road to the vicinity of the SR 12 West/Red Top Road intersection during construction.

Under the No-Build Alternative, no construction would take place and therefore there would be no disruption of vehicle, pedestrian or bicycle circulation due to construction.

Avoidance, Minimization, and/or Mitigation Measures

Design and Construct Intersection Improvements

To minimize the impact of traffic pattern changes associated with the proposed project's on-ramp terminal and non-ramp terminal intersections, the Department, in cooperation with the City of Fairfield, Suisun City, and Solano County, will design and construct intersection improvements (including signalization, lane configuration changes, approach widening, and operational improvements) as part of each project phase. The specific intersections projected to operate at LOS F for each project alternative are listed in the FTOR and referenced in the section titled "Intersection Operations," above. The improvements should be designed to provide LOS E or better under either project alternative. Intersection improvements would be designed in accordance with Highway Design Manual (HDM) sections 405.2 and 405.3, and would include adequate turn lane storage, including multiple turn lanes where needed.

Maintain Existing or Accommodate Planned Bicycle and Pedestrian Facilities

The Department, in cooperation with STA, will ensure that the design of each project phase accommodates existing and planned bicycle and pedestrian facilities within the project area, including providing for alternative connecting routes if and where needed. In particular, the planned improvements in the Fairfield General Plan Bicycle Network and the North Connector Corridor Transportation for Livable Communities Concept Plan will be incorporated into the project design at each project phase.

To minimize potential impacts to bicycle and pedestrian users of the bicycle path from Green Valley Road to the vicinity of the SR 12 West/Red Top Road intersection, the project shall implement a bike and pedestrian bridge (i.e. van service) during construction to transport bicyclists and pedestrians traveling between Green Valley Road at I-80 and Red Top Road at McGary Road. After construction is complete, bicyclists and pedestrians would be able to traverse the project area utilizing the new extension of Business Center Drive to cross over SR12W, the UPRR tracks and connect with Red Top and McGary Road.

Adjust Transit Routes and Stops as Needed

The Department, in cooperation with STA, local transit agencies, the City of Fairfield, Suisun City, and Solano County, will ensure that transit routes and stops are adjusted as needed, concurrent with each project phase, preserving service levels to be consistent with current and planned levels.

Develop and Implement a Transportation Management Plan and Construction Scheduling to Minimize Adverse Effects

The Department, in cooperation with STA and the affected local jurisdictions, will require the following measures to be implemented as part of project construction.

- The contractor will be required to prepare and implement a TMP that identifies the locations of temporary detours and signage to facilitate local traffic patterns and through-traffic requirements.
- The Project Special Provisions of the highway contract will require that emergency service providers (i.e., law enforcement, fire protection, and ambulance services) be given adequate notice of any street closures during the construction phases of the proposed project.
- Construction activities will be coordinated to avoid blocking or limiting access to homes and businesses to the extent possible. Residents will be notified in advance about potential access or parking effects before construction activities begin.
- Any interchange, ramp, or road closures required during construction will, to the extent possible, be limited to nighttime hours to reduce effects on businesses in or adjacent to the project limits.
- Construction activities will be coordinated to avoid blocking or limiting access to businesses in or adjacent to the project area during business hours. Businesses will be notified in advance concerning construction activities before construction begins near businesses.
- The TMP will be prepared to address short-term disruptions in existing circulation patterns during construction. For example, the TMP will identify the locations of temporary detours or temporary roads to facilitate local traffic circulation and through-traffic requirements.

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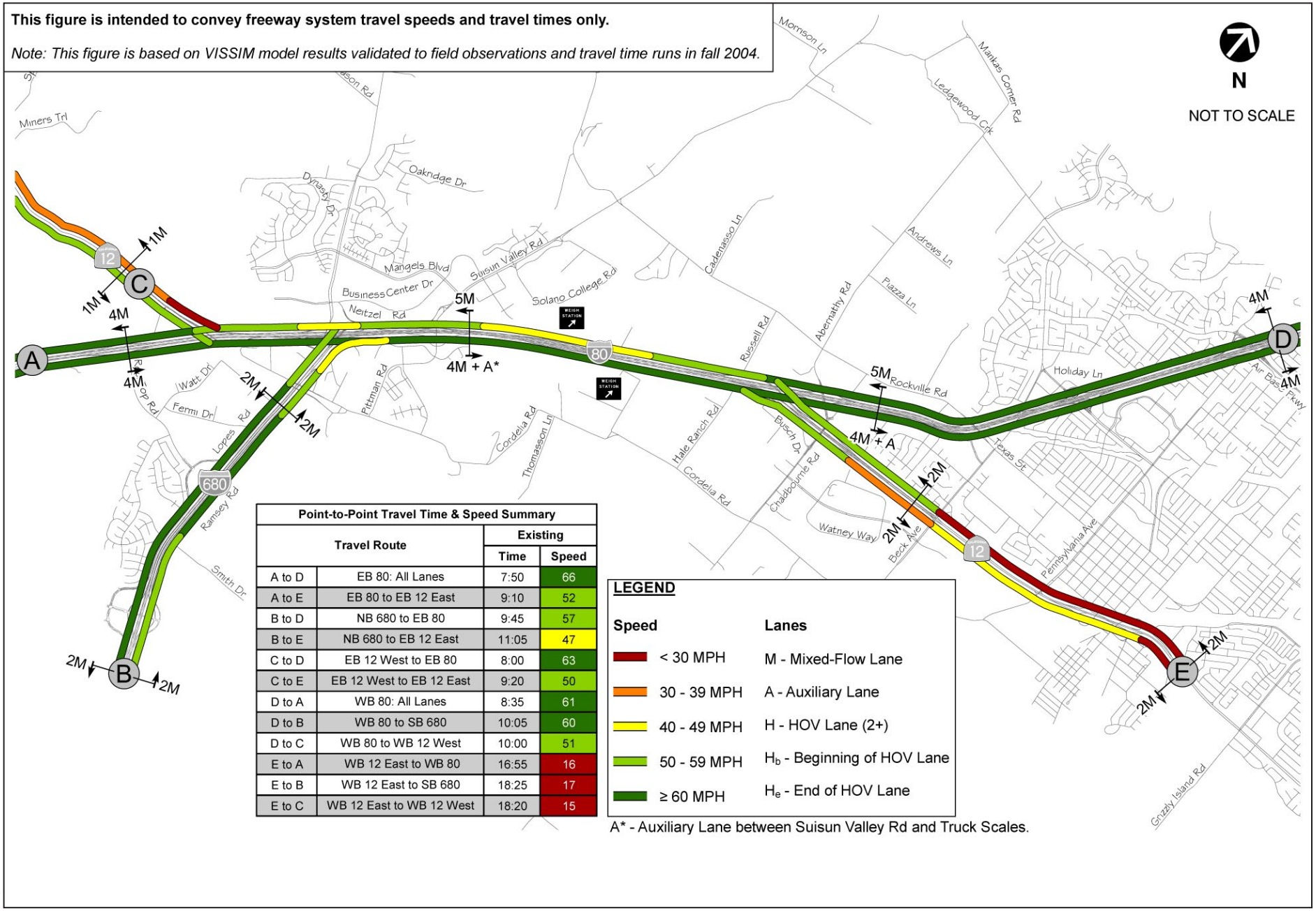
This figure is intended to convey freeway system travel speeds and travel times only.

Note: This figure is based on VISSIM model results validated to field observations and travel time runs in fall 2004.



Point-to-Point Travel Time & Speed Summary			
Travel Route		Existing	
		Time	Speed
A to D	EB 80: All Lanes	7:50	66
A to E	EB 80 to EB 12 East	9:10	52
B to D	NB 680 to EB 80	9:45	57
B to E	NB 680 to EB 12 East	11:05	47
C to D	EB 12 West to EB 80	8:00	63
C to E	EB 12 West to EB 12 East	9:20	50
D to A	WB 80: All Lanes	8:35	61
D to B	WB 80 to SB 680	10:05	60
D to C	WB 80 to WB 12 West	10:00	51
E to A	WB 12 East to WB 80	16:55	16
E to B	WB 12 East to SB 680	18:25	17
E to C	WB 12 East to WB 12 West	18:20	15

LEGEND

Speed	Lanes
< 30 MPH	M - Mixed-Flow Lane
30 - 39 MPH	A - Auxiliary Lane
40 - 49 MPH	H - HOV Lane (2+)
50 - 59 MPH	H_b - Beginning of HOV Lane
≥ 60 MPH	H_e - End of HOV Lane

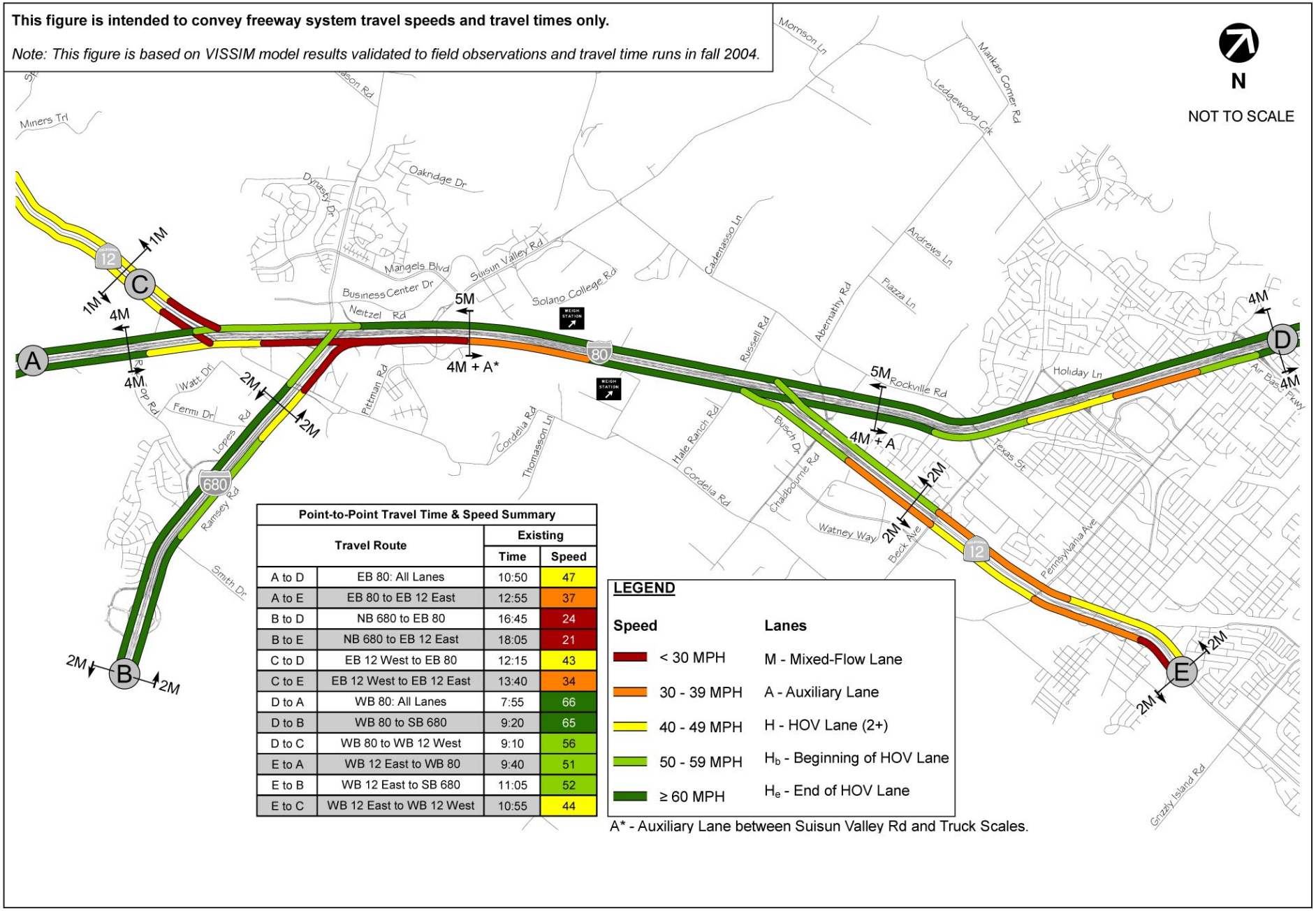
A* - Auxiliary Lane between Suisun Valley Rd and Truck Scales.

Graphics/02166.02 (4-2012) JD

Figure 3.1.6-1
Existing Year 2004 AM Peak Hour Travel Speeds

This figure is intended to convey freeway system travel speeds and travel times only.

Note: This figure is based on VISSIM model results validated to field observations and travel time runs in fall 2004.



Point-to-Point Travel Time & Speed Summary			
Travel Route		Existing	
		Time	Speed
A to D	EB 80: All Lanes	10:50	47
A to E	EB 80 to EB 12 East	12:55	37
B to D	NB 680 to EB 80	16:45	24
B to E	NB 680 to EB 12 East	18:05	21
C to D	EB 12 West to EB 80	12:15	43
C to E	EB 12 West to EB 12 East	13:40	34
D to A	WB 80: All Lanes	7:55	66
D to B	WB 80 to SB 680	9:20	65
D to C	WB 80 to WB 12 West	9:10	56
E to A	WB 12 East to WB 80	9:40	51
E to B	WB 12 East to SB 680	11:05	52
E to C	WB 12 East to WB 12 West	10:55	44

LEGEND

Speed	Lanes
< 30 MPH	M - Mixed-Flow Lane
30 - 39 MPH	A - Auxiliary Lane
40 - 49 MPH	H - HOV Lane (2+)
50 - 59 MPH	H_b - Beginning of HOV Lane
≥ 60 MPH	H_e - End of HOV Lane

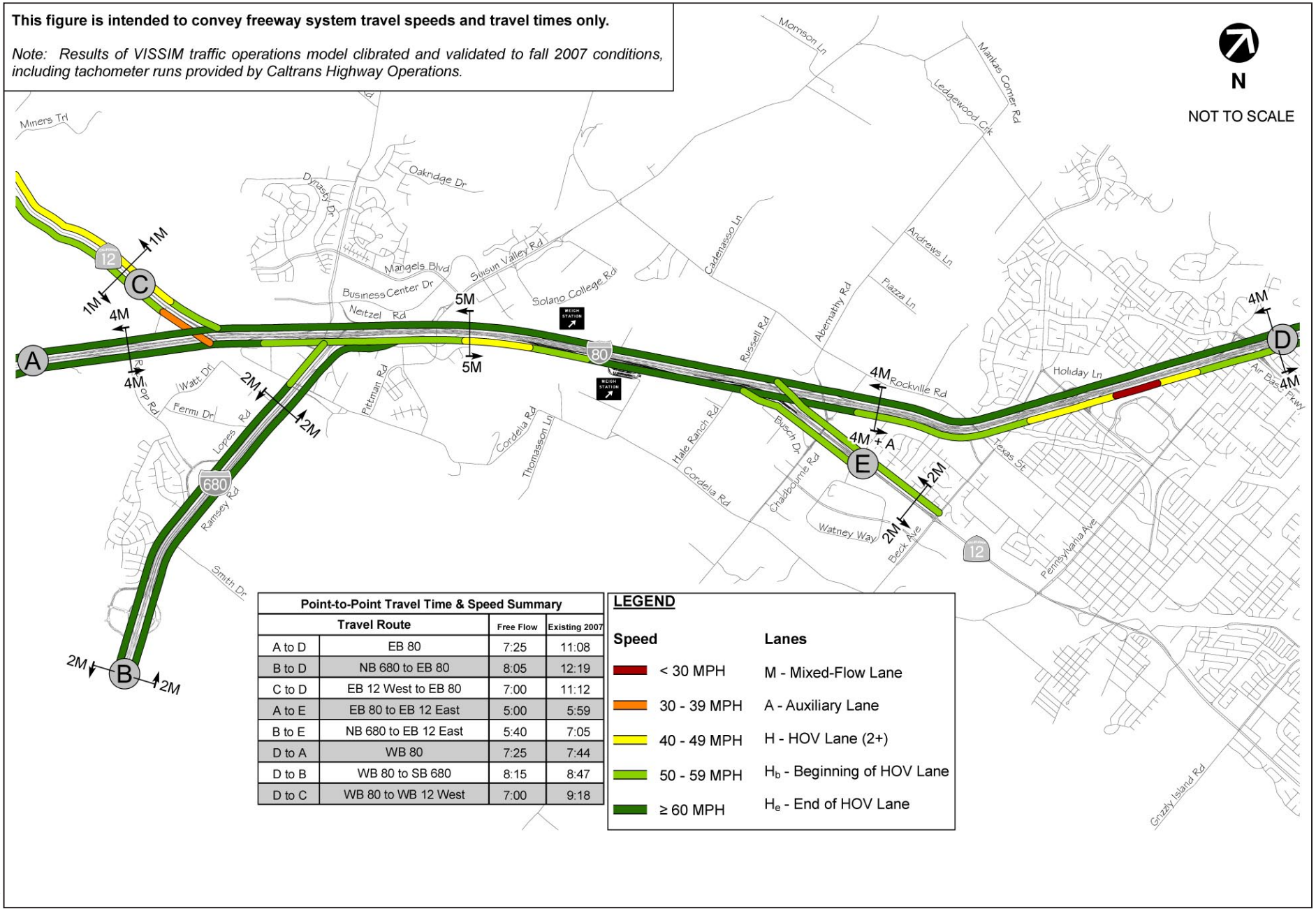
A* - Auxiliary Lane between Suisun Valley Rd and Truck Scales.

Graphics/02166.02 (4-2012) JD

Figure 3.1.6-2
Existing Year 2004 PM Peak Hour Travel Speeds

This figure is intended to convey freeway system travel speeds and travel times only.

Note: Results of VISSIM traffic operations model clibrated and validated to fall 2007 conditions, including tachometer runs provided by Caltrans Highway Operations.



Point-to-Point Travel Time & Speed Summary			
Travel Route		Free Flow	Existing 2007
A to D	EB 80	7:25	11:08
B to D	NB 680 to EB 80	8:05	12:19
C to D	EB 12 West to EB 80	7:00	11:12
A to E	EB 80 to EB 12 East	5:00	5:59
B to E	NB 680 to EB 12 East	5:40	7:05
D to A	WB 80	7:25	7:44
D to B	WB 80 to SB 680	8:15	8:47
D to C	WB 80 to WB 12 West	7:00	9:18

LEGEND

Speed	Lanes
< 30 MPH	M - Mixed-Flow Lane
30 - 39 MPH	A - Auxiliary Lane
40 - 49 MPH	H - HOV Lane (2+)
50 - 59 MPH	H_b - Beginning of HOV Lane
≥ 60 MPH	H_e - End of HOV Lane

Graphics/02166.02 (4-2012) JD

Figure 3.1.6-3
Existing Year 2007 PM Peak Hour Travel Speeds

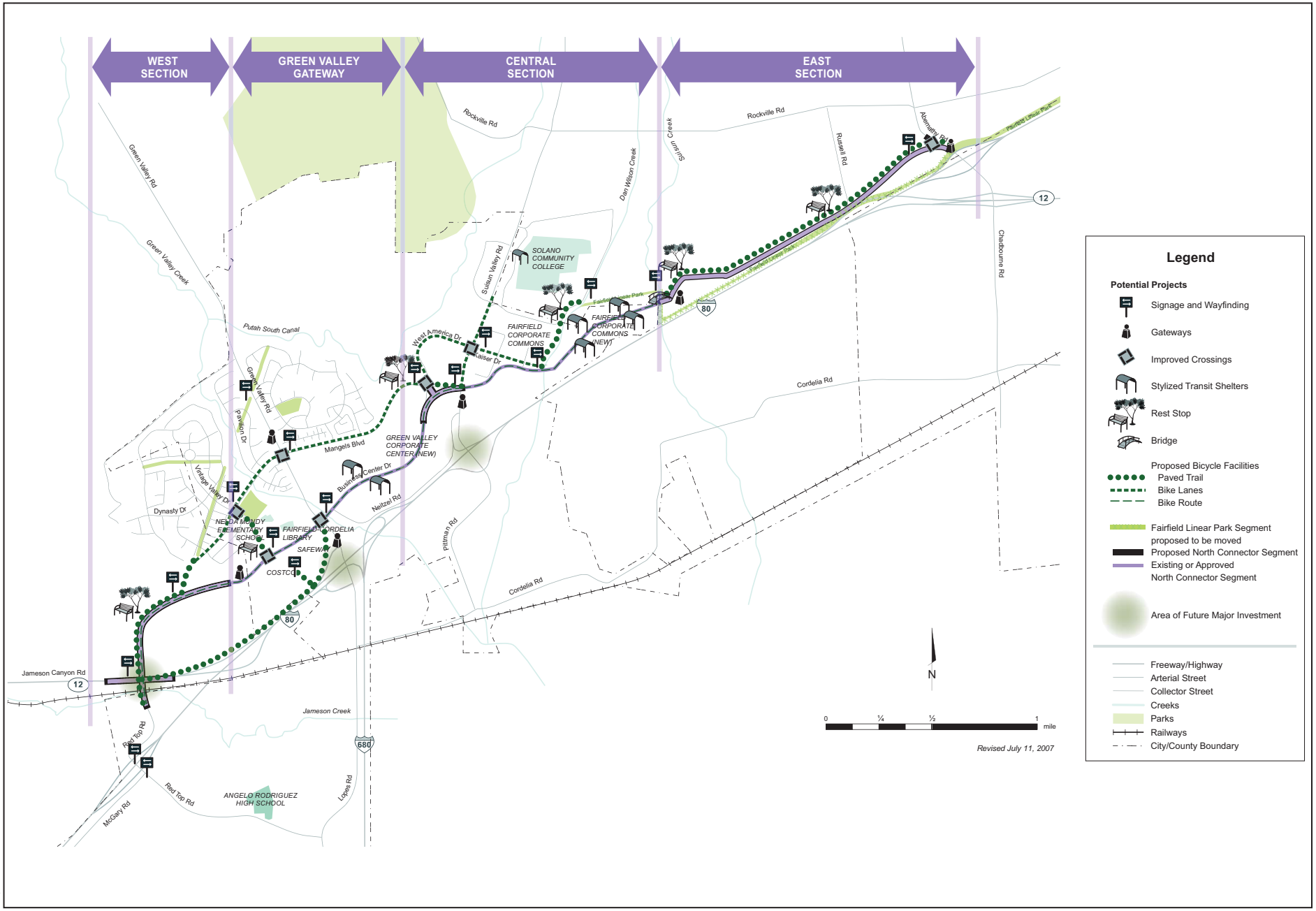


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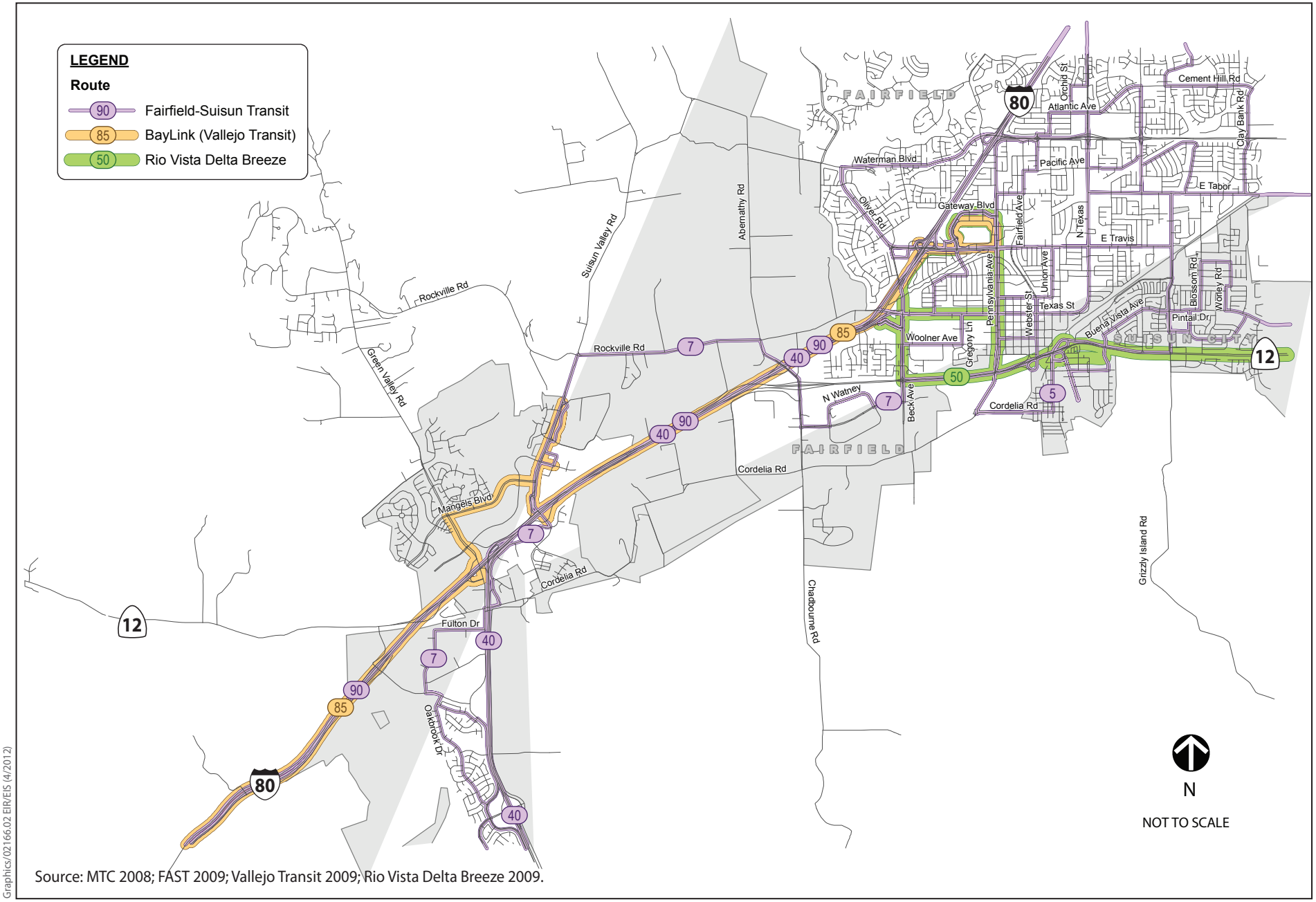
Figure 3.1.6-4
Existing and Planned Bicycle/Trails System



Source: MTC 2008; FAST 2009; Vallejo Transit 2009; Rio Vista Delta Breeze 2009.

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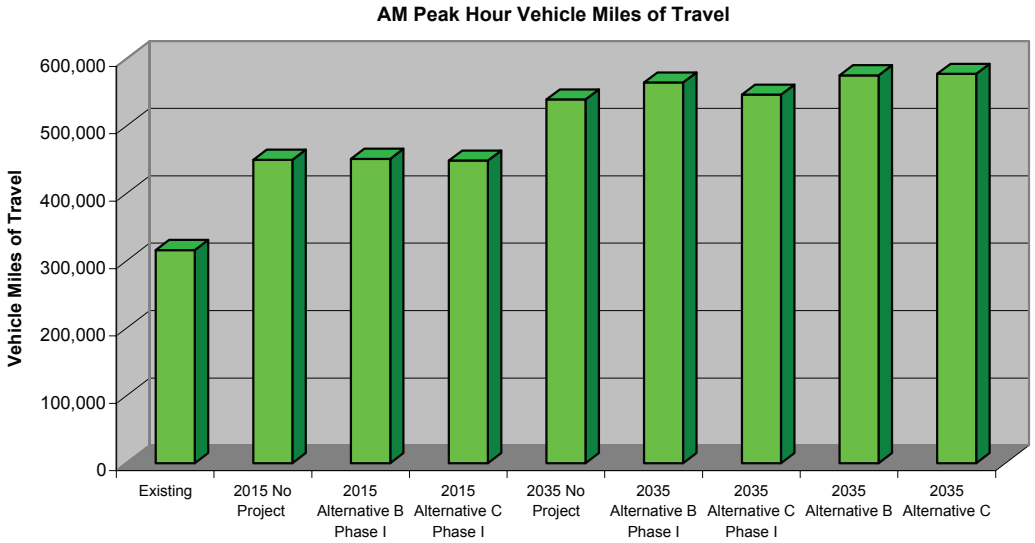
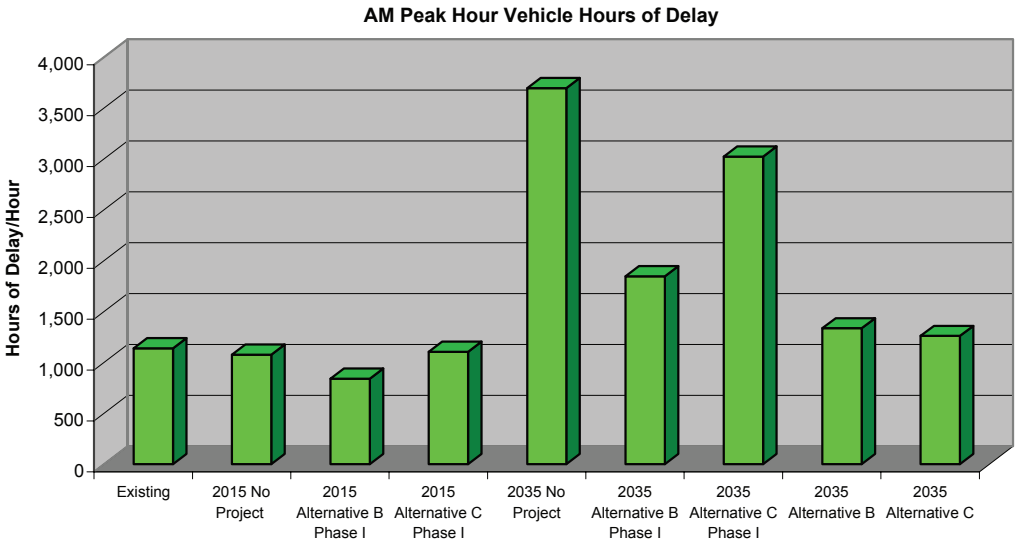
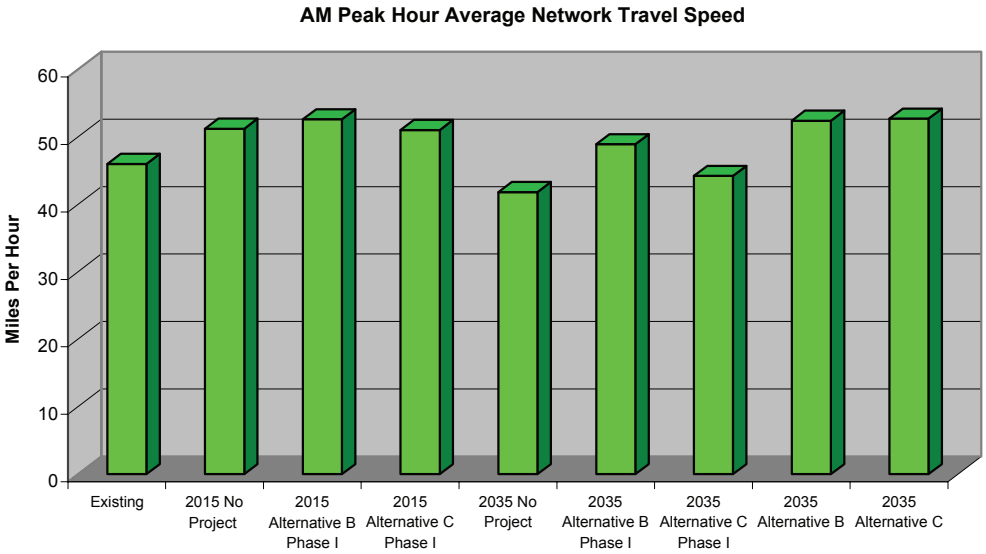
Figure 3.1.6-5
Existing Transit System

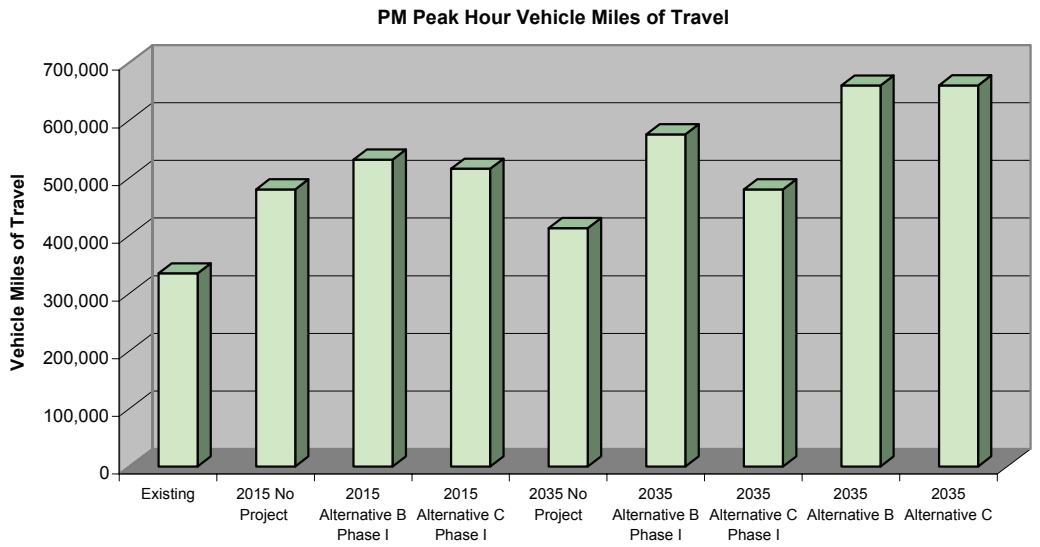


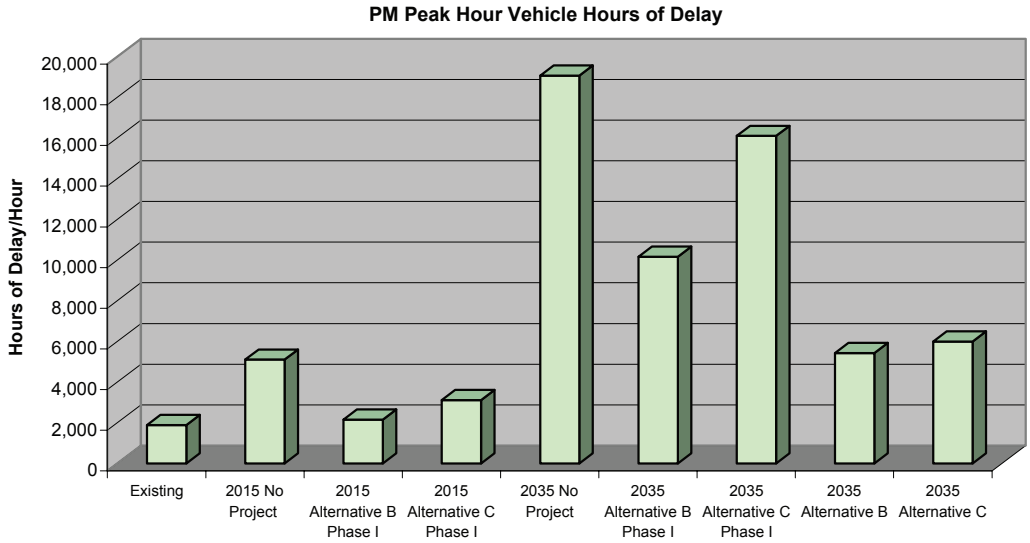


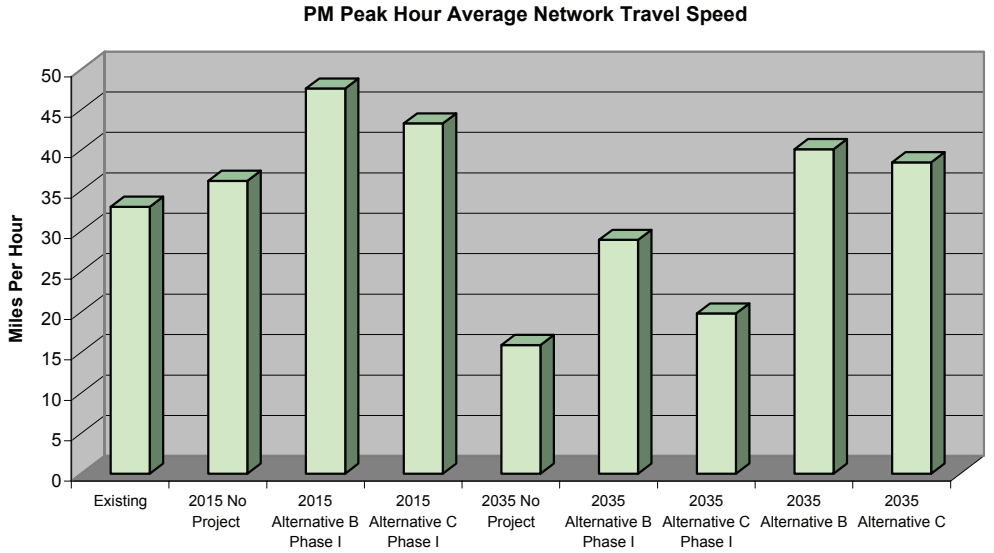


Graphics/02166.02 EIR/EIS (4/2012)

Figure 3.1.6-6
System-Wide AM Measures of Effectiveness







Graphics/02166.02 EIR/EIS (4-2012)

Figure 3.1.6-7
System-Wide PM Measures of Effectiveness

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3.1.7 Visual and Aesthetic Resources

Regulatory Setting

The National Environmental Policy Act (NEPA) of 1969 as amended establishes that the federal government use all practicable means to ensure all Americans safe, healthful, productive, and *aesthetically* (emphasis added) and culturally pleasing surroundings (42 U.S.C. 4331[b][2]). To further emphasize this point, the Federal Highway Administration in its implementation of NEPA (23 U.S.C. 109[h]) directs that final decisions regarding projects are to be made in the best overall public interest taking into account adverse environmental impacts, including among others, the destruction or disruption of aesthetic values.

Likewise, the California Environmental Quality Act (CEQA) establishes that it is the policy of the state to take all action necessary to provide the people of the state "with…enjoyment of *aesthetic*, natural, scenic and historic environmental qualities." (CA Public Resources Code Section 21001[b])

Local Regulations

Local publication and planning documents can be indicators of viewer sensitivity to visual change. The applicable locally and regionally designated scenic roadways are listed below to provide insight into viewer sensitivity.

Solano County General Plan Resources Element

The Solano County General Plan's Resources Element identifies the County's scenic roadways and adopts policies for their preservation. The following roadways within or near the project area are identified on Figure RS-5 of the General Plan as being scenic roadways in the Solano County General Plan Resources Element (Solano Transportation Authority 2008).

- I-80 from Carquinez Strait at Vallejo to Solano-Yolo County line at Davis.
- I-680 from Carquinez Strait at Benicia to I-80 at Cordelia.
- SR 12 from the Solano-Napa County line to I-80 and from Union Pacific Railroad at Fairfield to Solano-Sacramento County line at Rio Vista.
- Green Valley Road from I-80 at Cordelia to Rockville Road.
- Oliver Road from I-80 at Fairfield to Mankas Corner Road and Waterman Boulevard.

City of Fairfield Scenic Vistas and Roadways Plan

The project includes changes to I-680 within the Fairfield Urban Limit Line. This area of I-680 is considered a scenic roadway by the City of Fairfield Scenic Vistas and Roadways Plan (Solano Transportation Authority 2008).

Methods

Landscape Units are described using the Federal Highway Administration (FHWA) Method of Visual Resource Analysis as described below.

Visual Character

Visual character is descriptive and non-evaluative, which means it is based on defined attributes that are neither good nor bad in themselves. Visual character is described in terms of its pattern elements such as form, line, color, and texture, and in terms of pattern character such as dominance, scale, diversity, and continuity.

A change in visual character cannot be described as having good or bad attributes until it is compared with the viewer response to that change. If there is public preference for the established visual character of a regional landscape, and resistance to a project that would contrast that character, then changes in the visual character can be evaluated.

Visual Quality

Visual quality is evaluated by identifying the vividness, intactness, and unity present in the viewshed. The FHWA states that this method should correlate with public judgments of visual quality well enough to predict those judgments. This approach is particularly useful in highway planning because it does not presume that a highway project is necessarily an eyesore. This approach to evaluating visual quality can also help identify specific methods for mitigating each adverse impact that may occur as a result of a project. The three criteria for evaluating visual quality are defined here.

Vividness is the visual power or memorability of landscape components as they combine in distinctive visual patterns.

Intactness is the visual integrity of the natural and man-made landscape and its freedom from encroaching elements. It can be present in well-kept urban and rural landscapes, as well as in natural settings.

Unity is the visual coherence and compositional harmony of the landscape considered as a whole. It frequently attests to the careful design of individual man made components in the landscape.

Vividness, intactness, and unity of a landscape unit were each rated on a scale from 1 to 7 using the scale provided in Table 3.1.7-1. These scores were averaged and rounded to the nearest whole number to determine an overall visual quality score for the landscape unit.

Table 3.1.7-1. Vividness, Intactness, and Unity Scoring System

Score	Definition
1	Very Low
2	Low
3	Moderately Low
4	Moderate
5	Moderately High
6	High
7	Very High

Affected Environment

This discussion is taken primarily from the *I-80/I-680/SR 12 Interchange Project Visual Impact Assessment* (VIA), prepared in 2012.

Regional Landscape

Solano County has retained much of its agricultural character; however, the cities of Fairfield and Suisun City have experienced rapid growth of new residential and commercial development over the past several decades, resulting in a regional landscape characterized by a patchwork of rural, suburban, and urban landforms and aesthetics. This regional landscape is visually striking at times when abrupt changes between aesthetics occur, such as broad expanses of agricultural land being interrupted by dense residential subdivisions or large industrial parks. With the regional backdrop of the coastal mountains (locally, the Twin Sisters peak) and with Suisun Marsh providing a distinctive and vivid natural backdrop, this patchwork of rural, suburban, and urban aesthetics is even more vivid.

This patchwork of aesthetics is quite evident in the immediate project area and viewshed. For example, the western portion of the project area is surrounded by rolling hills used for grazing cattle; but at the junction with SR 12W, the land uses change abruptly to a large industrial park to the south and a large commercial center to the north. Similarly, dense residential subdivisions line the west side of I-680 while the east side is mostly undeveloped open space associated with the Suisun Marsh. Through the central portion of the study area, this patchwork continues with commercial retail uses lining both sides of the I-80 corridor through Cordelia, and then abruptly changing to an agricultural aesthetic east of Suisun Creek. Along the SR 12E corridor, striking differences can also be seen. The south side of the roadway is lined by a large industrial park, which abruptly turns to undeveloped lands east of Ledgewood Creek, while the north side is lined by the dense residential neighborhoods of downtown Fairfield.

Landform

The majority of the landform is flat, consisting of the valley. A large portion of the project area is located in Green and Suisun Valleys. Suisun Valley is a highly scenic agricultural area, extending north and south from Twin Sisters peak to south of I-80.

A portion of the project area along Jameson Canyon Road and I-80 at the west end consists of rolling hills. Rolling hills are generally visible to the west and north. Twin Sisters peak, a double-peaked 2,200-foot mountain, is north of the existing I-80/I-680/SR 12 interchange.

Land Cover

Land cover in the project area consists of man-made components (e.g., roadways, buildings, signs, and utility lines), vegetation, and water. Land cover elements include the existing roads, single-family homes, commercial development, farmland, trees, shrubs, marshland, grazing land, industrial development, a school, utility lines, creeks, and railroad tracks.

Because the region is largely agricultural, vegetation (crops and grazing land) make up a large part of the region's visual character. Regional vegetative land cover also includes scattered trees and shrubs in farmland, grazing land, land adjacent to the roadways, the median of I-80 and I-680, and residential developments. Crops and grassland along the existing highways are coarse, dense, low to the ground and, in some areas, adjacent to the existing roadway. Suisun Marsh,

grazing land, trees, and farmland provide a brown/green element to the regional landscape that changes color depending on the time of year.

Suisun Marsh is a vegetated water feature that contributes to the regional character. Marshland adjacent to I-680, I-80, and SR 12E appears covered by coarse, low-lying marsh plants. Water is not immediately visible most of the year. In addition to the marshland, creeks are a visible water feature in the project area. Six creeks (American Canyon, Jameson, Green Valley, Dan Wilson, Suisun Creek, and Ledgewood Creeks) run through the project area.

Man made land cover in the region is diverse in age and scale. To the west of I-680, in Fairfield, manmade development includes new single-family residential neighborhoods, several dominant large white warehouses, and commercial buildings of various sizes and colors. Residential neighborhoods are visually separated from the highways by walls. These dense neighborhoods mostly consist of new two-story single-family homes. Man made development in Old Town Cordelia, a distinct community in Solano County, is comprised of less-dense neighborhoods of older one- or two-story single-family homes.

Man made land cover also includes train tracks that run perpendicular to SR 12E on the western border of Suisun City. Train cars and containers are visible on or adjacent to the tracks south of SR 12E. Industrial and commercial buildings, several of which appear older, are one or two stories high, of various browns and grays, and are located in Suisun City, east of the railroad tracks and south of SR 12E. Apartment buildings and single-family homes lie to the north. Tall walls in earth-toned colors block views of the majority of homes from SR 12E. Apartment buildings visible from the roadway include a light-pink three-story apartment building and a gray two-story building near the intersection with Pennsylvania Avenue. A black iron fence is located between the apartment buildings and SR 12E.

Utility poles line many of the local roadways and are visible from the freeway. In addition, several large electrical transmission lines and towers are visible in the area, including one large transmission line that crosses I-80 in the vicinity of the I-80/SR 12E interchange. Rural agricultural areas located at the far west end of the project area, along the east side of I-680, and in the central section between Suisun Creek and SR 12E include farm buildings, occasional residences, fencing, farm equipment, cattle, and other agricultural uses and facilities.

Project Viewshed

A viewshed is comprised of broad-range views from a specific viewing location. Viewsheds are generally quite large. The limits of a viewshed are defined as the visual limits of the views from the proposed project. The viewshed also includes the locations of viewers likely to be affected by visual changes brought about by project features.

For the purpose of this analysis, the viewshed is determined by the height of the landforms and the presence or absence of buildings along the roadway. These factors vary over the length of the project area and, as shown in Figure 3.1.7-1, create a viewshed that varies in width.

Landscape Units

To provide a framework for understanding the visual effects of a proposed highway project, the regional landscape can be divided into distinct landscape units. A landscape unit is a portion of the regional landscape and can be thought of as an outdoor room that exhibits a distinct visual character. A landscape unit often corresponds to a place or district that is commonly known among local viewers. The landscape units for the proposed project are shown in Figure 3.1.7-2.

Landscape Unit 1

Landscape Unit 1 is the westernmost portion of the project area. It runs from west of Red Top Road along Jameson Canyon Road/SR 12W until it joins with I-80 to the east. This landscape unit also includes the hills south of SR 12W in the project area and I-80 west of the I-80/SR 12 interchange. This landscape unit is dominated by agricultural uses—primarily grazing land, much of it on rolling hills. Jameson Creek is south of SR 12W in this landscape unit. Wire cattle fencing supported on metal stakes and wooden poles, follows SR 12W. The vegetation in this landscape unit is mostly grassland with trees along Jameson Creek, shrubs, and an olive orchard. A rural building is adjacent to the olive orchard. Overhead utility lines cross the landscape unit. A gas station and a fast food restaurant building are located along I-80 in Landscape Unit 1.

Existing Visual Character

Landscape Unit 1 exhibits a rural character defined by the dominant rolling hills covered in grassland. Although Jameson Canyon Road cuts through this landscape unit, its path is curved and follows the rolling hills, maintaining the continuity of the landscape. The rural character of this landscape unit gets its texture from the grass, shrubs, and trees; the dominant brown/green color varies with the season.

Existing Visual Quality

The rural character, rolling hills, and vegetation create a moderately high level of vividness. A gas station and small fast food restaurant along I-80, SR 12 with its steady flow of traffic, and a power line traversing the hills interrupt the visual experience. As a result, the intactness and unity of the landscape unit are considered moderate (Table 3.1.7-2).

Table 3.1.7-2. Visual Quality in Landscape Unit 1

Visual Quality Criteria	Vividness		Intactness		Unity		Visual Quality (Average Scores for Vividness, Intactness, and Unity)	
	Score	Description	Score	Description	Score	Description	Score	Description
Existing Conditions	4	Moderate	4	Moderate	4	Moderate	4	Moderate

Landscape Unit 2

This landscape unit is the developed valley floor where Green Valley and Suisun Valley come together along I-80. The landscape unit stretches along I-80 from the I-80/SR 12W interchange in the west to Dan Wilson Creek in the east. Commercial buildings are located north of I-80 and warehouses are located south of I-80/west of I-680. Old Town Cordelia and commercial buildings are located south of I-80/east of I-680.

Existing Visual Character

This landscape unit is characterized by suburban development. In Landscape Unit 2, north of I-80, the visual character is defined by relatively new commercial buildings of various sizes and colors along the flat valley floor. A similar character informs the area west of I-680 and south of I-80. There are a variety of forms and colors in these areas, created by the different sizes and colors of the commercial buildings and warehouses.

In Landscape Unit 2, Old Town Cordelia has a distinct visual character. Old Town Cordelia consists of one- or two-story single-family homes that are generally older and less densely spaced than other homes in the project area. Grass and scattered trees are visible between these homes, adding height and texture to the landscape. Commercial development of various ages, mostly earth-toned in color, is located near the intersection of I-680 and I-80. Flat open space (pavement or grass) lies between the commercial buildings in this area. Old Town Cordelia contains a diverse array of pattern elements, although a distinct boundary between the single-family homes and commercial development detracts from the diversity of this area. The visually distinct area of Old Town Cordelia is visually separated by I-80 and I-680 from the other portions of this landscape unit.

Existing Visual Quality

Old Town Cordelia and views of the hills contribute to a moderate level of vividness in this landscape unit. The random pattern of commercial and residential development along the highway in this landscape unit creates a low level of intactness and unity (Table 3.1.7-3).

Table 3.1.7-3. Visual Quality in Landscape Unit 2

Visual Quality Criteria	Vividness		Intactness		Unity		Visual Quality (Average Scores for Vividness, Intactness, and Unity)	
	Score	Description	Score	Description	Score	Description	Score	Description
Existing Conditions	4	Moderately	2	Low	2	Low	3	Moderately Low

Landscape Unit 3

Landscape Unit 3 is a flat area of the valley floor that is bisected by I-680. This landscape unit is characterized by commercial uses and single-family development to the west and marshland to the east of I-680. The marshland to the east is Suisun Marsh.

Existing Visual Character

This landscape unit exhibits a natural visual character east of I-680 characterized by flat brown marshland, and man-made suburban visual character to the west that includes a variety of building types and sizes.

The area to the west of I-680 includes man made elements such as two-story single-family developments, Rodriguez High School and its playing fields, large rectangular white warehouses, and other commercial development of varying sizes. The warehouses are dominant elements in the landscape due to their scale and their white color. Development in this landscape unit is varied in scale and function. Despite this, it does not appear continuous or diverse because it is

clustered by type and size, rather than intermixed. Farther north along I-680, the buildings become larger and more commercial.

The flat marshland east of I-680 contains little diversity but has a distinct texture and brown/green color created by the marsh plants.

Existing Visual Quality

Suisun Marsh, to the east of I-680, is fairly visually intact and unified since there are few man made elements visible in the marshland. However, the landscape west of I-680 is not visually unified and detracts from the visual quality of this landscape unit. Views of Suisun Marsh in the foreground and distant views to the hills to the north contribute to a moderate vividness and intactness in this landscape unit (Table 3.1.7-4).

Table 3.1.7-4. Visual Quality in Landscape Unit 3

Visual Quality Criteria	Vividness		Intactness		Unity		Visual Quality (Average Scores for Vividness, Intactness, and Unity)	
	Score	Description	Score	Description	Score	Description	Score	Description
Existing Conditions	4	Moderate	4	Moderate	2	Low	3	Moderately Low

Landscape Unit 4

Landscape Unit 4 consists of flat agricultural fields in Suisun Valley on either side of I-80 between developed areas of Fairfield. This landscape unit includes the existing I-80/SR 12E interchange.

Farmhouses, outbuildings, and commercial farm businesses are scattered throughout the area. Solano Community College and the new Fairfield Corporate Commons business park are also in this landscape unit. Agricultural lands consist of row crops, orchards, and vineyards. Dan Wilson Creek and Suisun Creek flow from north to south.

Existing Visual Character

East of Dan Wilson Creek (the western boundary of Landscape Unit 4), the project area becomes rural in character. I-80 constitutes a line of man-made development through flat farmland on the valley floor. Several rural homes and farm buildings are scattered throughout the landscape unit on the agricultural land. The presence of agriculture creates a texture and a brown/green color. Due to its scale relative to other elements in this landscape unit, one building, a Budweiser brewery, dominates the southeastern portion of the landscape. The rural character of this landscape unit is continuous with the exception of the Budweiser brewery.

Existing Visual Quality

The rural character of this landscape unit creates a moderate level of vividness (Table 3.1.7-5). Although the majority of the landscape unit appears intact and unified in its agricultural character, encroachment of industrial uses (e.g., the brewery) in the eastern portion of the unit detracts from the overall intactness and unity.

Table 3.1.7-5. Visual Quality in Landscape Unit 4

Visual Quality Criteria	Vividness		Intactness		Unity		Visual Quality (Average Scores for Vividness, Intactness, and Unity)	
	Score	Description	Score	Description	Score	Description	Score	Description
Existing Conditions	4	Moderate	4	Moderate	4	Moderate	4	Moderate

Landscape Unit 5

This landscape unit is generally flat. It encompasses SR 12E and the man-made development on either side of the highway. Single-family residential development is north of SR 12E, while commercial and industrial structures with grass and parking lots between them are south of SR 12E. This landscape unit also includes train tracks and a portion of downtown Suisun City at its eastern end. Commercial/industrial buildings, including an Amtrak station, are present in this portion of downtown Suisun City.

Existing Visual Character

Landscape Unit 5 is characterized by buildings along SR 12E. Large retail and industrial buildings generally characterize the area south of SR 12E. Although an undeveloped area of Suisun Marsh lies between the existing commercial development south of SR 12E and downtown Suisun City, a mixed-use development project planned for this area by Suisun City will extend the existing commercial/industrial character on the south side of SR 12E in this landscape unit. Structures north of SR 12E are mostly single-family homes separated from SR 12E by a wall. The buildings north of SR 12E are smaller than those to the south. SR 12E divides the visual character in this landscape unit.

In addition to SR 12E, the train tracks form a line through this landscape unit west of downtown Suisun City. The area of downtown Suisun City in this landscape unit consists of commercial/industrial buildings, mostly gray and earth toned in color, that are smaller and older than those west of the train tracks.

Existing Visual Quality

The mix of commercial and residential development in this landscape unit is not vivid (Table 3.1.7-6). Because the pattern of development switches from clusters of large commercial/ industrial buildings to single-family residential to smaller, older commercial/industrial buildings, this landscape unit is not intact or unified. The walls around the majority of residential development also detract from the unity of this landscape unit.

Table 3.1.7-6. Visual Quality in Landscape Unit 5

Visual Quality Criteria	Vividness		Intactness		Unity		Visual Quality (Average Scores for Vividness, Intactness, and Unity)	
	Score	Description	Score	Description	Score	Description	Score	Description
Existing Conditions	2	Low	2	Low	2	Low	2	Low

Viewer Sensitivity and Response

Viewer sensitivity is defined both as the viewers' concern for scenic quality and the viewers' response to change in the visual resources that make up the view. Local values and goals may confer visual significance on landscape components and areas that would otherwise appear unexceptional in a visual analysis. Community aspirations for visual quality can be expressed in local publications and planning documents.

Viewer response is typically assessed by measuring the number of viewers exposed to the resource change, type of viewer activity, duration of views, speed at which the viewer moves, and position of the viewer.

Three different sets of viewer groups were identified for this analysis as discussed below. These groups represent people with views from the project and people with views of the project.

Motorists

Motorists comprise both drivers and passengers traveling on I-80 in the project area. Motorists in approximately 160,000 vehicles drive through the project area during each weekday. These viewers experience a constantly changing sequence of views as they travel along I-80 in the project area.

Motorist sensitivity to visual change would vary depending on the individual's role as passenger or driver and the level of traffic congestion experienced. Drivers traveling at normal speeds usually need to focus their attention on long-range, non-peripheral views (Federal Highway Administration 1981). However, passengers likely have a more heightened awareness of a wide range of views because they are not concentrating on the task of driving and can look out the side window toward their side of the highway. Motorists traveling at normal highway speeds would have a much shorter duration of view than motorists driving slowly due to congested traffic (which is common in the project area during peak periods). For safety reasons, motorists experiencing congested traffic conditions are likely to focus on views of the existing highway and the traffic in front of them.

Residents

Thousands of residents live near the project area. The greatest number of homes are west of I-680 in the Gold Hill area of Fairfield and on the north side of SR 12E in Fairfield. Other residential areas are Cordelia, Green Valley, and scattered rural residences. Some residents have distant views of the I-80/I-680/SR 12 interchange from their homes in the hills northeast of the I-80/SR 12W interchange. Others have middle ground views of the existing highways from their homes. Community residents are likely to experience views of long duration. Most residential views of the existing highways are screened by walls, landscaping, or both.

Residents are likely to have a higher concern about the project than motorists. It is expected that residents would be concerned with effects on views from their homes and neighborhoods.

Commercial Area Employees and Customers

A variety of commercial uses, ranging from shopping centers to hotels, line portions of the roadways that constitute the project area. Commercial uses are concentrated along I-80, east of its intersection with SR 12W and west of Dan Wilson Creek; east of the I-80/SR 12E

interchange; and on the west side of I-680, north of Red Top Road. Consequently, hundreds of viewers per day would have short duration, middle ground-to-distant views of the project. Viewer awareness would be low and sensitivity medium-to-low, because these viewers would generally be concentrating on specific indoor tasks, not looking at the highway.

Environmental Consequences

Because it is not feasible to analyze all the views in which the project alternatives would be seen, it is necessary to select a number of viewpoints that most clearly reflect the visual effects of the project. Viewpoints also represent the primary viewer groups that would potentially be affected by the project. The locations of the viewpoints selected for this analysis are shown in Figure 3.1.7-3. The viewpoints and visual simulations are presented in Figures 3.1.7-4 through 3.1.7-27.

The most substantial visual effects would be associated with Alternatives B and C. The visual effects of the fundable first phases of the project alternatives (Phase 1s) would be similar but reduced. Accordingly, there is no separate discussion for the fundable first phases in this analysis.

The 14 viewpoints used in this analysis were selected in consultation with the Department's Office of Landscape Architecture to represent views of Alternatives B and C. Viewpoint 1 was adjusted to a slightly different position for Alternative C to better represent the alternative's features. Viewpoint 14 was selected as a point of interest for Alternative B to depict the central interchange configuration. Alternative C does not include this interchange; accordingly, a simulation of Alternative C at Viewpoint 14 is not included in this analysis.

At several viewpoint locations, the future view of project components is the same or nearly the same for both alternatives. The simulations for the two alternatives are essentially the same at viewpoints 5, 12, and 13. The simulations at viewpoints 2, 3, 9, and 11 reflect minor variations between the two alternatives, such as a slight difference in a sign or a sidewalk; both simulations are shown even though the resulting visual impact is the same.

The visual impacts of project alternatives are determined by assessing the visual resource change caused by the project and predicting viewer response to that change.

Visual resource change is the sum of the change in visual character and the change in visual quality. The first step in determining visual resource change is to assess the compatibility of the proposed project with the visual character of the existing landscape. The FHWA's Method of Visual Resource Analysis, discussed above in the section titled "Affected Environment," is used to determine visual character and visual quality. As part of this process, vividness, intactness, and unity of the viewpoint were each rated on a scale from 1 to 7 (Table 3.1.7-1). These scores were averaged and rounded to the nearest whole number to determine an overall visual quality score for each viewpoint.

The second step is to compare the visual quality of the existing resources with the projected visual quality after the project is constructed. For this analysis, simulations of the build alternatives were prepared for each viewpoint (Figures 3.1.7-4 through 3.1.7-27) and the "future" condition visual quality was calculated (Table 3.1.7-1). Visual impact was determined by subtracting the "future" visual quality score from the existing visual quality score. An effect is

considered adverse if the visual quality score would decrease by two points or more. Beneficial effects to visual quality would occur if there would be an increase in the visual quality score.

The viewer response to project changes is the sum of viewer exposure and viewer sensitivity to the project as determined in the preceding section. The resulting level of visual impact is determined by combining the severity of resource change with the degree to which people are likely to oppose the change.

Temporary Visual Impacts Caused by Construction Activities

During construction, small trees and shrubs adjacent to the freeway would be removed. Crops in areas immediately adjacent to construction areas may also be removed during grading, exposing the soils underneath. Construction equipment would be visible along the highway. Disturbed earth and construction equipment would introduce an encroaching element into an otherwise agricultural setting. However, ongoing and recently completed major construction activities are widespread throughout most of the project area. Projects currently under construction include the Fairfield Corporate Commons, along the north side of I-80 in the central section, and the North Connector Project, which will be a local frontage road along the north side of I-80 in the central section. Because of the considerable extent of recent development activity in the I-80/I-680/SR 12 interchange area, construction sites would not be out of character with the existing visual environment. The construction process would decrease visual quality by interrupting and decreasing the vividness of views, and create encroaching elements, reducing the intactness and unity of views. In addition, construction sites may include lighting, introducing new sources of light and glare. Although adverse visual impacts would occur during construction, these impacts would be temporary and would not contrast with the existing visual character of the area.

There would be no effect under the No-Build Alternative because no construction would take place.

Long-Term Changes in Visual Quality and Character

The project would result in several localized changes to visual character. Alternative B would result in two beneficial impacts to visual quality (viewpoints 1 and 10) and two adverse impacts to visual quality (viewpoints 2 and 8); Alternative C would result in only one beneficial impact to visual quality (viewpoint 10), and would result in three adverse impacts to visual quality (viewpoints 2, 6, and 8). However, since the project is the improvement of an existing interchange, as a whole it would not be out of character with the existing major highway interchange or add substantial new sources of light and glare. The project as a whole would not result in an extreme visual change or create severe adverse visual impacts.

Although the project as a whole would not result in severe visual impacts, it would alter the existing visual quality in the selected viewpoints. Overall, one of the alternatives would result in more dramatic visual quality changes than the other.

Alternative C would have a greater adverse visual impact than Alternative B. The variation in height and the large scale of the interchange structures of Alternative C would contrast more dramatically with the existing rural and suburban aesthetic and decrease visual quality more severely than Alternative B.

Table 3.1.7-7. Summary of Change to Visual Quality Scores

Location	Alternative B			Alternative C		
Landscape Unit 1						
	Existing	Proposed	Change	Existing	Proposed	Change
Viewpoint 5	3	3	0	3	3	0
Viewpoint 6	4	3	-1	3	1	-2
Viewpoint 7	4	3	-1	4	3	-1
Viewpoint 8	5	3	-2	5	3	-2
Landscape Unit 2						
	Existing	Proposed	Change	Existing	Proposed	Change
Viewpoint 1	2	4	+2	3	3	0
Viewpoint 4	2	2	0	3	2	-1
Landscape Unit 3						
	Existing	Proposed	Change	Existing	Proposed	Change
Viewpoint 2	5	3	-2	5	3	-2
Viewpoint 3	4	3	-1	4	3	-1
Landscape Unit 4						
	Existing	Proposed	Change	Existing	Proposed	Change
Viewpoint 9	4	3	-1	4	3	-1
Landscape Unit 5						
	Existing	Proposed	Change	Existing	Proposed	Change
Viewpoint 10	2	3	+1	2	3	+1
Viewpoint 11	4	3	-1	4	3	-1
Viewpoint 12	4	4	0	4	4	0
Viewpoint 13	2	2	0	2	2	0
Viewpoint 14	2	2	0	-	-	NA

Effect on Officially Designated Scenic Highways

There are no officially designated state scenic highways or highways eligible for such designation within the project limits.

The following roadways within or in close proximity to the project area are identified as being scenic roadways in the Solano County General Plan Scenic Roadway Element (1977):

- I-80 from Carquinez Strait at Vallejo to Solano-Yolo County line at Davis.
- I-680 from Carquinez Strait at Benicia to I-80 at Cordelia.
- SR 12 from the Solano-Napa County line to I-80 and from Union Pacific Railroad at Fairfield to Solano-Sacramento County line at Rio Vista.
- Green Valley Road from I-80 at Cordelia to Rockville Road.
- Oliver Road from I-80 at Fairfield to Mankas Corner Road and Waterman Boulevard.

The project includes changes to I-680 within the Fairfield Urban Limit Line. This area of I-680 is considered a scenic roadway by the City of Fairfield Scenic Vistas and Roadways Plan (1999).

All build alternatives would result in several adverse and beneficial localized changes to visual character. The visual changes in Landscape Unit 3 which includes changes along State Route 12 West and I-80 would be the most dramatic and result in an adverse visual impact. However, because the alternatives involve improvement of existing freeways and interchanges, as a whole the alternatives would not be out of character and would not be expected to result in changes to local scenic roadway designations and therefore would not result in an adverse visual impact.

No-Build Alternative
There would be no changes to the visual quality and character of the project area under the No-Build Alternative.

Light and Glare

Under all build alternatives, new lighting would be incorporated into portions of the proposed project which would affect the surrounding neighborhoods. Under Alternative C, tall utility towers would cross over the proposed I-80/I-680 freeway-to-freeway ramps. These towers would have blinking red lights at their tops that would create a new source of light during the night. However, because such lighting would be consistent with existing freeway lighting and because adjoining land uses in areas where new lighting would be installed currently include lighting fixtures such as street lights, this effect would not be severe. Moreover, as discussed below in the section titled “Avoidance, Minimization, and/or Mitigation Measures,” incorporation of appropriate light and glare screening measures would ensure this effect is not adverse.

Under the No-Build Alternative there would be no changes to lighting and therefore no effects from light and glare.

Avoidance, Minimization, and/or Mitigation Measures

The Department mandates that a qualitative/aesthetic approach should be taken to minimize visual quality loss in the project area. This approach addresses the actual cumulative loss of visual quality that will occur in the project viewshed when the project is implemented. It also constitutes minimization measures that can more readily generate public acceptance of the project.

Visual minimization measures will consist of adhering to the following design requirements in cooperation with the Department's District Landscape Architect. While these measures will not fully reduce or avoid effects such as view blockage that will occur at several viewpoints, the measures will help to reduce the overall visual effects of the project and project elements.

All visual minimization measures will be designed and implemented with the concurrence of the Department's District Landscape Architect.

Replace Landscaping as Appropriate

The Department will replace highway planting within the project limits per policy.

Light and Glare Screening Measures

Light and glare screening measures shall be incorporated into project plans during final design, including the use of downward-cast lighting.

Building Materials and Forms for the Westbound Truck Scales

The I-80 westbound truck scales building materials and forms are to blend with local architectural features of the surrounding community, consistent with the architecture and landscaping of the I-80 Eastbound Truck Scales Relocation Project.

Incorporate Aesthetic Recommendations in Design of Freeway-Related Structures

Sound walls, overpass structures, landscaping, and other freeway-related structures and features will be consistent with the corridor aesthetic recommendations for the I-80 corridor being prepared by the STA.

Source: CirclePoint 2009.

Figure 3.1.7-1
Project Viewshed

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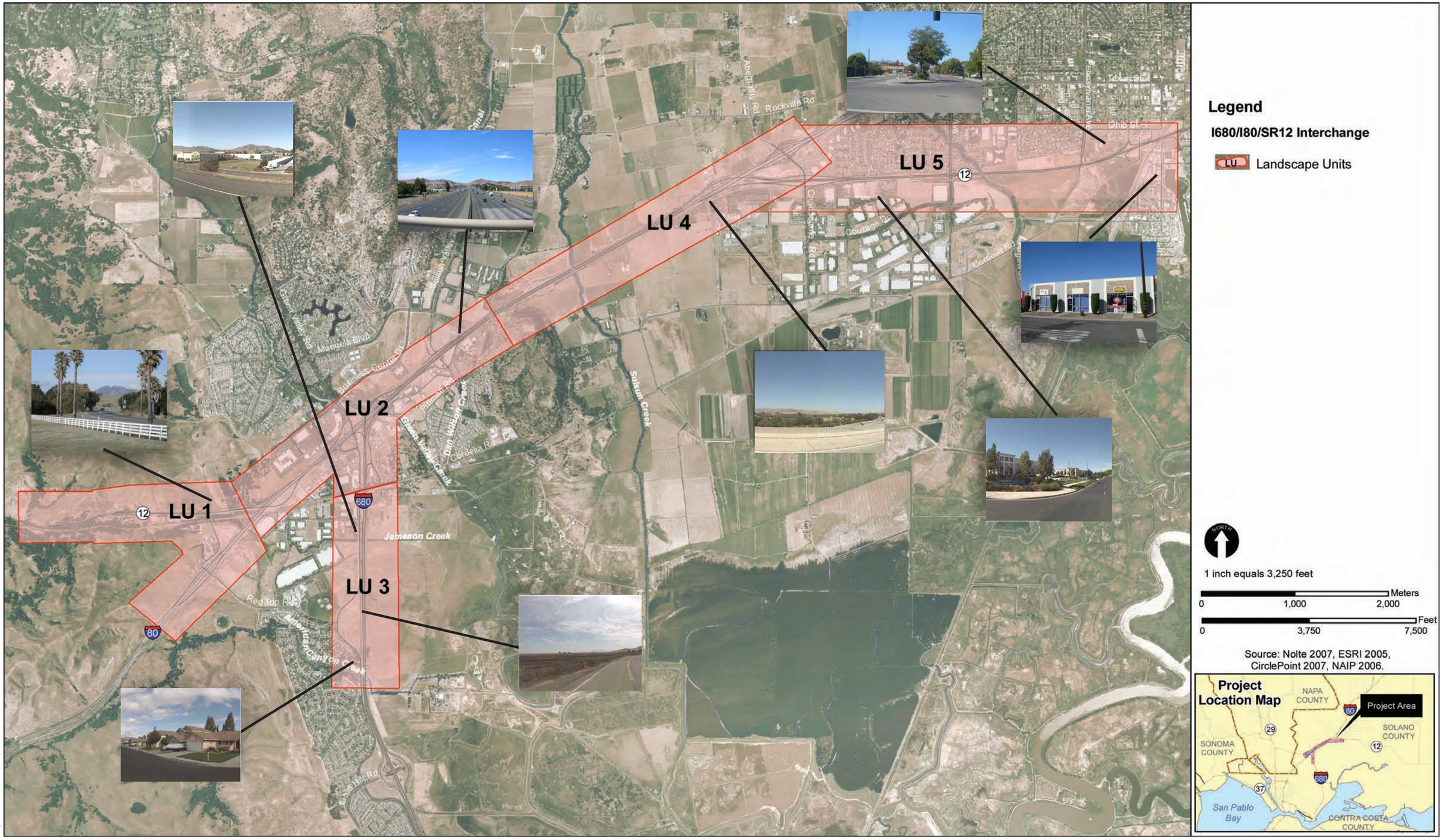

Source: CirclePoint 2009.

Figure 3.1.7-2
Landscape Units

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Source: CirclePoint 2009.

Figure 3.1.7-3
Project Viewpoints

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Existing view from Central Way south of Ritchie Road looking north

Visual simulation of Alternative B

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-4
Viewpoint 1, Alternative B

Existing view from Red Top Road at Lopes Road looking east

Visual simulation of Alternative B

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-5
Viewpoint 2, Alternative B

Existing view from Interstate 680 northbound near Red Top Road looking north (VP 3)

Visual simulation of Alternative B

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-6
Viewpoint 3, Alternative B

Existing view from I-80 westbound near Green Valley Road overhead looking southwest

Visual simulation of Alternative B

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-7
Viewpoint 4, Alternative B

Existing view from I-80 westbound near Red Top Road looking west

Visual simulation of Alternatives B & C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-8
Viewpoint 5, Alternatives B and C

Existing view from I-80 eastbound near Red Top Road looking northeast

Visual simulation of Alternative B

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-9
Viewpoint 6, Alternative B

Existing view from State Route 12 eastbound near Red Top Road (VP 7)

Visual simulation of Alternative B

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-10
Viewpoint 7, Alternative B

Existing view from State Route 12 westbound near Red Top Road (VP 8)

Visual simulation of Alternative B

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-11
Viewpoint 8, Alternative B

Existing view from I-80 westbound near SR12E

Visual simulation of Alternative B

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-12
Viewpoint 9, Alternative B

Existing view from State Route 12 eastbound near Pennsylvania Avenue (VP 10)

Visual simulation of Alternative B

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-13
Viewpoint 10, Alternative B

Existing view from Pennsylvania Avenue near Illinois Street

Visual simulation of Alternative B

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-14
Viewpoint 11, Alternative B

Existing view from Beck Avenue at Diamond Way

Visual simulation of Alternatives B and C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-15
Viewpoint 12, Alternatives B and C

Existing view from Main Street at Common Street

Visual simulation of Alternatives B & C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-16
Viewpoint 13, Alternatives B and C

Existing view from State Route 12 eastbound near Ledgewood Creek (VP 14)

Visual simulation of Alternative B

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-17
Viewpoint 14, Alternative B

Existing view from Central Way between Ritchie Road and Cordelia Road looking north

Visual simulation of Alternative C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-18
Viewpoint 1, Alternative C

Existing view from Red Top Road at Lopes Road looking east

Visual simulation of Alternative C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-19
Viewpoint 2, Alternative C

Existing view from Interstate 680 Northbound looking north

Visual simulation of Alternative C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-20
Viewpoint 3, Alternative C

Existing view from Interstate 80 westbound near Green Valley overcrossing looking southwest (VP 4)

Visual simulation of Alternative C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-21
Viewpoint 4, Alternative C

Existing view from Interstate 80 eastbound near Red Top Road looking northeast (VP 6)

Visual simulation Alternative C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-22
Viewpoint 6, Alternative C

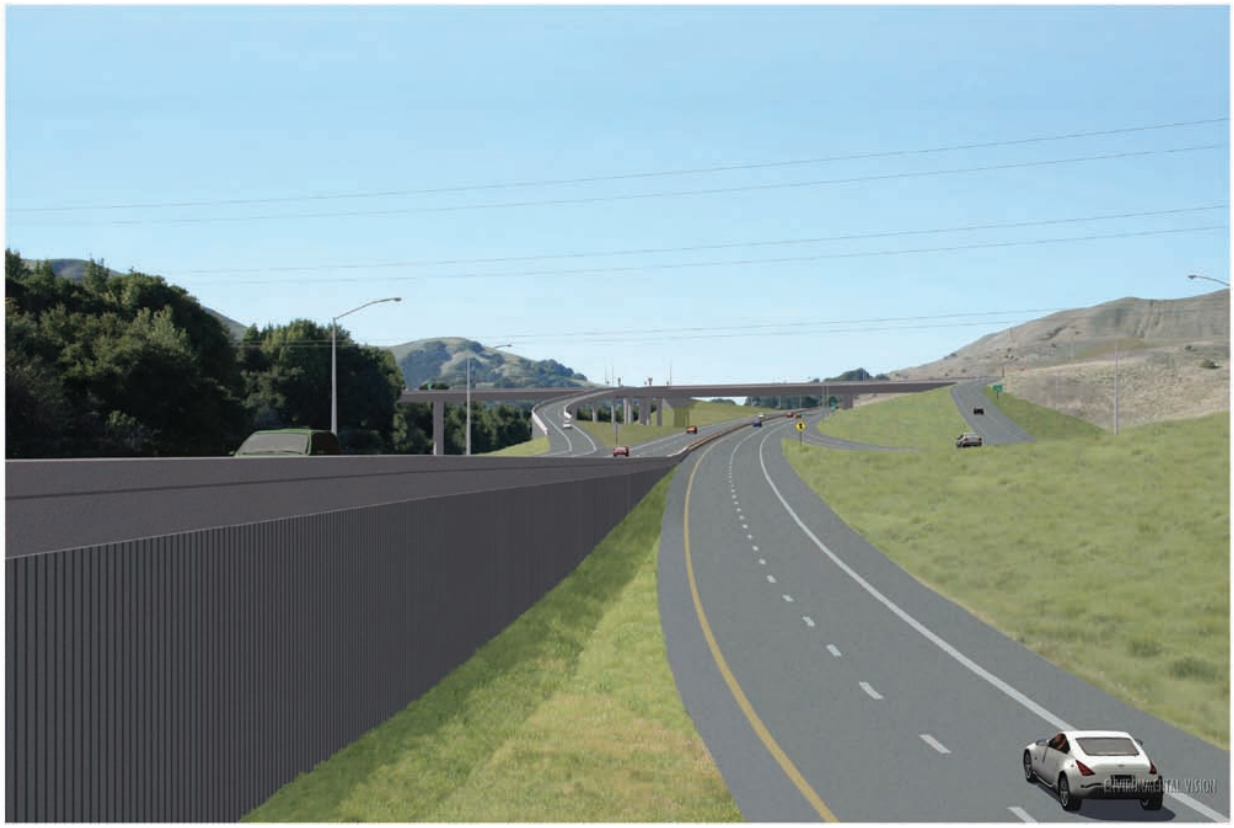
Existing view from SR12W eastbound near Red Top Road

Visual simulation of Alternative C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-23
Viewpoint 7, Alternative C

Existing view from SR12W westbound near Red Top Road



Visual simulation of Alternative C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-24
Viewpoint 8, Alternative C

Existing view from I-80 westbound near SR12E

Visual simulation of Alternative C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-25
Viewpoint 9, Alternative C

Existing view from State Route 12 eastbound near Pennsylvania Avenue (VP 10)

Visual simulation of Alternative C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-26
Viewpoint 10, Alternative C

Existing view from Pennsylvania Avenue near Illinois Street

Visual simulation of Alternative C

Graphics ... 02166.02 EIS (9-24-09)

Figure 3.1.7-27
Viewpoint 11, Alternative C

3.1.8 Cultural Resources

Regulatory Setting

"Cultural resources" as used in this document refers to all "built environment" resources (structures, bridges, railroads, water conveyance systems, etc.), culturally important resources, and archaeological resources (both prehistoric and historic), regardless of significance. Laws and regulations dealing with cultural resources include:

The National Historic Preservation Act of 1966, as amended, (NHPA) sets forth national policy and procedures regarding historic properties, defined as districts, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places. Section 106 of NHPA requires federal agencies to take into account the effects of their undertakings on such properties and to allow the Advisory Council on Historic Preservation the opportunity to comment on those undertakings, following regulations issued by the Advisory Council on Historic Preservation (36 CFR 800). On January 1, 2004, a Section 106 Programmatic Agreement (PA) between the Advisory Council, the FHWA, the State Historic Preservation Officer (SHPO), and the Department went into effect for Department projects, both state and local, with FHWA involvement. The PA implements the Advisory Council's regulations, 36 CFR 800, streamlining the Section 106 process and delegating certain responsibilities to the Department. The FHWA's responsibilities under the PA have been assigned to the Department as part of the Surface Transportation Project Delivery Pilot Program (23 CFR 773) (July 1, 2007).

Historical resources are considered under the California Environmental Quality Act (CEQA), as well as California Public Resources Code (PRC) Section 5024.1, which established the California Register of Historic Resources. PRC Section 5024 requires state agencies to identify and protect state-owned resources that meet National Register of Historic Places listing criteria. It further specifically requires the Department to inventory state-owned structures in its rights-of-way.

Section 4(f) of the U.S. Department of Transportation Act

Historic properties may also be covered under Section 4(f) of the U.S. Department of Transportation Act, which regulates the "use" of land from historic properties. Section 4(f) applies to lands of a historic site of national, state, or local significance. Significance for historic sites under Section 4(f) means that the site is listed in or eligible for listing in the National Register of Historic Places (NRHP) and is a historic property as defined by Section 106 of the NHPA, as amended. The criteria for evaluating the significance of cultural resources are set forth in 36 Code of Federal Regulations (CFR) 60.4. If the historic site is not listed in or eligible for listing in the NRHP, the provisions of Section 4(f) do not apply (23 CFR 774.11[e]). For historic sites, the land would not need to be publicly owned for Section 4(f) to be triggered.

With regard to archaeological sites, Section 4(f) would not apply to such resources, even if they are eligible for the NRHP, if the Department concludes that "the resource is important chiefly because of what can be learned by data recovery and has minimal value for preservation in place" (23 CFR 774.13[b]).Historical resources are considered under the California Environmental Quality Act (CEQA), as well as California Public Resources Code (PRC) Section

5024.1, which established the California Register of Historical Resources. PRC Section 5024 requires state agencies to identify and protect state-owned resources that meet National Register of Historic Places listing criteria. It further specifically requires the Department to inventory state-owned structures in its rights-of-way.

Section 4(f) De Minimis Use

The requirements of Section 4(f) will be considered satisfied with respect to a Section 4(f) resource if it is determined that a transportation project will have only a minimal impact on the 4(f) resource. Specifically for historic sites, *de minimis* impact means that the Department has determined, in accordance with 36 CFR Part 800, that no historic property is affected by the project, or the project will have "no adverse effect" on the property in question.

Local

Solano County General Plan

The Solano County Board of Supervisors conditionally adopted the new 2008 General Plan in August 2008. County voters approved Measure T on the November 4, 2008, ballot and confirmed the Board of Supervisors approval of the General Plan. Chapter 4 of the new General Plan addresses resources, including "substantial historic and prehistoric sites." Its purpose is to identify the goals and policies Solano County will implement in its daily decision-making process to protect resources. The following goals and policies, as stated in Solano County's General Plan, pertain to cultural resources.

> **RS.G-1:** Manage and preserve the diverse land, water, and air resources of the county for the use and enrichment of the lives of present and future generations.
>
> **RS.G-4:** Preserve, conserve, and enhance valuable open space lands that provide wildlife habitat; conserve natural and visual resources; convey cultural identity; and improve public safety.
>
> **RS.P-38:** Identify and preserve important prehistoric and historic structures, features, and communities.
>
> **RS.P-39:** Tie historic preservation efforts to the County's economic development pursuits, particularly those relating to tourism.
>
> **RS.P-40:** Consult with Native American governments to identify and consider Native American cultural places in land use planning.

Additionally, the new General Plan provides implementation programs that identify specific action plans to achieve the goals and policies discussed above.

> **RS.I-25:** Require cultural resources inventories of all new development projects in areas identified with medium or high potential for archeological or cultural resources. Where a preliminary site survey finds medium to high potential for substantial archaeological remains, the County shall require a mitigation plan to protect the resource before issuance of permits. Mitigation may include:
>
> - having a qualified archaeologist present during initial grading or trenching (monitoring);

- redesign of the project to avoid archaeological resources (this is considered the strongest tool for preserving archaeological resources);
- capping the site with a layer of fill; and/or
- excavation and removal of the archaeological resources and curation in an appropriate facility under the direction of a qualified archaeologist.
- alert applicants for permits within early settlement areas to the potential sensitivity if significant archaeological resources are discovered during construction or grading activities, such activities shall cease in the immediate area of the find until a qualified archaeologist can determine the significance of the resource and recommend alternative mitigation.

RS.1-26: Work with federal and state agencies to identify, evaluate and protect the county's important historic and prehistoric resources. Programs administered by such agencies may include:

- California Historical Landmarks
- California Points of Historical Interest
- California Register of Historic Resources
- National Register of Historic Places
- State Historic Building Code

RS.1-27: Refer to the state Senate Bill 18 guidelines and requirements regarding cultural resources. Programs the County will engage in may include:

- ensuring local and Native American governments are provided with information early in the planning process,
- working with Native American governments to preserve and protect Native American cultural sites by designating them as open space where possible,
- providing management and treatment plans to preserve cultural places, and working with Native American groups to manage their cultural places.

RS.1-38: Protect and promote the county's historic and prehistoric resources by:

- providing educational programs to the public, staff, and commissions that promote awareness of the county's history and the value in preserving historic or prehistoric resources; and
- exploring and developing historic or prehistoric sites that can be used appropriately as visitor-oriented destinations.

RS.1-29: Develop historic preservation programs and development guidelines to prevent the loss of significant historic buildings and structures. This should be done in conjunction with Program SS.I-16 (Solano County General Plan 2008).

Affected Environment

Information presented in this section is derived from technical studies conducted for the proposed project. These studies include:

- *Historic Property Survey Report, I-80/I-680/SR 12 Interchange Project, California Department of Transportation District 4, Solano County, California* (2009) (HPSR).
- *Historic Resource Evaluation Report, I-80/I-680/SR 12 Interchange Project, California Department of Transportation District 4, Solano County, California* (2009) (HRER).
- *Archaeological Survey Report, I-80/I-680/SR 12 Interchange Project, California Department of Transportation District 4, Solano County, California* (2009) (ASR).
- *Archaeological Extended Phase I and Geoarchaeological Assessment, I-80/I-680/SR 12 Interchange Project, California Department of Transportation District 4, Solano County, California* (2009) (XPI).

Area of Potential Effects

The westernmost extent of the Area of Potential Effects (APE) is approximately 0.5 mile west of I-80 at the Red Top Road exit extending east along I-80 to Ledgewood Creek. The APE also encompasses I-680 from Gold Hill Road north to the I-80 interchange; SR 12E from the I-80 interchange (west of Abernathy Road) to Suisun City and SR 12W.

The APE map included in this report (Figure 3.1.8-1) is an overview depiction; the entire 15-page APE map sets for archaeological and architectural resources are available in the HPSR. The APE for this undertaking was established by the Department in accordance with Stipulations VI.B.7 and VIII.A of the PA. Most relevant to this report, the APE follows the area of impact resulting from all activities associated with both alternatives, including all construction activities, easements, and staging areas. The architectural history APE includes parcels immediately adjacent to the existing right-of-way from which new rights-of-way would be acquired through project activities.

Methodology

An investigation for the cultural resources located in the project APE was conducted beginning in 2007. The investigation included a records search, Native American consultation, archaeological and architectural field surveys, archaeological investigations, and additional research.

Records Search

A background literature review for the area of potential effect (APE) and a 2-mile radius around the APE (the study area) was conducted on May 14, 2008, at the California Historical Resources Information System's Northwest Information Center (NWIC), located at Sonoma State University. The purpose of this review was to determine the geographic boundaries of previous surveys, the location of potential significant historical resources, and the number of documented sites near the APE. Sources reviewed include archaeological site maps and records, archaeological study maps and reports, historic maps, and local reference books. The data were used to assess the likelihood of unrecorded resources based on historical references and the distribution and environmental setting of nearby sites. Subsequent records searches were conducted (October 2008, February 2009) to gather additional information for sites pertinent to this study but outside the 1-mile radius.

The records search identified 30 previous studies within or abutting portions of the APE.

Two archeological sites are recorded within the APE; however, neither has been located again since being recorded in the 1970s. One archaeological site was mapped in two separate locations (as CA-SOL-242 and CA-SOL-242S) within the project APE in the vicinity of Green Valley Creek. No site records exist for this site at either location, and it has long been assumed that this site was mislocated or was a duplicate of CA-SOL-18—a nearby site. Several studies (including this study) have tried to locate this site again, and examinations of areas near the mapped locations (both surface and creek banks) have failed to identify prehistoric deposits of any kind.

Additional Research

Background research was conducted to arrive at a general understanding of the history of Cordelia, Fairfield, and Suisun City with a general focus on the history of the settlement and development of the project area. Research was undertaken at the California State Library, Sacramento; the Office of the Solano County Assessor/Recorder, Planning Department and Resource Management Building and Safety Services Division; the Fairfield Civic Center Library; the Solano County Archives; the Solano County Library; and the Transportation Library History Center, Sacramento.

Consultation

On October 15, 2008, a letter providing a brief project description, a map of the project area, and a summary of the background research was sent to all Native American representatives identified by the Native American Heritage Commission. The letter also requested that the recipient respond with any concerns or information. Follow-up phone calls were made on March 2, 2009; there was no response as of June 22, 2010. However, Caltrans was contacted directly by Mr. Reno Franklin, Tribal Historic Preservation Officer of the Yocha Dehe Wintun Nation in late June 2010. Mr. Franklin requested to be involved in additional studies, and the Yocha Dehe Wintun would like to be consulted in the development of the Programmatic Agreement (PA) for this project (discussed below under Avoidance and Minimization Measures and provided in Appendix H).

During an introductory meeting between Department staff and Yocha Dehe Wintun Nation tribal representatives on July 19, 2010, the Yocha Dehe requested a meeting to specifically discuss the project with the proponents and the Department.

As a result, a consultation meeting was held on August 23, 2010. During this meeting the Yocha Dehe indicated that any comments or concerns regarding the PA and HPTP or any information on resources that may be affected by the project could be provided within 30 days of receipt of the documents. Following this meeting, a copy of the Draft PA and HPTP were mailed to the Chairman on November 1, 2010.

A subsequent meeting was held on November 29, 2010 with tribal representatives to provide the Yocha Dehe with an opportunity to ask questions or request more detailed information about the project and the documents. Tribal representatives indicated that a written response to the PA and HPTP would be provided following a scheduled Tribal Council meeting on December 14, 2010.

On January 7, 2011, an email was received by the Department with the commented-upon PA attached. The email, sent by Yocha Dehe Tribal Historic Preservation Officer, Reno Franklin, included a request to provide the Yocha Dehe signatory status on the PA, instead of the current

concurring party status. The Department has continued to meet with the Yocha Dehe regularly and consultation is ongoing.

In November 2008, letters describing the proposed project and requesting information on cultural resources in the project area were sent to the Solano County Historical Society, Solano County Genealogical Society, and the Solano County Archives. As of July 2010, no responses were received.

Field Methods

The project area was surveyed between 2004 and 2008. No new archaeological resources were encountered during these surveys.

The areas near the recorded locations of CA-SOL-242 and CA-SOL-262 were inspected for any evidence of cultural material. Because the mapping for these sites is suspect, a large area near the mapped locations was observed. No evidence of cultural material or archaeological deposits was observed at CA-SOL-242.

A sensitivity analysis was conducted as part of the ASR to assess the potential for buried resources. Sediment and soils research suggests that portions of the APE may have the potential for buried resources and paleosols based on the age of the deposits. Several factors potentially altering the likelihood for buried archaeological sites were taken into account, such as distance to water, soil classification, and landform stability. As an initial program of archaeological assessment, twelve subsurface mechanical test trenches were excavated within the project area. Locations were chosen to sample different zones of the proposed project—primarily highly sensitive areas.

One possible isolated prehistoric feature was encountered (near Suisun Creek). This feature consisted of a discrete area of concentrations of carbon at approximately 40 inches below the ground surface, with one piece of faunal bone recovered. No indications of culturally modified rock, shell, or bone were observed in other trenches, and no other cultural resources were identified during testing. However, geoarchaeological research, as well as archival research, strongly suggests that areas within 100 meters of creeks have the greatest potential to contain buried archaeological deposits.

Qualified architectural historians surveyed and recorded built-environment cultural resources in the architectural APE on November 1, 2007, November 19, 2007, December 13, 2007, March 13, 2008, April 18, 2008, April 25, 2008, June 4, 2008, January 30, 2009, and March 9, 2009. The surveys were conducted according to guidelines established in The Department's 2004 draft *Environmental Handbook, Volume 2*: *Cultural Resources* (California Department of Transportation 2004 [as amended]). Madeline Bowen, Kathryn Haley, Patricia Ambacher, Tim Yates, and Maya Beneli conducted the surveys. Ms. Bowen, Ms. Haley, Ms. Ambacher, and Mr. Yates all meet the qualifications of an Architectural Historian per Attachment 1 of the Programmatic Agreement. The survey effort included the formal recordation of properties with digital photographs and handwritten notes.

Significant Cultural Resources

This section summarizes the significant or potentially significant archaeological sites and architectural resources identified through the background research and as part of the field survey efforts. More detailed information on the architectural resources can be found in the DPR 523 forms in Appendix E of the HRER. Concurrence of eligibility of districts, buildings, and structures, and of the development of a PA and HPTP was received from SHPO on March 20, 2010 (Appendix H). The PA was approved by SHPO and Caltrans HQ on November 7, 2011 and by the Caltrans District 04 Director on November 8, 2011.

Archaeological Resources

No new archaeological resources were observed during the survey or subsurface investigation completed to date for the proposed project. Additional identification and evaluation of archaeological properties, and any adverse effects, are provided for in the PA (provided in Appendix H). The PA provides for a phased approach to the identification, evaluation and application of the criteria of adverse effects in consultation with the Yoche Dene Wintun Nation prior to the beginnings of construction stages.

If cultural materials are discovered during construction, all earth-moving activity within and around the immediate discovery area will be diverted until a qualified archaeologist can assess the nature and significance of the find.

If human remains are discovered, State Health and Safety Code Section 7050.5 states that further disturbances and activities shall cease in any area or nearby area suspected to overlie remains, and the County Coroner contacted. Pursuant to Public Resources Code Section 5097.98, if the remains are thought to be Native American, the coroner will notify the Native American Heritage Commission (NAHC), which will then notify the Most Likely Descendent (MLD). At this time, the person who discovered the remains will contact The Office of Cultural Resource Studies Office Chief so that they may work with the MLD on the respectful treatment and disposition of the remains. Further provisions of PRC 5097.98 are to be followed as applicable.

Architectural Resources

Architectural historians identified 209 properties that contained buildings or structures and one irrigation feature within the project area that predated 1965. Of the 209 properties, 122 are recommended as eligible for the NRHP (26 as contributors to the Village of Cordelia Historic District, 95 as contributors to the Suisun Historic District, and the Suisun City Train Depot). Properties within the Village of Cordelia Historic District were determined eligible by SHPO in 1989 and the Suisun City Train Depot was determined eligible in 1981. Concurrence from the SHPO regarding eligibility of the properties within the Suisun Historic District was received on March 20, 2010. Properties within the APE that are listed in, or eligible for listing in, state and federal registers are summarized below.

177 Main Street (APN 0032-020-240): This property features a train station (Suisun City Train Depot) with a medium-pitched, hipped roof, with wide open eaves, exposed rafters, and dormers. The building is clad in beveled horizontal wood siding and includes original wood frame windows.

The Suisun City Train Depot building was determined eligible for the NRHP in 1981. ICF Jones & Stokes revisited the property as part of this study to assess its integrity and found the 1981 finding remains valid. The building meets the criteria for inclusion on the California Register of Historic Resources (CRHR).

Village of Cordelia Historic District, Cordelia: This district contains 26 contributing buildings consisting primarily of residential buildings; however, civic, institutional, and agricultural-related buildings are included in the boundary. Most of the buildings were constructed between 1890 and 1915 and represent a variety of architectural styles, from foursquare to Greek revival. The agricultural-related buildings are largely vernacular.

The Village of Cordelia Historic District was determined eligible for the NRHP in 1989 under Criteria A, in the areas of commerce and social history, and C in the area of architecture, with 33 contributing buildings and six non-contributing buildings. Since that determination of eligibility, five buildings no longer contribute to the district because of a lack of integrity, and because they were constructed outside the district's period of significance (1870–1934). The original six non-contributing buildings remain non-contributors. One property, 2172 Bridgeport (APN 0045-132-080) was not evaluated as part of the district in 1989, but is within the district's boundaries. It was constructed outside the district's period of significance and is counted as a non-contributor. To date, the district has 26 contributing buildings, and 14 non-contributing buildings. The district is eligible for the NRHP and therefore is also considered a historical resource for the purposes of CEQA.

Suisun City Historic District, Suisun City: This district is comprised of 95 contributing buildings and an additional 34 non-contributing buildings. It is a mixture of one- and two-story residential buildings, commercial buildings, churches, and social halls constructed between 1880 and 1934. Architecturally, the buildings represent a variety of styles, including colonial revival, shingle, Queen Anne, and craftsman bungalows. The commercial buildings are largely single-story commercial buildings.

The district features one building, 623 Main Street (Masonic Lodge #55), that is listed in the NRHP. Concurrence from the SHPO regarding eligibility of the properties within the Suisun Historic District was received on March 20, 2010. The district is eligible for listing in the NRHP at the local level of significance under Criterion A in the area of community development, and Criterion C as significant and distinguishable, reflecting the architectural evolution of Suisun City. The district's period of significance is 1880–1934. The district meets the criteria for eligibility for listing in the CRHR.

Environmental Consequences

Based on the above-mentioned technical studies, two historic districts and one historic property within the APE for the proposed project are listed in or are eligible for listing in the NRHP and therefore eligible for protection under Section 4(f). The locations of these historic properties are shown in Figure 3.1.1-1.

Effects on Unknown or Known Resources from Construction

Research indicates that previously unidentified buried archaeological resources, both prehistoric and historic, could be present in the project area. Such resources could be discovered through

subsurface construction activities such as grading and excavations at the work areas. If buried cultural resources are inadvertently encountered during construction, disturbance could result in the loss of integrity of cultural deposits, loss of information, and the alteration of an archaeological site setting. Inadvertent exposure of prehistoric or historic-era archaeological resources could make the resources susceptible to vandalism. Inadvertent discovery of prehistoric or historic-era archaeological resources during construction would have a potentially adverse effect.

Conducting further research as guided by the PA for this project (provided in Appendix H) will ensure that additional identification efforts are completed prior to construction and any historic properties identified are treated appropriately. The execution of the project PA signifies completed compliance with Section 106 of the NHPA. Under the No-Build Alternative there would be no construction and therefore, no potential to disturb or destroy buried resources as a result of construction.

Potential to Affect Historic Properties at APN 0032-020-240 (Suisun City Train Depot)

Under both alternatives, construction would occur in the southern portion of this parcel and the building (Suisun City Train Depot) is located in the northern section of the parcel, which is partially sheltered by SR 12E that runs above the building's northwest corner. The proposed project would not constitute an adverse effect because it would take place some distance (approximately 300 feet) from the building and would not lead to the physical destruction, alteration or relocation of the historic resource. The proposed construction would occur in the southern section of the parcel, near Spring Street, where there is a median strip with modern covered benches used by waiting passengers. The proposed project would create a visual impact, but the effect is not considered adverse because it would not substantially alter the existing setting of the parcel. The building's overall setting was compromised by the construction of SR 12E in the mid-twentieth century as well as by the modern development that has occurred in close proximity to the parcel. Furthermore, the railroad tracks located near the parcel's west side are not being altered or realigned, so the depot would continue to retain its relationship with the tracks, which would help the depot retain its feeling, association, and immediate setting.

No construction would occur in the vicinity of the Suisun City Train Depot under the fundable first phase of either alternative or under the No-Build Alternative.

Potential to Affect Village of Cordelia Historic District

Under Alternative B and Alternative B, Phase 1, construction would occur in the vicinity of the Village of Cordelia Historic District. However, this effect would not be adverse because the proposed improvements are occurring in the existing right-of-way and on a parcel that no longer contains a building. None of the contributing properties within the district would be demolished, altered, or relocated. Under Alternative B project improvements would occur on a parcel located on Cordelia Road at the district's western boundary. When this district was originally evaluated, a contributing building was located on that parcel. Since the time of the determination of eligibility that building has been demolished or removed. Therefore, no building, contributing or non-contributing, would be affected by project construction. Proposed project improvements would not alter the overall integrity of the district as the parcel is located at the edge of the district boundary and the number of contributing resources within the district would be retained. Overall, the district would retain a high concentration of contributing properties and would

continue to convey a sense of place and time. The character-defining features of the district would remain intact.

The proposed improvements under Alternative B and Alternative B, Phase 1 would have a visual impact on the district's setting because there would be elevated construction where none has previously existed. This visual impact would not be considered an adverse effect because the setting of the district was already compromised when the existing interstate was built in the mid-to-late twentieth century. The Village of Cordelia Historic District as a whole would continue to convey its significance and maintain its integrity of location, design, workmanship, materials, setting, feeling and association.

Under Alternative C and Alternative C, Phase 1, the I-80/I-680 interchange would be relocated to the vicinity of the existing I-80/SR 12W interchange. The elevated ramps would be removed. The ramps are located far enough from the district (approximately 0.25 mile) that no direct effects would occur with their removal. The visual effect may be beneficial because the existing ramps would no longer be within the viewshed of the district.

Under the No-Build Alternative, there would be no construction and no changes to the project area and therefore no potential to affect the Village of Cordelia Historic District.

Potential to Affect Suisun City Historic District

Under both alternatives improvements would occur near and within the boundary of the Suisun City Historic District, but would not constitute an adverse effect on the district. Although the proposed improvements would not lead to the physical destruction, alteration or relocation of historic properties, it would result in a visual impact because there would be elevated construction where none historically existed. This visual impact would not be an adverse effect to the district because while elevated, the construction would not be directly over the district. Rather, it would be to the northwest of the district's north boundary and would not alter the district's overall sense of place and time. Therefore, it would not have an adverse effect on the district's overall integrity.

Additionally, both alternatives would disrupt a portion of the northwest district boundary because the design of an original street in the district (Sacramento Street) would be altered. Sacramento Street has historically been a through street between Main Street to the east and West Street to the west. The proposed project would convert Sacramento Street into a cul-de-sac. This impact would not be considered adverse because the core of the district, including the highest concentration of contributing properties, sits to the south and east of the proposed improvements. Those areas south and east of the proposed improvement would still provide a strong sense of place and time for the district's period of significance (1880–1927). Only eight contributing properties front the proposed improvements, and these resources are not individually eligible.

The district would retain its high number of contributors and it would continue to be geographically united. The district's overall integrity of location would remain intact because the proposed improvements do not necessitate the removal of properties. Integrity of workmanship and materials can be seen throughout the district's contributing buildings in their architectural styles. The district's overall integrity of feeling and association would also remain intact.

The district's setting and design would be altered on the northwest border. The design of the remaining streets within the district would not be altered and would continue to allow the district to convey its significance. Integrity of setting would also be altered along Sacramento Street, but it would not have an adverse effect on the district as a whole. Overall, the historic character of the Suisun City Historic District would remain intact and the district would continue to possess the essential physical features that allow it to convey its significance.

No construction would occur in the vicinity of the Suisun City Historic District under the fundable first phase of either alternative or under the No-Build Alternative and, therefore, there would be no potential to affect it.

Historic Resources Protected Under Section 4(f)

APN 0032-020-240 (Suisun City Train Depot)

As noted above, this property was evaluated in 1981 and determined eligible for the NRHP. Per the recent HRER for the proposed project, the building continues to retain its historic integrity and therefore continues to be eligible for the NRHP. The SHPO concurred that this property is eligible under Criterion C in the area of architecture at the local level of significance. Its period of significance is 1906, the estimated year of its construction. As such, the property is an eligible historical resource on the NRHP, and is therefore considered a Section 4(f) resource.

Potential to Affect the Suisun City Train Depot

In the vicinity of the Suisun City Train Depot, both alternatives include improvements occurring within the boundaries of the parcel on which the eligible property is located. The construction activities occurring within the property under the two alternatives would involve identical features.

The Suisun City Train Depot is located directly south of SR 12E and adjacent to the UPRR tracks on the east. Proposed project improvements under Alternative B and Alternative C would involve the extension of West Street northward from Solano Street to Spring Street in Suisun City. It would be on an embankment supported by retaining walls to intersect the roadway crossing over the existing UPRR tracks. Approximately 0.27 acre located within the southern section of the parcel would be acquired by these improvements. The proposed improvements would occur within the southern section of the parcel, approximately 250 feet south of the train depot. The eligible building would not be demolished or moved. The building's overall setting was compromised by the construction of SR 12E in the mid-twentieth century as well as by the modern development that has occurred in close proximity to the parcel. Furthermore, the railroad tracks located near the parcel's west side are not being altered or realigned, so the depot would continue to retain its relationship with the tracks, which would help the depot retain its feeling, association, and immediate setting.

Based on traffic noise modeling results, noise levels taken from one prediction site northwest of the property were calculated for existing and future conditions with and without the project alternatives. The existing traffic noise level at the loudest hour was estimated to be 61 dBA. The future levels (2035) at this site were predicted to be between 64–65 dBA with Alternative B and Alternative C and 63 dBA under the No-Build Alternative. Although both alternatives would increase noise levels 1 to 2 dBA higher than under the No-Build Alternative, the noise level does

not approach or exceed the NAC for the land use (67–72 dBA) under 23 CFR 772. Therefore, there would be no impacts due to noise.

Access to the train depot would not permanently change. During construction, access to the property would be maintained because the main entrance is located adjacent to the train depot and north of the proposed project improvements. Proposed project improvements would occur along Spring Street, the train depot's southern parking lot entrance, and short-term disruptions in access could occur at this location. However, implementation of the TMP would ensure that nearby businesses and residents are notified of the locations of temporary detours to facilitate local traffic patterns and through-traffic requirements.

The Suisun City Train Depot would be able to maintain its integrity of location, design, workmanship, materials, setting, feeling, and association under Alternative B and Alternative C. Consequently, the proposed project would not have an adverse affect on this property. Furthermore, as the proposed project does not appear to adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection, the work occurring within this eligible NRHP property appears to meet the qualifications for a de minimis impact finding. Thus, per 49 U.S.C. 303 and 23 U.S.C. 138, no discussion of avoidance alternatives is listed for this resource. As indicated in Stipulation II.B.4 of the 80/680/12 Programmatic Agreement (See Appendix H) there will be no adverse effect on eligible built environment properties. The SHPO's signature on the PA constitutes agreement with that determination.

Measures to Minimize Harm to the Suisun City Train Depot

Measures to minimize harm to this Section 4(f) resource would include maintaining property access and communicating the proposed construction activities with the nearby businesses and property residents. Implementation of the TMP would ensure that nearby businesses and residents are notified of the locations of temporary detours to facilitate local traffic patterns and through-traffic requirements.

Coordination for the Suisun City Train Depot

During preparation of the HRER and the evaluation of the Suisun City Train Depot, project historians coordinated with the Department's Architectural Historian, Andrew Hope, who meets the Professionally Qualified Staff Standards in Section 106 PA Attachment 1 as an Architectural Historian.

Concluding Statement for the Suisun City Train Depot

The project alternatives would not affect the significance and character-defining features of the Suisun City Train Depot that contribute to its eligibility for listing in the NRHP. Accordingly, the effects of the project on this Section 4(f) resource appear to meet the requirements for a *de minimis* impact finding as they do not appear to adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection.

Village of Cordelia Historic District

As noted above, the Village of Cordelia Historic District was determined eligible for the NRHP in 1989 under Criteria A, in the areas of commerce and social history, and C in the area of architecture, with 33 contributing buildings and six non-contributing buildings. Since that determination of eligibility, five buildings no longer contribute to the district because of a lack of

integrity, and because they were constructed outside the district's period of significance (1870–1934). The original six non-contributing buildings remain non-contributors. One property, 2172 Bridgeport (APN 0045-132-080) was not evaluated as part of the district in 1989, but is within the district's boundaries. It was constructed outside the district's period of significance and is counted as a non-contributor.

With the re-evaluation of the district, the HRER determined the district is now comprised of 26 contributing buildings and 14 non-contributing buildings. The district is eligible for the NRHP; thus, this district is considered a protected resource under Section 4(f).

Potential to Affect the Village of Cordelia Historic District

Construction is proposed in the vicinity of the Village of Cordelia Historic District under all build alternatives. However, only Alternative B and Alternative B, Phase 1 have improvements occurring within the boundaries of this district (see Figure 3.1.8-2).

The Village of Cordelia Historic District is located just south of the I-80/I-680 interchange and directly east of northbound I-680. Under Alternative B and Alternative B, Phase 1, a third mixed-flow lane would be constructed to northbound I-680 beginning 1,000 feet south of the Cordelia overhead within this portion of the proposed project area. With this proposed lane addition, approximately 0.47 acre of a non-contributing parcel, located on Cordelia Road at the district's western boundary, would be acquired by these improvements. This acquisition would not alter the overall integrity of the district. Because the building on this parcel no longer exists, it cannot be eligible individually or as a contributor to the district. This, combined with the property's location at the edge of the district's boundary, lessens the effect to the district as a whole. Cordelia Road would still retain a high number of contributing resources at its west end. Overall, the district would retain a high concentration of contributing properties and would continue to convey a sense of place and time. The character-defining features of this district would remain intact.

The improvements under Alternative B and Alternative B, Phase 1would affect the district's visual setting because there would be elevated construction where none has previously existed. However, this visual affect would not be considered adverse under Section 106 because the setting of the district was already compromised when the interstate was created. The elevated construction would not alter the setting of the overall district enough that the district would lose the ability to convey significance in the areas of commerce, social history, and architecture.

Based on traffic noise modeling results, noise levels at two monitoring sites and one prediction site within the district were applied for existing and future conditions with and without the Alternative B. The existing traffic noise levels at the loudest hour were predicted to be between 63–68 A-weighted decibels (dBA). The future noise levels (2035) at these three sites were predicted to be between 63–71 dBA with Alternative B and Alternative B, Phase 1 alignments and between 63–71 dBA under the No-Build Alternative. The noise levels with Alternative B would be the same or one dBA less than the future design-year (2035) noise levels under the No-Build Alternative. As such, while the projected noise levels under Alternative B would exceed the noise abatement criteria (NAC) under 23 CFR 772 for the land use (67 dBA), they would not

exceed the future design-year (2035) No-Build noise levels and no impacts attributable to noise would occur.

No improvements under Alternative B or Alternative B, Phase 1 would occur on the roadways within the district boundaries, and access within the district would be maintained during construction. Improvements under Alternative B would only occur on a vacant parcel on the western edge of the district. However, approximately 250 feet north of the district, project improvements on the local roadways are proposed. These improvements could result in short delays in access to the district. However, with implementation of a transportation management plan (TMP), overall access to the district would be maintained.

The Village of Cordelia Historic District as a whole would be able to maintain integrity of location, design, workmanship, materials, setting, feeling, and association under Alternative B and Alternative B, Phase 1. Consequently, the project alternatives would not have an adverse eeffect on this District. Furthermore, as the project alternatives do not appear to adversely affect the activities, features, or attributes that make the District eligible for Section 4(f) protection, the work occurring within this eligible NRHP resource appears to meet the qualifications for a *de minimis* impact finding. Thus, per 49 U.S.C. 303 and 23 U.S.C. 138, no discussion of avoidance alternatives is listed for this resource. As indicated in Stipulation II.B.4 of the 80/680/12 Programmatic Agreement (See Appendix H) the project, as currently proposed, will result in no adverse effect on eligible built environment properties. The SHPO's signature on the PA constitutes agreement with that determination.

Measures to Minimize Harm to the Village of Cordelia Historic District

Measures to minimize harm to this potential Section 4(f) resource would include maintaining access and existing circulation patterns within this district. The non-contributing building that was located on the parcel that is being affected by the proposed project has been demolished and no longer exists. This vacant parcel does not have any driveway or access points onto the surrounding roadways. Because it is on the district's western boundary, the proposed project improvements would not affect overall access to this district. Furthermore, a TMP would be implemented to ensure that property owners within and nearby the district are notified of the locations of temporary detours to facilitate local traffic patterns and through-traffic requirements.

Coordination for the Village of Cordelia Historic District

During preparation of the HRER and the evaluation of the Village of Cordelia Historic District, project historians coordinated with the Department's Architectural Historian, Andrew Hope, who meets the Professionally Qualified Staff Standards in Section 106 PA Attachment 1 as an Architectural Historian.

Concluding Statement for the Village of Cordelia Historic District

The project alternatives would not affect the significance and character-defining features of the Village of Cordelia Historic District, which make it eligible in the NRHP. Accordingly, the effects of the project on this Section 4(f) resource appear to meet the requirements for a *de minimis* impact finding as they do not appear to adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection.

Suisun City Historic District

As discussed above, the Suisun City Historic District is comprised of 95 contributing buildings and 34 non-contributing buildings, and has a period of significance between 1880 and1934. The district is eligible for the NRHP under Criterion A at the local level of significance in the area of community development, and Criterion C as a collection of late nineteenth- and early twentieth-century architecture. The district features one building, 623 Main Street (Masonic Lodge #55) that was listed on the NRHP in 1978. The district is an eligible historical resource listed on the NRHP, and therefore is considered a protected resource under Section 4(f).

Potential to Affect the Suisun City Historic District

In the vicinity of the Suisun City Historic District, both Alternative B and Alternative C would have project improvements occurring directly adjacent to the district boundaries (see Figure 3.1.8-3). The construction activities occurring adjacent to the district under both alternatives involve identical features. The Suisun City Historic District is located south of SR 12E and adjacent to the UPRR tracks on the west. Proposed project improvements under Alternative B and Alternative C would involve the extension of West Street northward from Solano Street to Spring Street in Suisun City. The West Street extension would be on an embankment supported by retaining walls to intersect the roadway crossing over the existing UPRR tracks. Additionally, under both alternatives, the proposed project would convert Sacramento Street into a cul-de-sac. Under this alternative, proposed project improvements would occupy approximately 0.38 acre of Sacramento Street.

Although the proposed improvements would occur near and within the boundary of the proposed Suisun City Historic District, the physical destruction, alteration, or relocation of historic properties would not occur. The proposed improvements would affect the district's visual setting because there would be elevated construction where none has previously existed. This elevated construction would involve extending West Street along an embankment supported by retaining walls that would run from road stationing 10+50 to 25+00 (North of Solano Street to South of Spring Street). The eastern portion of this retaining wall would be adjacent to the Suisun City Historic District, and located near two contributing properties (properties 63 and 75 on Figure 3.1.8-3) within the District. The retaining wall would be located approximately 25 feet away from the building located on contributing property 63 and approximately five feet away from the building located on contributing property 75. The elevated roadway would begin along the curb line of West Street, abutting contributing property 75. At this location the retaining wall and concrete barrier would be approximately six feet in height. At its peak, the retaining wall would be approximately 34 feet above ground surface. However, this elevated construction would not be directly over the district, but rather to the northwest of the district's north boundary and would not alter the district's overall sense of place and time. Therefore, it would not affect this district's overall integrity.

Additionally, the proposed improvements would disrupt a portion of the northwest district boundary because the design of an original street in the district, Sacramento Street, would be altered. Sacramento Street has historically been a through street between Main Street to the east and West Street to its west. However, because the core of the district sits to the south and east of the proposed improvements, the district would have the ability to convey its significance for its association with community development and for its many distinctive nineteenth-century and

early twentieth-century architectural styles. Those areas south and east of the proposed improvements would still provide a strong sense of place and time for the district's period of significance (1880–1934).

The highest concentration of contributing properties is located within the core area of the district, away from the proposed improvements. Only six contributing properties front the proposed improvements, and these resources are not individually eligible. This district would retain its high number of contributors and it would continue to be geographically united. The district's overall integrity of location would remain intact because the proposed improvements do not necessitate the removal of properties. The district's overall integrity of feeling and association would also remain intact. Although the district's setting and design would be altered on the northwest border, the design of the remaining streets within the district would not be altered and would continue to allow the district to convey its significance. The Suisun City Historic District would continue to possess the essential physical features that would allow people to understand its importance to the development of the city.

Taken from one noise prediction site within the district, noise modeling results were forecast for existing and future conditions with and without the project alternatives. The existing traffic noise levels at the loudest hour were predicted to be 51 dBA. With Alternative B and C future levels (2035) were estimated to be between 54–59 dBA, and 53 dBA under the No-Build Alternative. Although noise levels with the project alternatives would be up to six dBA higher compared to the No-Build conditions, noise levels would still not approach or exceed the NAC under 23 CFR 772 for the land use (67 dBA). Therefore, there would be no impacts due to noise.

Although project alternatives would occur adjacent to and within the boundary of the district (along Sacramento Street), access to and from the district would be maintained. Neither alternative would involve improvements along Main Street, which serves as the main entrance to the district. Construction along Sacramento Street would result in short delays in access to the residences along the roadway. However, with implementation of the TMP (see Chapter 3, Section 3.1.5, "Utilities and Emergency Services") residents would be notified of any delays so that property access during construction would be coordinated with the timing of construction activities.

The Suisun City Historic District would continue to share its historic associations and the majority of the district's historic character would remain intact under Alternative B and Alternative C. As such, the project alternatives would not have an adverse affect on this District. Furthermore, as the project alternative do not appear to adversely affect the activities, features, or attributes that make the District eligible for Section 4(f) protection, the work occurring within this eligible NRHP resource appears to meet the qualifications for a *de minimis* impact finding. As indicated in Stipulation II.B.4 of the 80/680/12 Programmatic Agreement (See Appendix H) the project, as currently proposed, will result in no adverse effect on eligible built environment properties. The SHPO's signature on the PA constitutes agreement with that determination.

Thus, per 49 U.S.C. 303 and 23 U.S.C. 138, no discussion of avoidance alternatives is listed for this resource.

Measures to Minimize Harm to the Suisun City Historic District

Measures to minimize harm to this potential Section 4(f) resource would include maintaining access and existing circulation patterns within the district. As noted above, proposed project improvements would occur adjacent to and within the boundary (along Sacramento Street) of the Suisun City Historic District. However, the physical destruction, alteration, or relocation of historic properties would not occur. Access into the district would be preserved along Main Street. Implementation of the TMP would require that the contractor notify property owners within and nearby the district of the locations of temporary detours to facilitate local traffic patterns and through-traffic requirements. Residents would also be notified in advance about potential access or parking effects before construction activities begin.

Coordination for the Suisun City Historic District

During preparation of the HRER and the evaluation of the Suisun City Historic District, project historians coordinated with the Department's Architectural Historian, Andrew Hope, who meets the Professionally Qualified Staff Standards in Section 106 PA Attachment 1 as an Architectural Historian.

Concluding Statement for the Suisun City Historic District

The project alternatives would retain the significance and character-defining features of the Suisun City Historic District, which contribute to its eligibility in the NRHP. Accordingly, the effects of the project on this Section 4(f) resource appear to meet the requirements for a *de minimis* impact finding as they do not appear to adversely affect the activities, features, or attributes that make the property eligible for Section 4(f) protection.

Avoidance, Minimization, and/or Mitigation Measures

Because the potential remains for archaeological resources to be discovered in the project area, a PA between Caltrans and the SHPO and other stakeholders has been prepared that includes a Historic Properties Treatment Plan (HPTP). The HPTP includes a detailed protocol for identification, evaluation and treatment of any affected historic properties. The HPTP also includes protocols for archeological monitoring, and evaluation and treatment of unanticipated discoveries that may be encountered during implementation of the undertaking.

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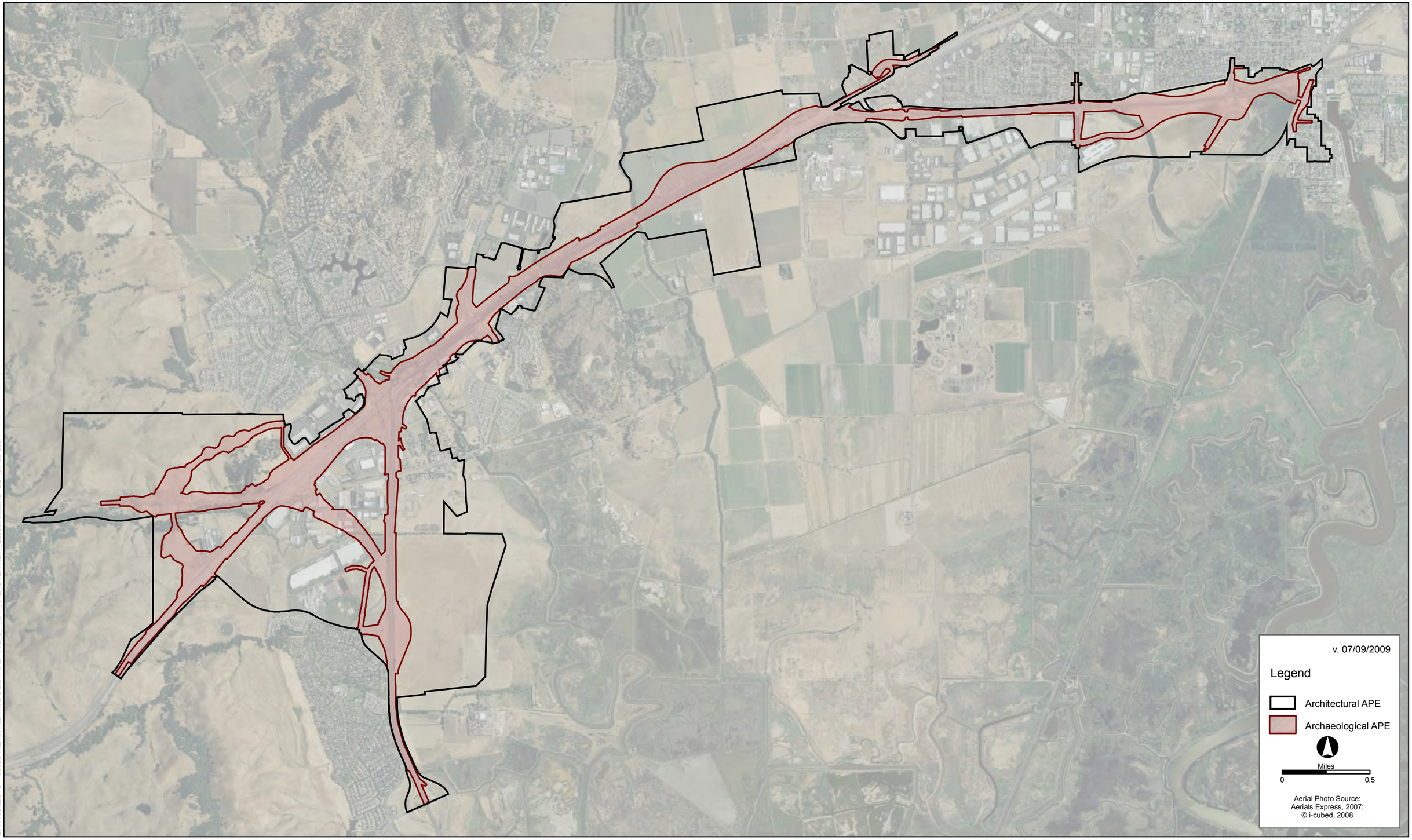

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Figure 3.1.8-1
Area of Potential Effect Overview

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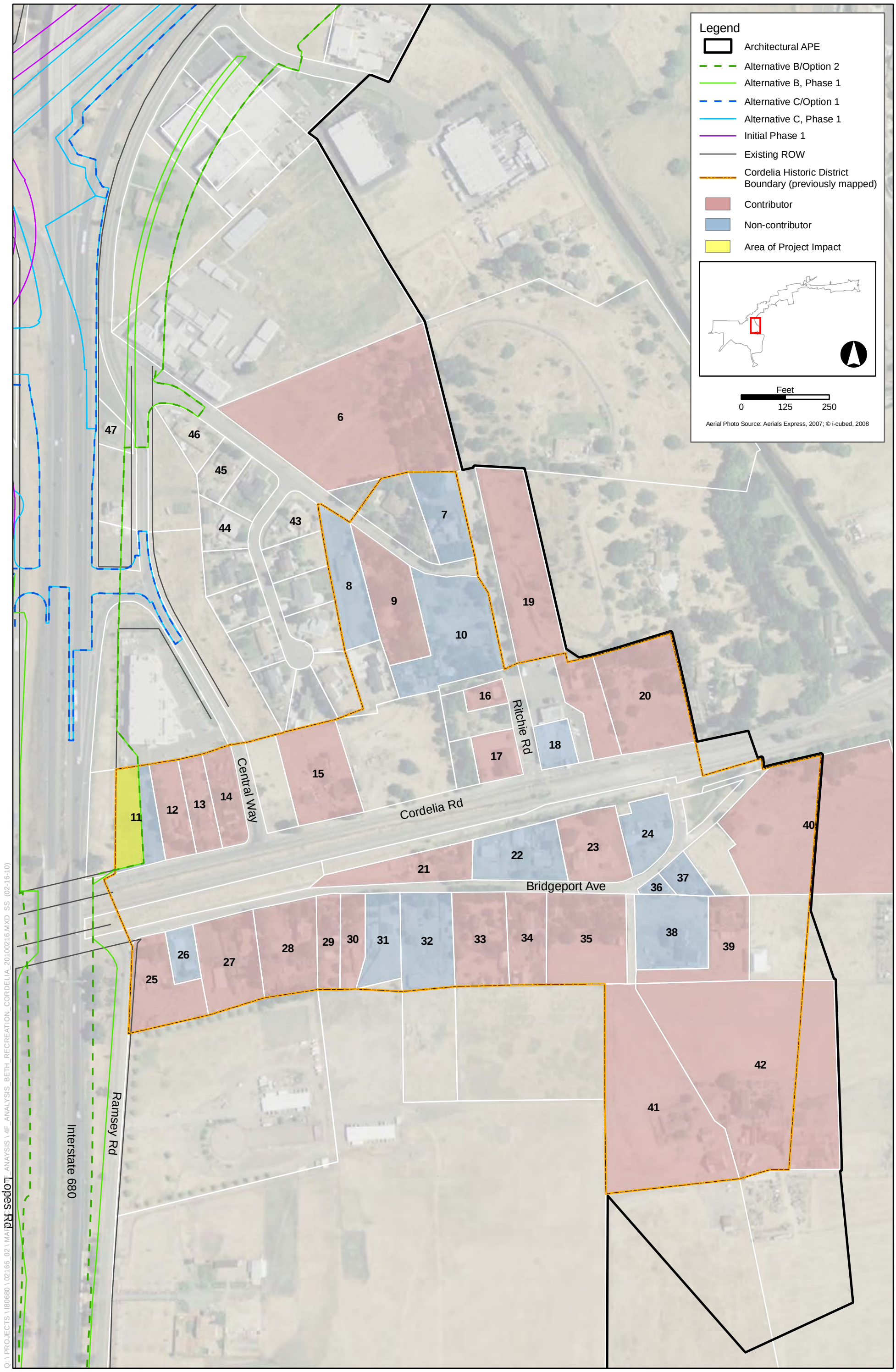

Figure 3.1.8-2
Cordelia Historic District

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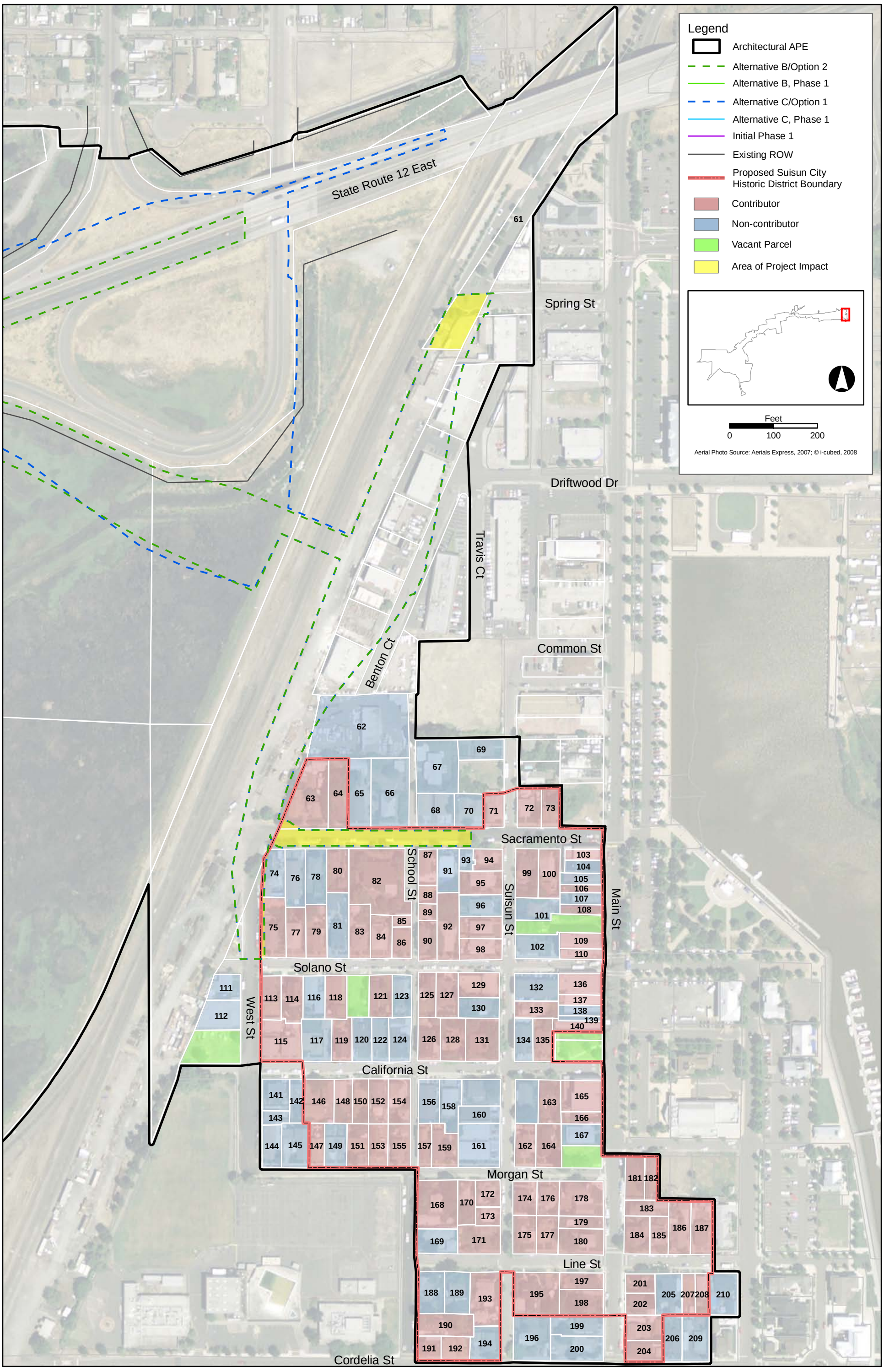

Figure 3.1.8-3
Suisun City Historic District

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3.2 Physical Environment

3.2.1 Hydrology and Floodplain

Regulatory Setting

Executive Order 11988 (Floodplain Management) directs all federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless it is the only practicable alternative. The Federal Highway Administration (FHWA) requirements for compliance are outlined in 23 CFR 650 Subpart A.

In order to comply, the following must be analyzed:

- The practicability of alternatives to any longitudinal encroachments.
- Risks of the action.
- Impacts on natural and beneficial floodplain values.
- Support of incompatible floodplain development.
- Measures to minimize floodplain impacts and to preserve/restore any beneficial floodplain values affected by the project.

The base floodplain is defined as "the area subject to flooding by the flood or tide having a one percent chance of being exceeded in any given year." An encroachment is defined as "an action within the limits of the base floodplain."

Affected Environment

The following text is based on the *I-80/I-680/SR-12 Interchange Project, Location Hydraulic Study & Summary Floodplain Encroachment Report* (LHS) prepared in 2011.

The project area is comprised of relatively flat grazing plains and rural open space with gently sloping hills adjacent to the I-80/I-680/SR-12 interchange. The Vaca Mountains lie to the north of Suisun Valley and Fairfield. Along the reach of the project, nine named creeks convey runoff to Suisun Bay to the South: American Canyon Creek, Jameson Creek, Green Valley Creek, Dan Wilson Creek, Suisun Creek, Raines Drain, Alonzo Drain, Ledgewood Creek, and Pennsylvania Avenue Creek.

Solano County, a central region of California, is characterized by a Mediterranean climate. Summer is dominated by subtropical high pressure cells, with dry sinking air capping a surface marine layer of varying humidity, making rainfall impossible or unlikely but for the odd thunderstorm. During winter, the polar jet stream and associated periodic storms reach into the lower latitudes of the Mediterranean zones, bringing approximately 95% of the total precipitation for the region.

The San Francisco Bay Regional Water Quality Control Board (RWQCB) lists this region as Area 2 of its domain. The San Francisco Bay RWQCB further notes that its rainy season is from October 15 to April 15. The California Irrigation Management System (CIMIS) station collects meteorological data and is located in Suisun Valley (Station Number 123). Minimum, mean and maximum monthly precipitation values from August 1994 through February 2010 are included in Table 3.2.1-1. Note that the minimum precipitation values are only the minimum value recorded on a single day within that month. Thus each month since 1994 had a least one day where no precipitation was recorded.

Table 3.2.1-1. Minimum, Mean and Maximum Monthly Precipitation from August 1994 to February 2010 in Suisun Valley (Station No. 123)

Month	Minimum	Mean	Maximum
January	0	0.17	2.46
February	0	0.16	3.66
March	0	0.08	1.78
April	0	0.08	1.83
May	0	0.06	2.12
June	0	0.00	0
July	0	0.00	0
August	0	0.00	0.34
September	0	0.00	0.36
October	0	0.03	4.03
November	0	0.07	2.45
December	0	0.16	5.34

Source: http://wwwcimis.water.ca.gov/cimis/welcome.jsp. Accessed: 3/8/2010.

The land gradually slopes south toward Suisun Bay and all drainages within the project limits drain to Suisun Bay. The area is composed of relatively flat grazing plains and rural open space with gently sloping hills adjacent to the I-80/I-680 interchange. The Vaca Mountains lie to the north of Suisun Valley and Fairfield. Along the reach of the project area, nine named creeks convey runoff to Suisun Bay to the south: American Canyon Creek, Jameson Canyon Creek, Green Valley Creek, Suisun Creek, Raines Drain, Alonzo Drain, Ledgewood Creek, and Pennsylvania Avenue Creek. Historically, agriculture has affected runoff patterns in the areas adjacent to the proposed project. There is extensive urban development in areas to the west and east of the project but not in the immediate project area.

The Federal Emergency Management Agency (FEMA) delineates flood zones on Flood Insurance Rate Maps (FIRMs) and each FIRM depicts specific flood zones based primarily on topography and the areas likelihood of flooding. A 100-year flood is a flood that has a 1% chance of being equaled or exceeded in any given year. Zone X flooding are areas determined to be outside the 0.2% annual chance floodplain. “Patterned” Zone X flooding are areas protected by levees from the 1% annual chance flooding; or areas subject to 1% annual chance flooding with average depths less than 1-foot, or with drainage areas less than one square mile; or Areas of 0.2% annual chance flooding. Zone A is an area subject to 1% annual flooding that does not have flood elevations or depths defined. Zone AE is defined as areas subject to 1% annual flooding with base flood elevations determined. Figures 3.2.1-1 through 3.2.1-7 are each individual maps of the multiple flood zones along the project alignment.

American Canyon Creek

The American Canyon Creek drainage area is approximately 6.8 square miles at I-680, flowing east. The 100-year flow rate at the I-680 crossing is approximately 1,250 cubic feet per second (cfs). At I-680, American Canyon Creek passes under the freeway in a double box culvert; each cell is 12 feet wide. The 100-year flood is conveyed through the highway bridge without flooding the highway, as shown on the FEMA FIRMs. The most recent modifications to the FEMA-defined floodplain for American Canyon Creek are shown on FEMA mapping dated May 4, 2009. The reach of the creek that crosses I-680 was studied with approximate methods, and shows the 100-year floodplain as Zone A contained within the waterway upstream of the freeway and crossing under the freeway completely contained in the bridge crossing through the double 12-foot-wide reinforced concrete box (Figure 3.2.1-1).

Jameson Canyon Creek

The Jameson Canyon Creek drainage area is approximately 4.2 square miles at I-680, flowing east. The 100-year flow rate at the I-680 crossing is approximately 750 cfs. At I-680, Jameson Canyon Creek passes under the freeway in a double box culvert. The 100-year flood is conveyed through the highway bridge without flooding the highway, as shown on the FEMA FIRMs. The most recent modifications to the FEMA-defined floodplain for Jameson Canyon Creek are shown on FEMA mapping dated May 4, 2009. The reach of the creek between I-680 and I-80 was studied with approximate methods, and shows the 100-year floodplain as Zone A contained within the waterway and crossing under each freeway completely contained in the bridge crossings at I80 and I-680 (Figure 3.2.1-2). The culverts at I-80 and I-680 will be extended to accommodate the widened freeways.

Green Valley Creek

The Green Valley Creek drainage area is approximately 17.8 square miles at I-80, flowing south. The 100-year flow rate at I-80 crossing is 3300 cfs. Near I-80, Green Valley Creek passes under a series of bridges: the Green Valley Road crossing just north of I-80, four bridges that are part of the freeway crossing, and the Central Way Bridge immediately south of the freeway. The most recent modifications to the FEMA-defined floodplain for Green Valley Creek are shown on FEMA mapping dated May 4, 2009. The reach of the creek that crosses I-80 was studied with detailed methods, and shows the 100-year floodplain as Zone AE contained within the waterway upstream of the freeway and crossing under the freeway completely contained within the multiple multi-span bridge crossings (Figure 3.2.1-3). Farther downstream of I-80, the 100-year floodplain exceeds the channel banks. For this reach, including a portion of I-80, FEMA has also identified a “patterned” Zone X to indicate an area protected by levees from 1% annual chance flooding (Figure 3.2.1-3).

Dan Wilson Creek

Dan Wilson Creek flows south with a drainage area at I-80 that is approximately 4.6 square miles. Upstream of I-80, flows in Dan Wilson Creek can be diverted to two detention basins located just west of the creek. These detention basins release back into the creek. Levees line the creek and approximately 190 meters of I-80 just to the west of the creek. The floodplain also receives overflows from Suisun Creek located east of Dan Wilson Creek. Dan Wilson Creek floods when the water surface elevation of the creek reaches an elevation of approximately 29.5 feet. The most recent modifications to the FEMA-defined floodplain for Dan Wilson Creek are shown on FEMA mapping dated May 4, 2009. The reach of the creek that crosses I-80 was

studied with detailed methods, and shows the 100-year floodplain as Zone AE (Figure 3.2.1-4). Both upstream and downstream of I-80, portions of the 100-year floodplain exceed the channel banks. At the freeway, the 100-year runoff is completely contained within the multiple multi-span bridge crossings. Since the most recent levee improvements were made along the west bank north of I-80, FEMA has revised the flooding maps to show the 100-year runoff in Dan Wilson as contained by the existing highway bridge with no flooding onto the highway traveled way. A small area north of I-80 and west of the creek is identified as patterned Zone X, an area protected by levees (Figure 3.2.1-4).

Suisun Creek and Raines Drain

Beginning at Lake Curry to the north, the Suisun Creek watershed area is approximately 48.8 square miles. During historic flooding, water from Suisun Creek has overflowed to Ledgewood Creek near the most northern crossing of Suisun Valley Road. One-hundred-year overtopping occurs near the most southern crossing with Suisun Valley Road and flows to Dan Wilson Creek to the west and Raines Drain to the east.

During a 100-year runoff event, Suisun Creek exceeds its bank capacity farther upstream from the highway. Overtopping flows go to Ledgewood Creek and Raines Drain to the east and to Dan Wilson Creek to the west. At the highway, the flow that still remains within the banks of Suisun Creek passes through the highway bridge without additional flooding. Flood flows do not encroach on the highway traveled way at Suisun Creek Bridge. However, those 100-year flows that leave Suisun Creek and flow to Raines Drain, combine with runoff from the Raines Drain Watershed and overtopping flows from the upper reaches of Ledgewood Creek, and overtop the I-80 Freeway. FEMA has designated this area as a “Patterned” Zone X, indicating there is flooding up to a depth of one foot during the 100-year event (Figure 3.2.1-5).

The Raines Drain watershed has a watershed size of 2.3 square miles at I-80. The watershed, located just east of Suisun Creek and south of Ledgewood Creek, collects runoff from local agricultural lands and from over-bank flows from Suisun Creek and Ledgewood Creek during extreme events.

Raines Drain refers to a trapezoidal, concrete-lined ditch that begins at Rockville Road and extends southward across the agricultural floodplain to I-80. At I-80 the ditch transitions to a 66-inch-diameter reinforced concrete pipe (RCP) and then to a 60-inch-diameter RCP under the freeway. In addition to the main culvert at I-80, there is a 42-inch culvert constructed in 1986, and two more 42-inch culverts installed in the 1960s. However, one of the 42-inch culverts is currently closed off on both ends. On the southern side of I-80, all the pipes transition back to a trapezoidal concrete-lined channel.

The 100-year flow in Suisun Creek passes under the I-80 bridge without flooding the highway. The 100-year flood elevation is 36 feet just upstream of the bridge and the low point roadway elevation is 39 feet. However, at several locations within four miles upstream of I-80, 100-year flows escape from the banks of Suisun Creek, flowing away from the creek toward Raines Drain. Some of these flood flows encounter the I-80 embankment at Raines Drain. The capacity of the Raines Drain cross culverts is not sufficient to carry the 100-year flood flows (including those escaping Suisun Creek) beneath the highway, causing flood flows to overtop the highway at Raines Drain, as defined on the FEMA FIRMs. The freeway low point elevation at Raines Drain

is 34.4 feet. The FEMA maps do not indicate a floodplain elevation at this location, but indicate that the flooding is less than one foot deep (Figure 3.2.1-5).

Alonzo Drain

The Alonzo Drain watershed upstream from I-80 and SR 12E is bounded by Raines Drain to the west and Ledgewood Creek to the north and east. The watershed collects runoff from local agricultural lands and from over-bank flows from Ledgewood Creek and Suisun Creek during extreme events.

The existing waterway crossing under I-80 consists of a single 48-inch RCP with collector ditches north of the highway leading to the culvert. South of the highway is a series of storm drains owned by the City of Fairfield that connects the 48-inch RCP to a large trapezoidal channel with a 100-year capacity. The trapezoidal channel was constructed in the 1980s to convey the 100-year flow in Alonzo Drain, including overflows from Ledgewood Creek. Approximately one mile farther downstream, the improved Alonzo Drain crosses SR 12E in a six-cell 60-foot-wide RCB and joins Ledgewood Creek just east of Beck Avenue. The City of Fairfield indicated that the trapezoidal channel was designed for a 100-year flow of 2,500 cubic feet per second.

The existing 48-inch culvert under the I-80 does not have the hydraulic capacity to convey the 100-year runoff from the direct watershed and the overflows from Ledgewood Creek. FEMA identifies this area of 100-year flooding as Zone AO, with 1-foot-deep flooding (deeper flooding may exist in local low-lying areas) (Figure 3.2.1-6).

FEMA has not performed hydraulic calculations or prepared flood profiles for Alonzo Drain. West Yost & Associates has prepared a separate report for the Solano County Water Agency that includes hydrologic and hydraulic calculations for Alonzo Drain, identifying the manner and frequency of overtopping of I-80 (West Yost & Associates 1999).

I-80 flooding in the area of Alonzo Drain and Ledgewood Creek has occurred as recently as December 31, 2005, closing westbound I-80 traffic for several hours. This highway flooding is attributable to the deficiencies at the Alonzo Drain I-80 crossing and to overtopping of Ledgewood Creek upstream of I-80. The FEMA maps indicate flood flows overtopping the highway, but the presence of a 3-foot-high concrete median barrier inhibits overtopping flows, causing ponded upstream flows to seek relief toward the Ledgewood Creek Bridge to the east.

The most recent modifications to the FEMA defined floodplain for Alonzo Drain are shown on FEMA mapping dated May 4, 2009. The reach of the creek that crosses SR 12 was studied with approximate methods, and shows the 100-year floodplain as Zone AO (depth one foot) flowing across the location of SR 12E (Figure 3.2.1-6). This analysis of the Alonzo floodplain was performed before this reach of SR 12E was improved to current conditions and before the Alonzo Drain was improved between I-80 on the upstream end to downstream of SR 12E and Beck Avenue to the confluence with Ledgewood Creek. It is understood by Solano County and the Solano County Water District that the current improvements to Alonzo Drain between I-80 and SR 12E and downstream of SR12E are sufficient to convey the peak 100-year flow.

Ledgewood Creek

The Ledgewood Creek drainage area at I-80 is approximately 16.8 square miles (Figure 3.2.1-6). At SR 12, the Ledgewood Creek drainage area is about 0.5 square miles greater. Far upstream of I-80, Ledgewood Creek receives overflows from Suisun Creek during a 100-year runoff event. South of where overflows are received from Suisun Creek (and still upstream from I-80), overflows escape from Ledgewood Creek, flowing to the west and south to join with the Alonzo Drain and Raines Drain at the highway crossing.

At I-80, the flow that still remains within the banks of Ledgewood Creek passes through the highway bridge without additional flooding. Flood flows do not encroach on the I-80 traveled way at Ledgewood Creek Bridge. While there has been flooding of the highway in the area of Ledgewood Creek as recently as December 31, 2005, this flooding is attributable to the deficiencies at the Alonzo Drain highway crossing and the fact that Ledgewood Creek overtopped upstream of I-80. At SR 12E, Ledgewood Creek crosses the highway in a five-cell 75-foot-wide RCB.

The most recent modifications to the FEMA-defined floodplain for Ledgewood Creek are shown on FEMA mapping dated May 4, 2009. The reach of the creek that crosses SR 12E was studied with detailed methods, and shows the 100-year floodplain as Zone AE contained within the waterway upstream of the freeway and crossing under the freeway completely contained within the existing bridge crossings (Figure 3.2.1-6). Farther downstream of SR 12E, the 100-year floodplain is shown within the stream banks. However, the FEMA maps show a Zone AO (depth one foot) flooding beyond the Ledgewood stream banks beginning just upstream of SR 12E and extending far downstream of the highway. The *Summary Floodplain Encroachment Report* does not state if this flood depth is from overflows or mixing of Alonzo Drain, Ledgewood Creek, and/or Pennsylvania Avenue Creek. Flooding of Ledgewood Creek has occurred as recently as December 31, 2005 at I-80 and reaches both upstream and downstream of I-80, but no flooding was observed at the SR 12E crossing of Ledgewood Creek.

Pennsylvania Avenue Creek

The Pennsylvania Creek watershed area at SR 12E is approximately 3.2 square miles. Pennsylvania Avenue Creek crosses under SR 12E in a triple cell box culvert. The FEMA FIRMs indicate that the 100-year flow is contained in the culverts located in Pennsylvania Avenue upstream of SR 12, however the same flood maps indicate that the 100-year flooding inundates SR 12E.

The most recent modifications to the FEMA-defined floodplain for Pennsylvania Avenue Creek are shown on FEMA mapping dated May 4, 2009. The reach of the creek that crosses SR 12E was studied with detailed methods, and shows the 100-year floodplain as Zone AE to a point just upstream of SR 12E (Figure 3.2.1-7). At this point, the 100-year flood is completely contained in the existing culvert upstream of the highway. However, downstream of SR 12E and immediately upstream, the FEMA maps show a Zone AO (1-foot depth) flooding to the west of Pennsylvania Avenue Creek and Zone AE (elevation ten feet) to the east of the creek. It is not known if these flood depths and elevations are from overflows or mixing of Alonzo Drain, Ledgewood Creek, and/or Pennsylvania Avenue Creek.

Finally, The FEMA profile gives a roadway elevation of 10.1 feet. Current topographic mapping (using the same datum) indicates the roadway is just below elevation 13.0 feet. The current understanding is that the existing triple box culvert is sufficient to carry the 100-year flow. The existing box culvert will be extended as appropriate for the project improvements.

Environmental Consequences

The project alternatives would not involve construction of housing in the local 100-year floodplain. The truck scale facility structures would be elevated above the floodplain. The project alternatives will not result in a significant encroachment on the floodplains. The project alternatives are not downstream of any dams or large bodies of water (as it is located approximately 15 miles north of Suisun Bay) and would not pose any risk of flooding hazards as a result of dam failure. Although levees line some of the creeks that cross under the highway, the risk of a levee failure significantly affecting people or structures would be low. The project area is located in an area of relatively flat topography that is not near any large bodies of water. The potential for a seiche, tsunami, or mudflow is low.

The LHS concluded that the project alternatives would not affect the hydraulic capacity or floodplain of American Canyon Creek and Jameson Creek, the existing culvert waterway crossings are intended to be extended in-kind, not replaced. Therefore, these creeks are not discussed further. Table 3.2.1-2 summarizes floodplain impacts by creek.

Table 3.2.1-2. Floodplain Summary Table

Waterway	Within Alternative Limits	Affected by the Project
American Canyon Creek	All	
Jameson Canyon Creek	All	
Green Valley Creek	All	✓
Dan Wilson Creek	B, C, B1	✓
Suisun Creek	B, C	✓
Raines Drain	B, C	✓
Alonzo Drain	All	✓
Ledgewood Creek	All	✓
Pennsylvania Avenue Creek	B, C	✓

Coordination on the existing conditions and the potential project impacts on the existing waterways and floodplains of Suisun Creek and Raines Drain has included specific discussions with Caltrans District 4 Hydraulics office, the County of Solano, the Solano County Water District and the Solano Irrigation District.

Hydraulic Capacity and Floodplain of Green Valley Creek

With the use of levees, the 100-year flow is currently contained within Green Valley Creek. Major reconstruction of this waterway crossing would occur under both alternatives. However, as discussed below, the reconstruction would improve flow characteristics in such a manner that there would be no adverse effect to the 50-year or 100-year hydraulic conditions:

- The five existing waterway bridges would be removed, including the numerous columns and pier walls in the active waterway.
- The new low-elevation bridges (four under Alternative B and three under Alternative C) would be longer than the existing bridges, and would clear-span the waterway above the 100-year water surface elevation.
- The four high-elevation bridges proposed in Alternative B would be constructed with no columns in the active waterway.
- The side slopes and bottom of the existing Green Valley Creek would be restored to a more natural condition than that of the existing waterway.
- There are no planned longitudinal encroachments to the Green Valley Creek floodplain.
- Currently, the 100-year flow is contained within Green Valley Creek and the proposed project would not change these conditions.
- The project will not increase the base floodplain elevation.

Under the No-Build Alternative, no changes would be made to Green Valley Creek or the bridges that cross it, and therefore there would be no change in the hydraulic capacity and floodplain of Green Valley Creek.

Hydraulic Capacity and Floodplain of Dan Wilson Creek

Reconstruction of the Dan Wilson Creek waterway crossing would occur under Alternative B, Alternative C, and Alternative B, Phase 1. However, as discussed below, the planned improvements would improve flow characteristics in such a manner that there would be no adverse effect to the 50-year or 100-year hydraulic conditions:

- The existing waterway bridge would be removed, including the numerous columns and pier walls in the active waterway.
- The new bridge would clear-span the waterway, be longer than the existing bridge, and be placed above the 100-year water surface elevation.
- The side slopes and bottom of the existing Dan Wilson Creek would be restored to a more natural condition than the existing waterway.
- There are no planned longitudinal encroachments to the Dan Wilson Creek floodplain.
- The project will not increase the base floodplain elevation.

There would be no changes to the Dan Wilson Creek Crossing under Alternative C, Phase 1 and under the No-Build Alternative and therefore there would be no potential to change the hydraulic capacity or floodplain.

Hydraulic Capacity and Floodplain of Suisun Creek

The 50-year design flood and the 100-year base flood are both contained within Suisun Creek. Reconstruction of the Suisun Creek waterway crossing would occur under both alternatives. However, as discussed below, the planned improvements would improve flow characteristics in such a manner that there would be no adverse effect to the 50-year or 100-year hydraulic conditions:

- The existing highway bridge is three spans wide and 72 feet long (in the direction of traffic). The new Suisun Creek bridge would be significantly longer at 110 feet and would clear-span the creek.
- Additionally, both alternatives include an adjacent bridge that would carry the westbound truck scales on-ramp to I-80.
- The Suisun Creek side slopes and bottom would not be affected by the new Suisun Creek bridges, and there are no planned modifications to Suisun Creek.
- Soffit elevations for all bridges would be placed above the existing FEMA 100-year flow elevation.
- There are no planned longitudinal encroachments to the floodplain.
- The project will not increase the base floodplain elevation.

No changes to Suisun Creek or the creek crossing are proposed under the fundable first phase of either alternative or the No-Build Alternative, and therefore there would be no change in the hydraulic capacity at that location.

Hydraulic Capacity and Floodplain of Raines Drain

The location where Raines Drain crosses the highway is a low point in the highway's vertical profile. Originally constructed for irrigation purposes, Raines Drain also serves as a storm drain. The waterway crossing consists of four culverts ranging in size from 18 inches to 66 inches in diameter. One of the 42-inch culverts is blocked at both the upstream and downstream ends per agreement between the Department and the Solano Irrigation District. At I-80, the lined ditch enters a 66-inch diameter reinforced concrete pipe from the north highway right-of-way, connecting to a 60-inch diameter reinforced concrete pipe that crosses under the freeway mainline. In addition to the main culvert at I-80, there is also a 42-inch culvert constructed in 1986 (more recently blocked to flow), and two additional 42-inch culverts installed in the 1960s. On the southern side of I-80, all the pipes transition back to a trapezoidal concrete-lined channel.

This section of the I-80 has been evaluated for a 50-year event consistent with correspondence from FHWA (see Appendix H). WRECO prepared a separate report for the Department, District 4, which includes detailed hydrologic and hydraulic calculations for Raines Drain, identifying the manner and frequency of highway overtopping under existing conditions (WRECO 2003). According to the LHS, water would encroach on the traveled way beginning at elevation 33.5 feet, and begin to overtop the highway at the low-point elevation of approximately 34.4 feet. According to the WRECO report, for the 50-year event depths of flow on the roadway were estimated to be a maximum of 1.5 feet in the westbound lanes and about 0.5 foot in the eastbound lanes. The capacity of the existing Raines Drain culverts is 355 cfs with surcharge

elevation to the edge of existing pavement, and 470 cfs with surcharge elevation to the overtopping elevation; compared to the 50-year peak flow of 925 cfs.[1] In other words, existing conditions can barely convey half of the 50-year peak flow of 925 cfs. This stated 50-year flood event for Raines Drain includes flood overflows from Suisun Creek in addition to the direct Raines Drain watershed. Even more flows (not identified here) could contribute from the upper Ledgewood Creek.

Under both alternatives, two features of the proposed project would result in impacts on the existing floodplain:

1. The centerline elevation of the reconstructed mainline roadway would be approximately three feet higher than the existing condition. If the freeway elevation were raised without increasing the capacity of the culverts or other mitigation, flood waters would rise to a higher elevation (up to three feet higher) upstream of the freeway before overtopping the roadway resulting in increased ponding elevation upstream. However, if additional culvert capacity were constructed without peak flow mitigation, more frequent and severe flooding might occur downstream because the reduction in peak flow attenuation from the existing upstream ponding.
2. The construction of the relocated westbound truck scales and associated on- and off-ramps will reduce the attenuation potential of the existing upstream condition by filling an area subject to shallow flooding, or ponding upstream of the freeway. Without the existing attenuation potential, peak runoff events may increase downstream of the freeway.

As part of the project, an upstream inlet and underground stable cavities (for stormwater storage) would be constructed beneath the new westbound truck scale facility. This would minimize changes in condition of floodplain of Suisun Creek and Raines Drain as a result of project operation. If possible, construction would occur during the dry season to minimize the effects to water quality and would be completed prior to operation of the proposed project. These structures would allow flooding up to the existing elevation of overtopping without increasing the flow passing under the freeway. Flows in excess of the overtopping event would be captured in a separate inlet structure upstream of the freeway. That inlet structure would mimic the manner and capacity of flows that overtop the existing freeway. These captured excess flows would be conveyed under the freeway and released on the downstream side of the freeway via a lateral structure to redistribute the flows across the existing floodplain. In addition, stable cavities would be created beneath the truck scale that would mitigate the reduction of floodplain storage from the placement of fill material in the floodplain.[2]

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[1] A separate Suisun Floodplain study is being conducted jointly by the Solano Transportation Authority and the Solano County Water Agency. Preliminary data from this study indicate that peak 50-year storm flows may be substantially greater than 925 cfs and may be closer to 6,450 cfs at the Raines Drain crossing of I-80. This separate study is a regional flood control study intended to identify flooding impacts, potential improvements, and benefits in the lower Suisun Creek, Ledgewood Creek, Dan Wilson, Raines Drain, and Alonzo Drain. The Raines Drain crossing of I-80 is one of several benefitted locations. The Location Hydraulic Study Form and Summary Floodplain Encroachment Report have been updated and resubmitted with this additional information.

[2] If the Suisun Floodplain study currently underway confirms that the 50-year peak flood flows are substantially greater than 925 cfs (increased to 6,450 cfs), the stormwater conveyance improvements proposed as part of the project would require upsizing to provide additional storm conveyance under I-80 and avoid increasing the flood elevations on adjacent properties. The potentially upsized drainage facilities would be placed within the proposed project right-of-way.

Stable cavities are meant to be spaces, vaults or other below ground storage devices for storm runoff intended to mitigate for lost floodplain storage. The cavities will not impact the groundwater because they are intended to be placed at or above the existing ground elevation within the new fill for the westbound truck sales.

Additionally, over-excavation in open areas within the project limits would also create additional storage to offset the additional fill material, ultimately increasing the size of the floodplain and minimizing the effect of the proposed project on the floodplain.

Construction of upstream inlet structures, new highway cross culverts, an outlet structure, and stable cavities would ensure that this effect would not be adverse. Both alternatives would not increase the 50-year floodplain elevation.

No changes to Raines Drain are proposed under the fundable first phase of either alternative or the No-Build Alternative, and therefore, there would be no change in the hydraulic capacity at that location.

Hydraulic Capacity and Floodplain of Alonzo Drain and Ledgewood Creek

The LHS concluded that the project alternatives would not affect the Alonzo Drain or Ledgewood Creek floodplain for the following reasons:

- The improvements across SR 12E include minor widening.
- The multi-cell box culvert at Beck Avenue would be replaced with a significantly elevated clear span structure, improving the hydraulics at that crossing.
- The existing floodplain is completely contained in the existing Alonzo Drain and Ledgewood Creek RCBs under SR 12E.
- The existing RCB at Alonzo Drain would be lengthened 30 feet in both the upstream and downstream directions under Alternative B, Alternative B, Phase 1, and Alternative C. Under Alternative C, Phase 1, the RCB would be lengthened 30 feet in the downstream direction only.
- Between the SR 12E crossing and the Beck Avenue Crossing there would be a slight encroachment to the left channel bank with the construction of the Beck Avenue off ramp. This is a man-made reach of Alonzo Drain that is sized to allow the existing earth-side slope to be modified to a vertical embankment or retaining wall. This would be a minimal effect on the very wide trapezoidal channel.
- As with the removal of the RCB at Beck Avenue, the existing waterway would be returned to a more natural state.
- Improvements to the Ledgewood Creek crossing on SR 12E include minor widening on both the upstream and downstream ends for Alternative B, Alternative B, Phase 1, and Alternative C; and only downstream widening for Alternative C, Phase 1.
- The existing RCB on Ledgewood Creek would be lengthened 15 feet in both the upstream and downstream directions under Alternative B and 45 feet in both directions under Alternative C.

- Over Ledgewood Creek, Alternative B has two additional bridges for collector roads, one immediately upstream and one immediately downstream of the widened mainline. The upstream bridge would be a three-span bridge 244 feet long, significantly longer than the existing 85-foot bridge. The downstream bridge would be two-span bridge 164 feet long, also significantly longer than the existing 85-foot bridge.
- There are no planned modifications to Ledgewood Creek except for the RCB extension.
- The project will not increase the base floodplain elevation to either Alonzo or Ledgewood creeks.

No changes to Alonzo Drain and Ledgewood Creek are proposed under the No-Build Alternative, and therefore, there would be no change in the hydraulic capacity and floodplain at that location.

Hydraulic Capacity and Floodplain of Pennsylvania Avenue Creek

The LHS concluded that the project alternatives would not affect the Pennsylvania Avenue Creek hydraulic capacity and floodplain under either Alternative B or Alternative C for the following reasons:

- The 100-year floodplain AE Zone is completely contained in the existing triple cell box culverts located in Pennsylvania Avenue just upstream of SR 12E. The 100-year elevation at the upstream side of SR 12 is 11 feet, and ten feet at downstream side. Though the FEMA maps indicate overtopping flooding of the culverts crossing SR-12, it is understood that the current condition of this crossing is that the existing triple box culvert is sufficient to convey the 100-year flood under the freeway.
- Immediately east of the Pennsylvania Avenue Creek crossing of SR-12 are ten small diameter culverts that drain a small isolated area across the freeway. These several culverts will be extended to match the highway improvements.
- For Alternative B, the cross culvert under SR 12E would be extended. A new culvert would be added under the proposed Meyer Way Extension.
- For Alternative C, the cross culvert under SR 12E would be extended upstream (with a possible gap within the loop ramp), connecting to the existing culvert in Pennsylvania Avenue, and extended downstream to clear the mainline widening. A new culvert would be added under the proposed connector street.
- There are no planned modifications to the natural portions of Pennsylvania Avenue Creek except for the new and extended culvert.
- There are no planned longitudinal encroachments to the floodplain.
- The project will not increase the base floodplain elevation.

No construction is proposed in this area under the fundable first phase of either alternative or under the No-Build Alternative and therefore, there would be no change in the hydraulic capacity at this location.

Avoidance, Minimization, and/or Mitigation Measures

The project alternatives have no potential to result in a significant encroachment on the floodplains. For the Raines Drain area, the two features of Alternative B and C would result in impacts on the existing floodplain, however, the proposed construction of an upstream inlet and underground stable cavities for stormwater storage beneath the new westbound truck scale facility would minimize changes in conditions of the floodplain.

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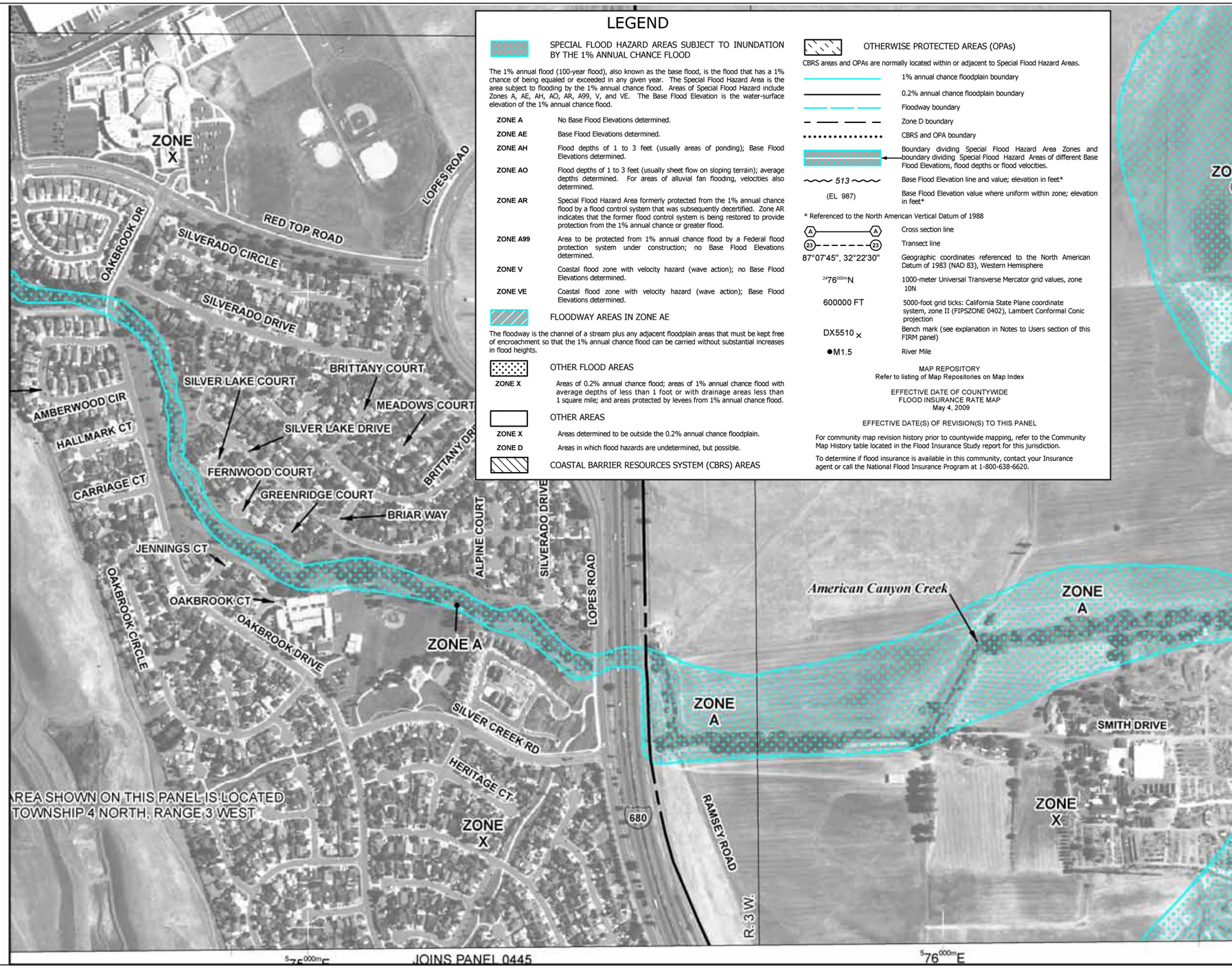

Figure 3.2.1-1
100-Year Floodplains

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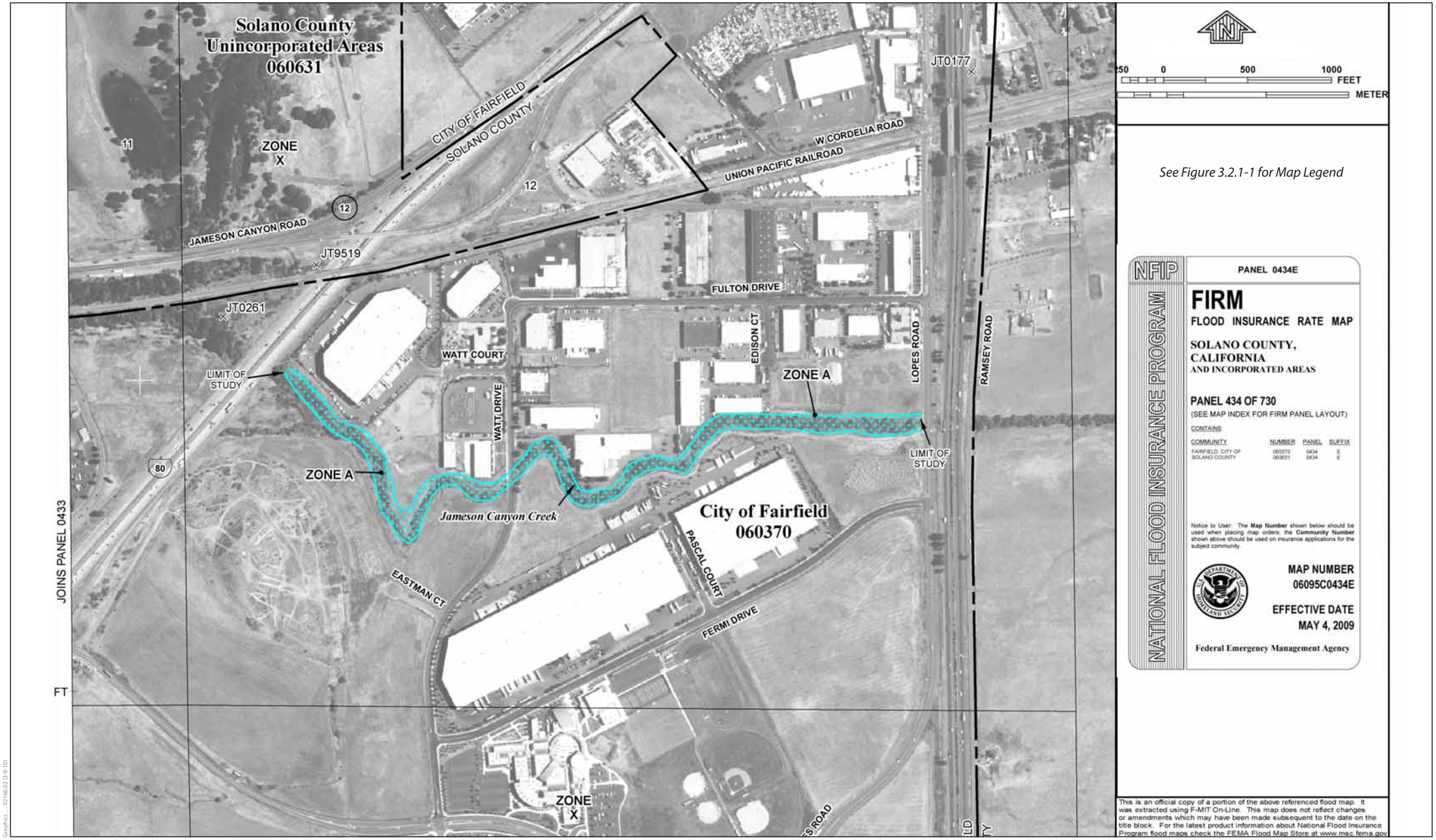

Figure 3.2.1-2
100-Year Floodplains

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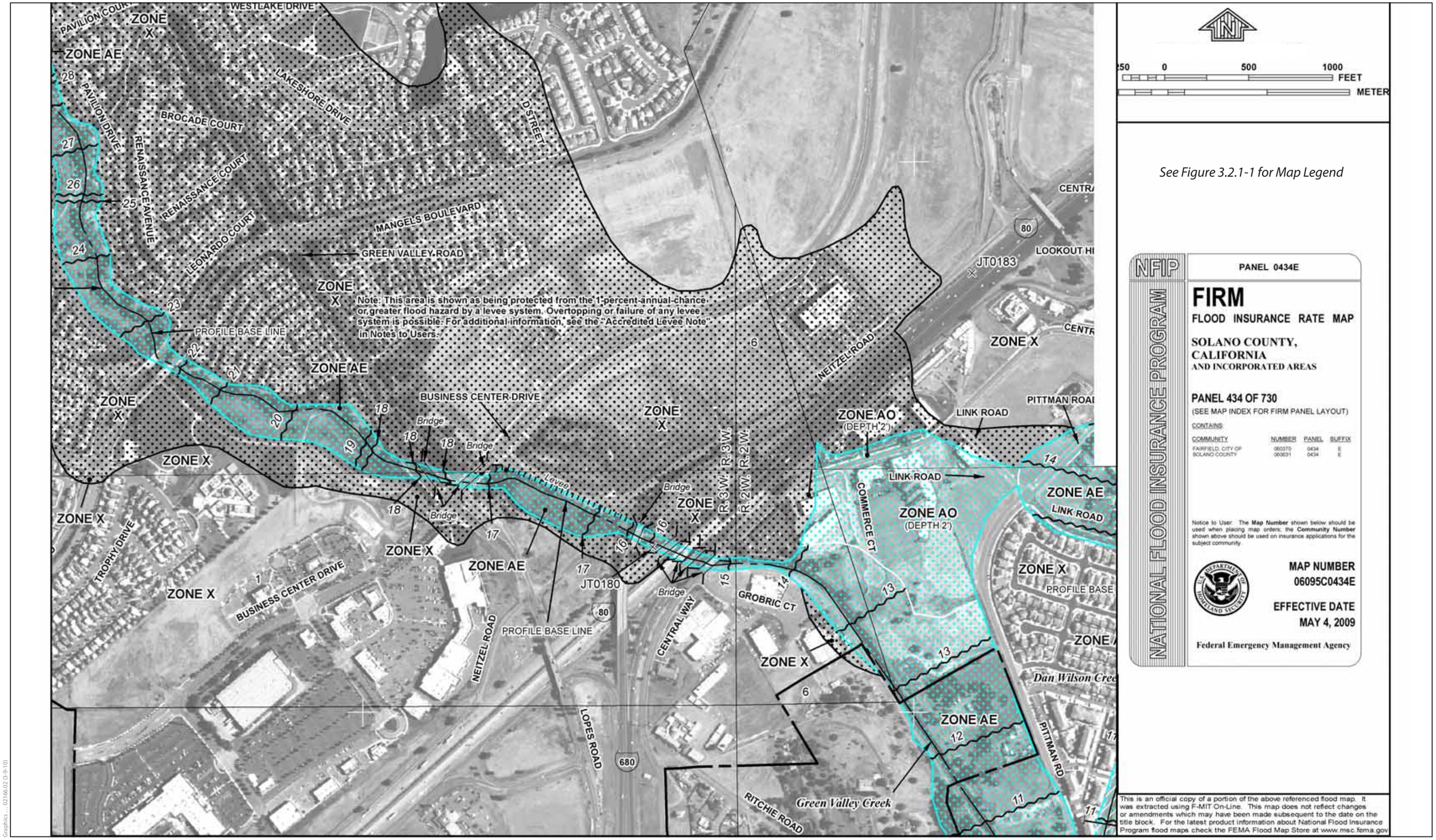

See Figure 3.2.1-1 for Map Legend

Figure 3.2.1-3
100-Year Floodplains

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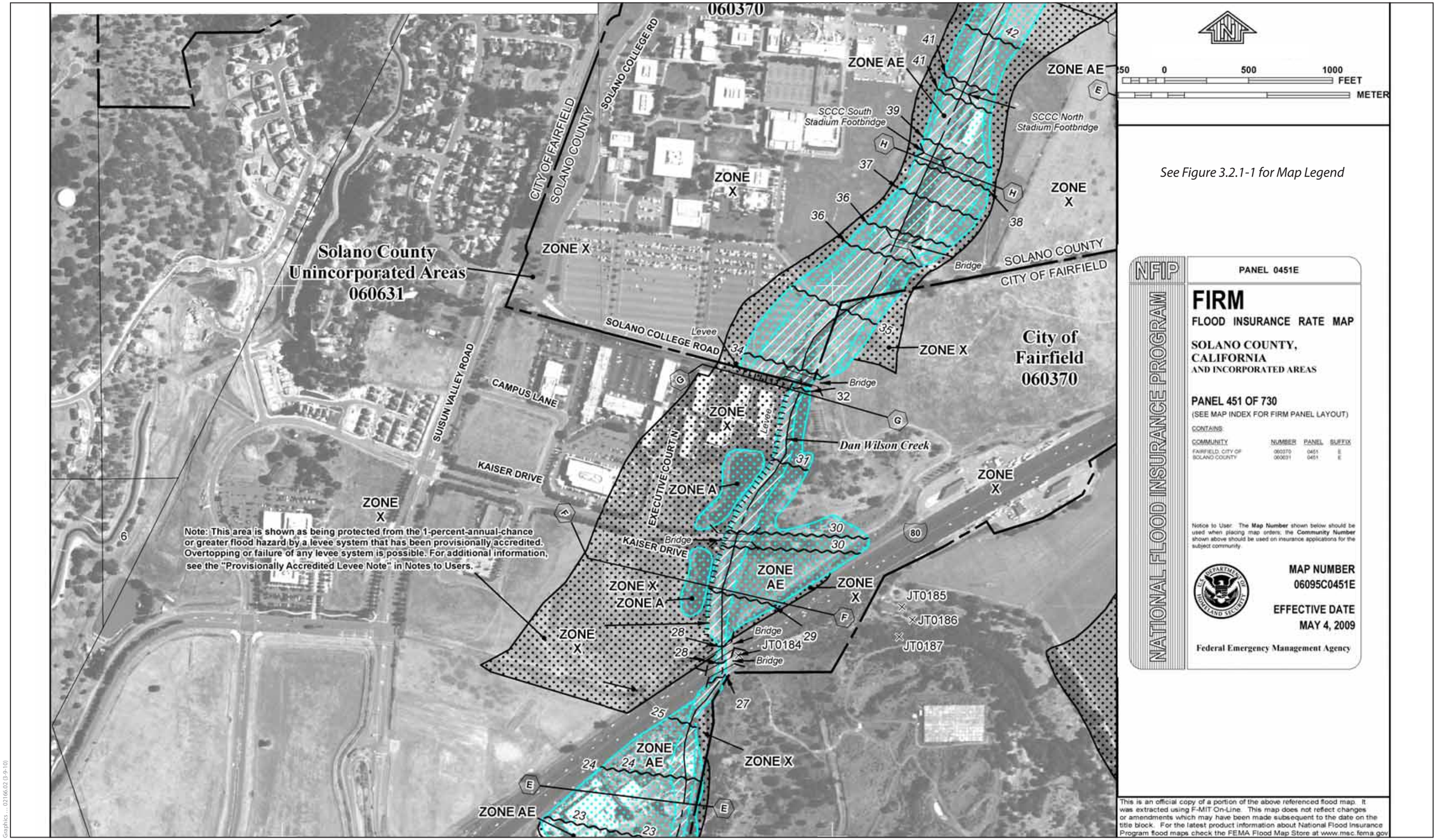

Figure 3.2.1-4
100-Year Floodplains

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Figure 3.2.1-5
100-Year Floodplains

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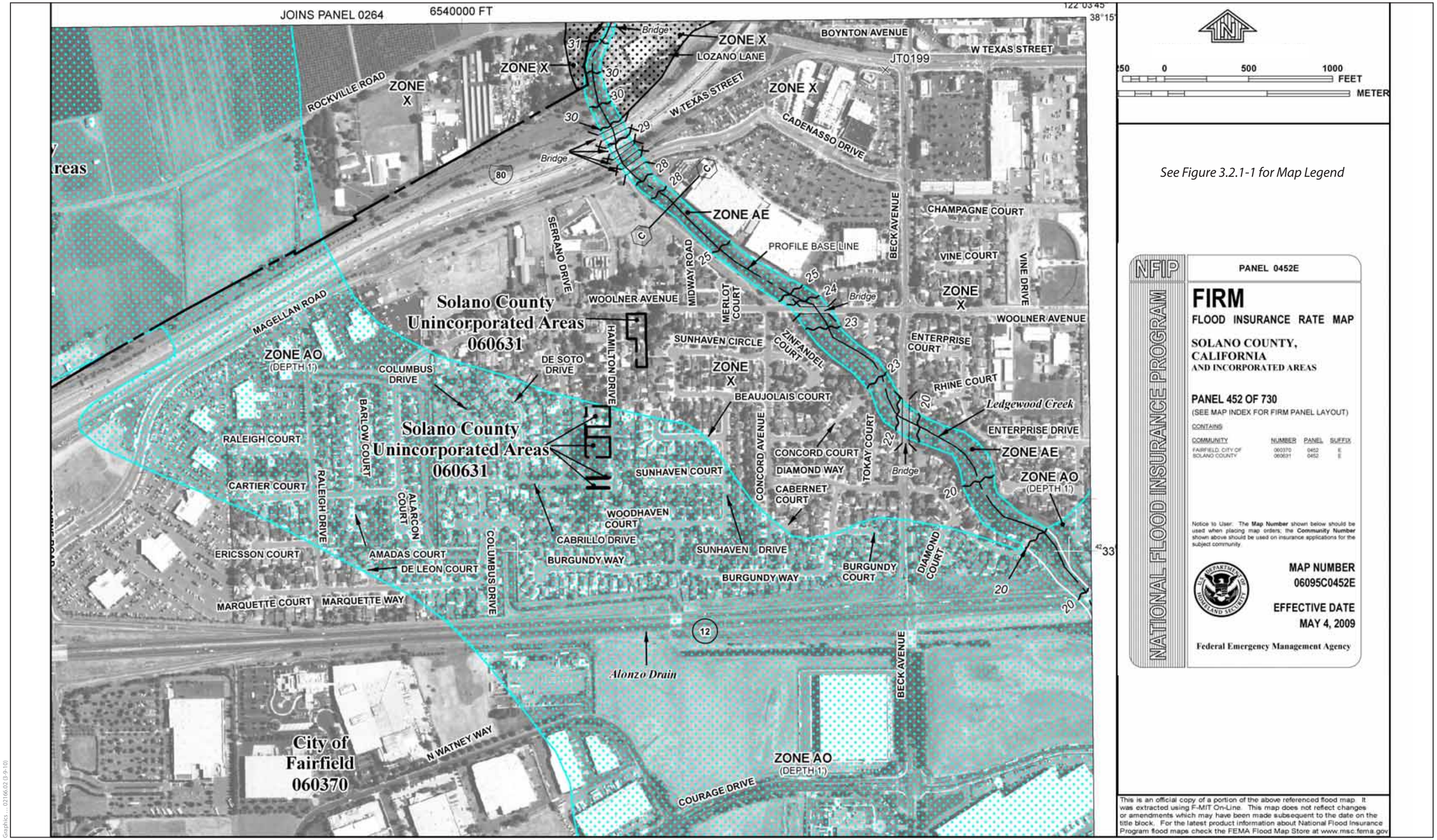

Figure 3.2.1-6
100-Year Floodplains

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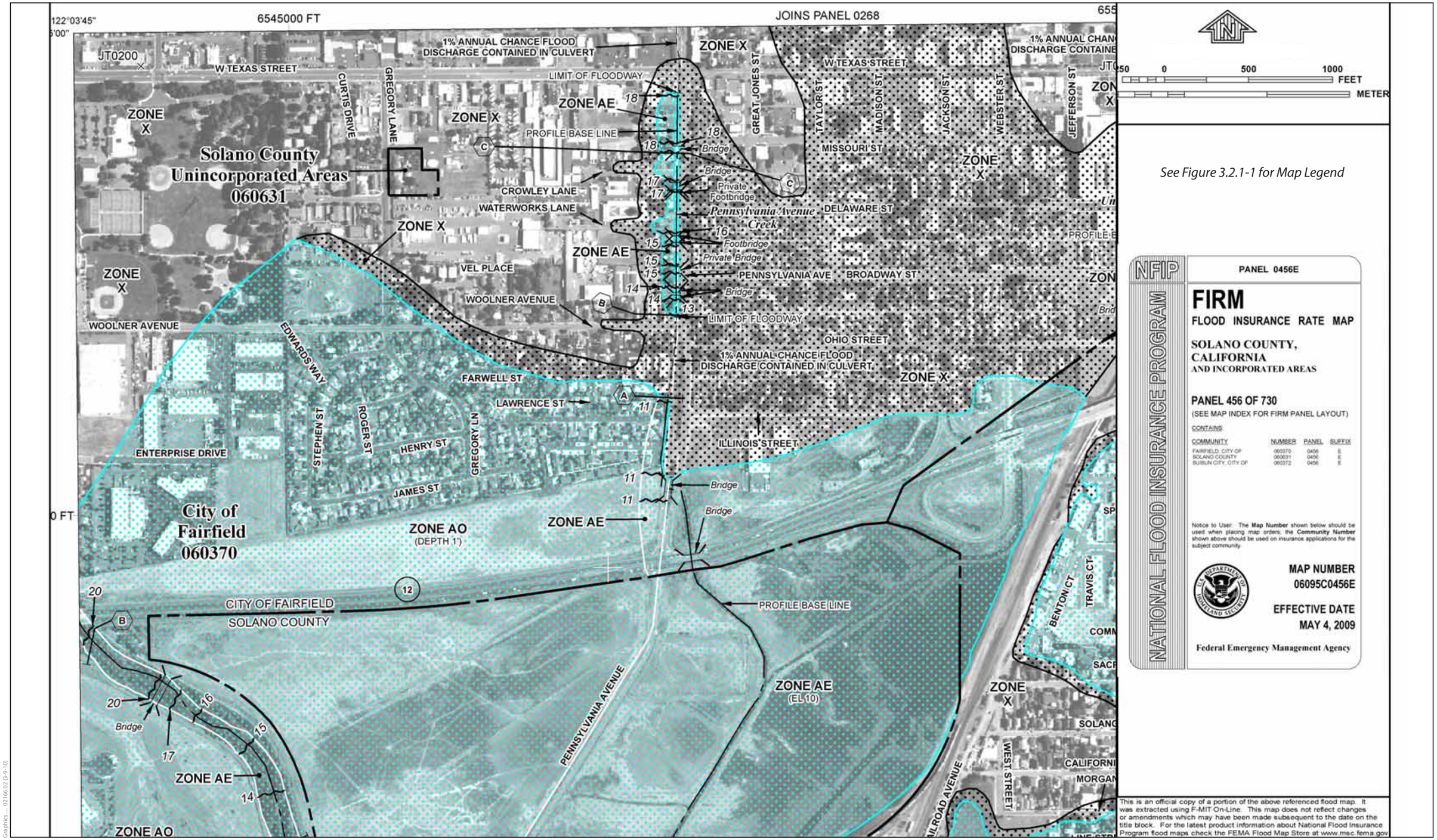

Figure 3.2.1-7
100-Year Floodplains

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3.2.2 Water Quality and Stormwater Runoff

Regulatory Setting

Federal Requirements: Clean Water Act

In 1972 Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to the waters of the United States (U.S.) from any point source unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. Known today as the Clean Water Act (CWA), Congress has amended it several times. In the 1987 amendments, Congress directed dischargers of storm water from municipal and industrial/construction point sources to comply with the NPDES permit scheme. Important CWA sections are:

- Sections 303 and 304 require states to promulgate water quality standards, criteria, and guidelines.
- Section 401 requires an applicant for any federal license or permit to conduct any activity, which may result in a discharge to waters of the U.S. to obtain certification from the State that the discharge will comply with other provisions of the act. [Most frequently required in tandem with a Section 404 permit request. See below.]
- Section 402 establishes the NPDES, a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. Regional Water Quality Control Boards (RWQCB) administer this permitting program in California. Section 402(p) requires permits for discharges of storm water from industrial/construction and municipal separate storm sewer systems (MS4s).
- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the U.S. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

USACE issues two types of 404 permits: Standard and General permits. There are two types of General permits, Regional permits and Nationwide permits. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to authorize a variety of minor project activities with no more than minimal effects.

There are two types of Standard permits: Individual permits and Letters of Permission. Ordinarily, projects that do not meet the criteria for a Nationwide Permit may be permitted under one of USACE's Standard permits. For Standard permits, the USACE decision to approve is based on compliance with U.S. EPA's Section 404 (b)(1) Guidelines (U.S. EPA CFR 40 Part 230), and whether permit approval is in the public interest. The Section 404(b)(1) Guidelines were developed by the U.S. EPA in conjunction with USACE, and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable

alternative which would have less adverse effects. The Guidelines state that USACE may not issue a permit if there is a least environmentally damaging practicable alternative (LEDPA), to the proposed discharge that would have lesser effects on waters of the U.S. and not have any other significant adverse environmental consequences. Per Guidelines, documentation is needed that a sequence of avoidance, minimization, and compensation measures has been followed, in that order. The Guidelines also restrict permitting activities that violate water quality or toxic effluent standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause "significant degradation" to waters of the U.S. In addition every permit from the USACE, even if not subject to the Section 404(b)(1) Guidelines, must meet general requirements. See 33 CFR 320.4. A discussion of the LEDPA determination, if any, for the document is included in the Wetlands and Other Waters section.

State Requirements: Porter-Cologne Water Quality Control Act

California's Porter-Cologne Act, enacted in 1969, provides the legal basis for water quality regulation within California. This Act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or otherwise) to land or surface waters that may impair beneficial uses for surface and/or groundwater of the State. Waters of the State include more than just Waters of the U.S., like groundwater and surface waters not considered Waters of the U.S. Additionally, it prohibits discharges of "waste" as defined and this definition is broader than the CWA definition of "pollutant". Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or exempt under the CWA.

The State Water Resources Control Board (SWRCB) and RWQCBs are responsible for establishing the water quality standards (objectives and beneficial uses) required by the CWA, and regulating discharges to ensure compliance with the water quality standards. Details regarding water quality standards in a project area are contained in the applicable RWQCB Basin Plan. States designate beneficial uses for all water body segments, and then set criteria necessary to protect these uses. Consequently, the water quality standards developed for particular water segments are based on the designated use and vary depending on such use. In addition, each state identifies waters failing to meet standards for specific pollutants, which are state listed in accordance with CWA Section 303(d). If a state determines that waters are impaired for one or more constituents and the standards cannot be met through point source controls, the CWA requires establishing Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed.

State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB administers water rights, water pollution control, and water quality functions throughout the state. RWCQBs are responsible for protecting beneficial uses of water resources within their regional jurisdiction using planning, permitting, and enforcement authorities to meet this responsibility.

National Pollution Discharge Elimination System (NPDES) Program

Municipal Separate Storm Sewer Systems

Section 402(p) of the CWA requires the issuance of NPDES permits for five categories of storm water dischargers, including Municipal Separate Storm Sewer Systems (MS4s). The U.S. EPA

defines an MS4 as any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a state, city, town, county, or other public body having jurisdiction over storm water, that are designed or used for collecting or conveying storm water. The SWRCB has identified the Department as an owner/operator of an MS4 by the SWRCB. This permit covers all Department rights-of-way, properties, facilities, and activities in the state. The SWRCB or the RWQCB issues NPDES permits for five years, and permit requirements remain active until a new permit has been adopted.

The Department's MS4 Permit, under revision at the time of this update, contains three basic requirements:

1. The Department must comply with the requirements of the Construction General Permit (see below);
2. The Department must implement a year-round program in all parts of the State to effectively control storm water and non-storm water discharges; and
3. The Department storm water discharges must meet water quality standards through implementation of permanent and temporary (construction) Best Management Practices (BMPs) and other measures.

To comply with the permit, the Department developed the Statewide Storm Water Management Plan (SWMP) to address storm water pollution controls related to highway planning, design, construction, and maintenance activities throughout California. The SWMP assigns responsibilities with the Department for implementing storm water management procedures and practices as well as training, public education and participation, monitoring and research, program evaluation, and reporting activities. The SWMP describes the minimum procedures and practices the Department uses to reduce pollutants in storm water and non-storm water discharges. It outlines procedures and responsibilities for protecting water quality, including the selection and implementation of Best Management Practices (BMPs). The proposed Project will be programmed to follow the guidelines and procedures outlined in the latest SWMP to address storm water runoff.

Part of and appended to the SWMP is the Storm Water Data Report (SWDR) and its associated checklists. The SWDR documents the relevant storm water design decisions made regarding project compliance with the MS4 NPDES permit. The preliminary information in the SWDR prepared during the Project Initiation Document (PID) phase will be reviewed, updated, confirmed, and if required, revised in the SWDR prepared for the later phases of the project. The information contained in the SWDR may be used to make more informed decisions regarding the selection of BMPs and/or recommended avoidance, minimization, or mitigation measures to address water quality impacts.

Construction General Permit

Construction General Permit (Order No. 2009-009-DWQ), adopted on September 2, 2009, became effective on July 1, 2010. The permit regulates storm water discharges from construction sites which result in a Disturbed Soil Area (DSA) of one acre or greater, and/or are smaller sites that are part of a larger common plan of development. By law, all storm water discharges

associated with construction activity where clearing, grading, and excavation results in soil disturbance of at least one acre must comply with the provisions of the General Construction Permit. Construction activity that results in soil disturbances of less than one acre is subject to this Construction General Permit if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. Operators of regulated construction sites are required to develop storm water pollution prevention plans; to implement sediment, erosion, and pollution prevention control measures; and to obtain coverage under the Construction General Permit.

The 2009 Construction General Permit separates projects into Risk Levels 1, 2, or 3. Risk levels are determined during the planning and design phases, and are based on potential erosion and transport to receiving waters. Requirements apply according to the Risk Level determined. For example, a Risk Level 3 (highest risk) project would require compulsory storm water runoff pH and turbidity monitoring, and before construction and after construction aquatic biological assessments during specified seasonal windows. For all projects subject to the permit, applicants are required to develop and implement an effective Storm Water Pollution Prevention Plan (SWPPP). In accordance with the Department's Standard Specifications, a Water Pollution Control Plan (WPCP) is necessary for projects with DSA less than one acre.

Section 401 Permitting

Under Section 401 of the CWA, any project requiring a federal license or permit that may result in a discharge to a water body must obtain a 401 Certification, which certifies that the project will be in compliance with State water quality standards. The most common federal permits triggering 401 Certification are CWA Section 404 permits issued by USACE. The 401 permit certifications are obtained from the appropriate RWQCB, dependent on the project location, and are required before USACE issues a 404 permit.

In some cases the RWQCB may have specific concerns with discharges associated with a project. As a result, the RWQCB may issue a set of requirements known as Waste Discharge Requirements (WDRs) under the State Water Code that define activities, such as the inclusion of specific features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or benefiting water quality. WDRs can be issued to address both permanent and temporary discharges of a project.

Caltrans Statewide NPDES Permit requires the Department to submit a Notice of Intent (NOI) to the RWQCB to obtain coverage under the Construction General Permit. Upon project completion, a Notice of Termination (NOT) is required to suspend coverage. This process will continue to apply to Department projects until a new Caltrans Statewide NPDES Permit is adopted by the SWRCB. An NOI or equivalent form will be submitted to the RWQCB at least 30 days prior to construction if the associated DSA is 1 acre or more. In accordance with the Department's Standard Specifications, a Water Pollution Control Program (WPCP) is used for projects with DSA less than 1 acre. A Storm Water Pollution Prevention Plan (SWPPP) is used for projects with DSA more than 1 acre.

Affected Environment

The following discussion is based on information taken from the *I-80/I-680/SR-12 Interchange Project, Water Quality Report* prepared for the proposed project in 2010.

The project area is within the watersheds of Jameson Creek, Green Valley Creek, Dan Wilson Creek, Suisun Creek, American Canyon Creek, Pennsylvania Avenue Creek, Raines Drain, Alonzo Drain, and Ledgewood Creek. The general topography of the land is gradually sloping to the south towards Suisun Bay, 15 miles downstream. These creeks and drainages cross the project area and discharge to the Suisun Marsh wetlands, which are between 1 and 2 miles downstream. The proposed project is located in the Suisun-Fairfield Valley groundwater basin (basin 2–3). The depth to groundwater ranges from three to 20 feet as reported in the as-built Log of Test Borings from 1950, 1960, and 1970.

The *Water Quality Control Plan for the San Francisco Bay Basin* (basin plan) establishes beneficial uses for waterways and water bodies within the region. Existing beneficial uses for Suisun Creek include freshwater supply, areas of special biological significance, cold freshwater habitat, fish migration, water contact recreation (potential), noncontact water recreation (potential), fish spawning, warm freshwater habitat, and wildlife habitat (San Francisco Bay Regional Water Quality Control Board 2007). Ledgewood Creek is the only other water body with defined beneficial uses in the basin plan. The beneficial uses for Ledgewood Creek are the same as Suisun Creek, with the exception that both contact and noncontact water recreation beneficial uses are existing as opposed to potential (San Francisco Bay Regional Water Quality Control Board 2007).

Section 303(d) of the 1972 CWA states that territories and authorized tribes are required to develop a list of water quality–limited segments that do not meet water quality standards, even after point sources of pollution have the minimum required levels of pollution control technology. The water bodies to which the proposed project discharges are not listed on the EPA's 303(d) List of Water Quality Limited Segments.

Of the named water bodies within the project vicinity, the San Francisco Bay RWQCB lists only the Suisun Marsh wetlands as impaired. Specifically, metal concentrations such as arsenic, cadmium, chromium, copper, lead, nickel, and zinc from urban runoff and storm sewers exceed the targeted design total maximum daily loads (TMDLs). However, the proposed project will not directly drain into the Suisun Marsh and these constituents have low TMDL priority. Farther downstream, the Suisun Bay and Carquinez Strait also contain several CWA Section 303(d)–listed pollutants (organic compounds, polychlorinated biphenyls [PCBs], mercury, selenium, general particulates, dissolved metals, nutrients, and salinity). A 2008 Draft List for TMDLs was adopted by the San Francisco Bay RWCQB in February 2009. When finalized these TMDLs will be required control targets for the project. As construction phases occur, the current TMDL requirements should be identified and met, in addition to consultation with the San Francisco Bay RWCQB.

Based on the highway stormwater runoff data collected by the Department's Storm Water Research and Monitoring Program, pollutants that are expected to be found in runoff from the proposed action include conventional constituents (biochemical oxygen demand [BOD], calcium carbonate [$CaCO_3$], chemical oxygen demand [COD], total dissolved solids [TDS], total organic

carbon [TOC], total suspended solids [TSS] and total volatile suspended solids [TVSS], etc.) hydrocarbons, metals, microbial agents, nutrients, volatile organics, semi-volatile organics, pesticides, and herbicides. Pollutants are usually deposited on the roadway as a result of fuel combustion processes, lubrication system losses, tire and brake wear, transportation load losses, paint from infrastructure, and atmospheric fallout. Constituent testing for another project in the area (the I-80 HOV widening project) revealed ADL soils are present within the project's limits. Sources of specific pollutants are outlined in Table 3.2.2-1 below.

Table 3.2.2-1. Known Roadway Pollutants

Constituents	Primary Sources
Particulates	Pavement wear, vehicles, atmosphere, maintenance, snow/ice abrasives, sediment disturbance
Nitrogen, Phosphorus	Atmosphere, roadside fertilizer application, sediments
Lead	Auto exhaust, tire wear, lubricating oil and grease, bearing wear, atmospheric fallout
Zinc	Tire wear, motor oil, grease
Iron	Auto body rust, steel highway structures, moving engine parts
Copper	Metal plating, bearing and bushing wear, moving engine parts, brake lining wear, fungicide and insecticide application
Cadmium	Tire wear, insecticide application
Chromium	Metal plating, moving engine parts, brake lining wear
Nickel	Diesel fuel and gasoline, lubricating oil, metal plating, bushing wear, brake lining wear, asphalt paving
Manganese	Moving engine parts
Bromide	Exhaust
Cyanide	Anticake compound used to keep deicing salt granular
Sodium, Calcium	Deicing salts, grease
Chloride	Deicing salts
Sulphate	Roadway bed, fuel, deicing salts
Petroleum	Spills, leaks or blow-by of motor lubricants, antifreeze and hydraulic fluids, asphalt leachate
PCBs, Pesticides	Spraying of highway rights-of-way, atmospheric deposition, PCB catalyst in synthetic tires
Pathogenic bacteria	Soil litter, bird droppings, trucks hauling livestock/stockyard waste
Rubber	Tire wear
Asbestos[a]	Clutch and brake lining wear

Source: Federal Highway Administration 1996.
[a] No mineral asbestos has been identified in runoff; however some breakdown products of asbestos have been measured.

Soils information for the project area has been obtained from the related project geotechnical reports and the U.S. Department of Agriculture, National Resource Conservation Service. The soils within the project limits are as described in Table 3.2.2-2 below.

Table 3.2.2-2. Soils in the Project Area

Map Unit Name	Map Unit Symbol	Hydrological Soil Group
Sycamore silty clay loam	(Sr)	D
Yolo Silty clay loam	(Ys)	D
Sycamore silty clay loam	(Sr)	D
Sycamore silty clay loam drained	(Ss)	D
Sycamore silty clay loam	(Sr)	D
Antioch-San Ysidro Complex, 0–2 percent slopes	(AoA)	
Brentwood clay loam, 0–2 percent slopes	(BrA)	D
Antioch-San Ysidro Complex, thick surface, 0–2 percent slopes	(AsA)	
Pescadero clay	(Pe)	D
Clear Lake clay, 0–2 percent slopes	(CeA)	D

Hydrological Group D soils have the highest runoff potential, very low infiltration rates when thoroughly wetted, and may be subject to erosion by water.

Environmental Consequences

Increased Runoff and Associated Operational Water Quality Issues

Implementation of both alternatives would involve significant mainline and interchange improvements. The general drainage design is to collect and convey pavement runoff while not conveying runoff within the travelled way. Once collected from the pavement or graded areas, runoff will be conveyed in non-erosive culverts, ditches, or swales to an existing waterway that currently receives highway runoff. The project alternatives would increase the amount of stormwater runoff within the state right-of-way by increasing the total impervious surface. The approximate acreage of impervious surface for each of the project alternatives is summarized in Table 3.2.2-3 below.

Table 3.2.2-3. Acreage of Impervious Surfaces

Alternative	New Impervious	Reworked
B	128.2 acres	251.7 acres
C	123.2 acres	219.9 acres
B-1	27.8 acres	71.4 acres
C-1	51.9 acres	90.1 acres

Increased runoff and operation water quality issues are integral to projects with new or reconstructed impervious surfaces. Increased impervious surfaces result in increased stormwater runoff which could lead to additional pollutants entering waterways. The project alternatives will incorporate approved permanent stormwater treatment BMPs to minimize potential water quality impacts. The exact amount of new or reconstructed pavement tributary to each waterway for each project alternative has not been determined at this phase of the project.

Effects on the receiving water bodies would be the result of capacity changes to the hydraulic features of the drainage system. To manage the stormwater runoff the on-site drainage facilities would be reconfigured within the proposed right-of-way as part of the project design. Additionally, stable cavities discussed in Section 3.2.1 would reduce the potential of flooding

and, therefore, the potential for resulting water quality issues. Therefore, the associated watersheds would be only minimally affected from the additional stormwater runoff from the increase in impervious surface.

Stable cavities are meant to be spaces, vaults, or other below ground storage devices, for storm runoff intended to mitigate for lost floodplain storage. The cavities will not impact the groundwater because they are intended to be placed at or above the existing ground elevation within the new fill for the westbound truck sales.

Both project alternatives have very similar water quality issues. The magnitude of the issues is very similar with both alternatives covering an area of approximately 350 acres of new or reworked pavement plus over 100 acres of graded surfaces. The footprint for both of these alternatives is substantially the same with no conditions or issues unique to either alternative.

Likewise, under the fundable first phase of either alternative, there would also be increased runoff and associated water quality issues. However the magnitude of runoff impacts for the fundable first phases of both alternatives are significantly reduced due to the smaller project footprints (100 acres of total new or reworked pavement for Alternative B, Phase 1, and 140 acres of total new or reworked pavement for Alternative C, Phase 1) compared to the full build alternatives.

All of the waterways in the project area are included in three hydrologic sub-areas 207.21, 207.22 and 207.23 as defined by the State Water Board. None of these hydrologic sub-areas currently have defined TMDL listings. (A draft TMDL listing dated 2008, not yet approved, lists Suisun Creek with dissolved oxygen and temperature, and Ledgewood Creek with diazinon.) At the downstream end of these three watersheds is the Suisun Marsh Wetlands for which there are Targeted Design Constituents of metals and nutrients. The proposed permanent treatment BMPs such as bioswales, biostrips, and infiltration devices will be effective for metals and nutrient uptake, minimizing the project impacts of these constituents (and others) to the receiving waters and the Suisun Marsh Wetlands. Treatment BMPs are included in all alternative layouts to manage all possible pavement runoff.

Discussions of other water quality issues are included in Section 3.2.1 (Hydrology and Floodplain), Section 3.2.5 (Hazardous Waste/Material), Section 3.3.2 (Wetlands and other Waters), the discussions of fish species in Section 3.3.4 (Animal Species) and Section 3.3.5 (Threatened and Endangered Species) and other sections within this document. Refer to Chapter 4, CEQA Evaluation, for discussion of non-jurisdictional perennial marsh, and non-jurisdictional seasonal wetland.

There would be no increase in pavement under the No-Build Alternative and therefore no potential to increase runoff and associated water quality issues.

According to the Department's NPDES permit and the Construction General Permit, best management practices (BMPs) will be incorporated into the proposed project to reduce the discharge of pollutants during construction and operation to the maximum extent practicable. These BMPs fall into three categories: temporary construction site BMPs, design pollution

prevention BMPs, and permanent treatment BMPs. Temporary construction site BMPs are discussed below under construction impacts.

Permanent Design Pollution Prevention BMPs

Slope/Surface Protection Systems
To minimize erosion from any of the new slopes, mitigating design features have been considered, including minimizing cut-and-fill slopes, shaping slopes to reduce concentrated flow, and collecting concentrated flows in stabilized channels. All graded slopes, either cut or fill, will be constructed with proper erosion control and permanent plantings. Except at bridges, no retaining walls are anticipated.

Certain areas of the project alternatives would be hardscaped as required for safety (ramp gores), maintenance (pullout areas), and slope stability (under bridges).

Construction of the project alternatives would remove moderate amounts of vegetation within the project right-of-way. In many locations, the project alternatives would replace existing unpaved areas with pavement or impervious structures. At all areas where new slopes are constructed, proper vegetation will be planted, monitored, and maintained to establish permanent cover. Approval of the erosion control plan by the Department's Division of Design, Landscape Architecture will occur during final design.

To minimize erosion potential, slopes will be rounded and or shaped to reduce concentrated flows, concentrated flows will be collected in stabilized drains or channels, slopes will be 1:4 or flatter and those greater than 1:2 will have an erosion control plan approved by the district landscape architect according to the project Geotechnical Design Report.

Given the characteristics of the in-situ soils, there are some slope stability concerns on this site. Slope and surface protection systems will be incorporated per Checklist DPP-1, Part 3. To minimize erosion from any of the slopes the methods being considered include:

- Minimizing cut and fill slopes,
- Shaping slopes to reduce concentrated flow, and
- Collecting concentrated flows in stabilized channels.

Concentrated Flow Conveyance Systems
Concentrated flow conveyance systems are used to collect, transport, convey, and/or dissipate stormwater flows. A variety of concentrated flow conveyance devices exist along the length of the proposed project. Along most of the existing reach of the highway, runoff sheet-flows off of the pavement, crossing several feet of vegetated strips before entering a swale oriented longitudinally to the right-of-way. The existing concentrated flow conveyance devices include lined and unlined ditches and swales, drainage inlets and culverts, asphalt concrete (AC) dikes and overside drains, flared end sections, rock slope protection (RSP) pads, flow energy dissipation devices, and other approved drainage design devices. For the proposed project, the planned drainage pattern will replicate as much as possible the existing runoff pattern. The

drainage improvements will direct pavement runoff to sheet flow to the outside edge of the new pavement where improved drainage devices will collect and convey the project runoff.

Preservation of Existing Vegetation

One goal of the project alternatives and construction activities is to preserve areas of existing vegetation wherever possible. Preserving existing vegetation is essential in the protection of water quality due to the elevated chances of cleared areas increasing erosion and sedimentation to waterways. At all areas where existing vegetation (on land to remain) is affected, or where new slopes are constructed, proper vegetation will be placed, monitored, and maintained to establish permanent cover. For those areas on the outside of the highway, pavement will be minimized in favor of retaining existing vegetative cover. In many locations the proposed project will replace existing unpaved areas with impervious surface. Approval of the erosion control plan by a landscape architecture and maintenance plan will occur in final design.

Bridge construction will take place at all seven water crossings that are ESAs. ESAs exist at other project locations as well and are potentially affected by the proposed project.

Permanent Treatment BMPs

Because the project alternatives are considered a major reconstruction project, they are not exempt from incorporating treatment BMPs. Treatment BMPs are permanent devices and facilities that will store and treat increased stormwater runoff expected with operation of the project alternatives in an effort to preserve water quality and reduce the potential for flooding. The Department's approved treatment BMPs are biofiltration swales, infiltration basins, detention basins, traction sand traps, dry weather flow diversions, media filters, gross solids removal devices (GSRDs), multi-chamber treatment trains, and wet basins. Those most feasible in the Bay Area are biofiltration swales, infiltration basins, detention basins, media filters, multi-chamber treatment trains, and wet basins.

Because of potential high groundwater within the project area, infiltration and detention basins would not be feasible. As such, biofiltration swales and biostrips have been investigated as possible alternatives. Both treatment BMPs treat the same types of constituents: TSS, particulate metals, and litter. Both biofiltration swales and strips are viable cost-effective treatment BMPs.

Because of the limited permeability of the soils and potentially high groundwater, infiltration devices and other filters allowing percolation of stormwater back into the ground are not a consideration. However, engineered biofiltration strips and swales are proposed. Biofiltration strips and swales are effective at trapping litter, TSS, and particulate metals. Where possible, it is recommended that the existing vegetation be evaluated for use as effective biostrip cover, or the proposed project should establish the proper vegetative cover and/or swale dimensions at each treatment location.

Locations within the project limits (primarily in the area between the toe of fill slopes and the right-of-way) are available to be used for permanent treatment BMPs. Plans developed at a later stage in design will be more specific in their location, size, vegetative characteristics, and performance measures.

Biofiltration Swales/Strips

Due to the flat topography of the project area, biofiltration would be the primary treatment option for stormwater runoff. Preliminary plans provided in the SWDR identify all potential BMP locations. Exact locations will be determined during final project design. Biostrips would be designed to provide the maximum water quality treatment time of stormwater. The tributary area to the biostrips is the length of pavement from the highway median to the outside edge of pavement. Bioswales would be designed according to the Department's guidance documents, to ensure maximum treatment of water. Additional right-of-way for the project improvements and treatment BMPs has been identified and is included on the project layout sheets included in the SWDR.

Dry Weather Diversion

Dry weather flow diversion BMPs were dropped from further considered for the proposed project because there is no dry weather flow.

Infiltration Devices

Infiltration device BMPs are not feasible for the project alternatives for the following reasons:

- Through much of the project area, the groundwater is too high.
- Most of the soils are Hydraulic Soil Group C or D, limiting the usefulness of infiltration.
- A gravity outlet cannot be created because of the flat terrain.
- There is no room within the right-of-way along most of the project area.
- Areas beyond the right-of-way are mostly prime farmland under cultivation.

Detention Devices

Detention basin BMPs are not feasible for the project alternatives for the following three reasons:

- There is not enough hydraulic head available for proper design.
- There are several locations where the groundwater is high.
- Along most of the project area, there are significant constraints on acquiring new right-of-way, with areas beyond the existing right-of-way consisting mostly of prime farmland under cultivation.

Detention as a treatment device may have negative hydraulic impacts because the project alternatives are located far downstream in the watershed, and detaining the peak runoff from the tributary shed may increase the peak runoff from the entire shed. If hydromodification control is a requirement of the approved project alternative, then detention facilities can be designed for that mitigation, but they would not specifically function as treatment for the reasons stated.

Gross Solids Removal Devices

Litter is not on the 303(d) list or identified as a TMDL for the water bodies near the project area; therefore, GSRDs are not incorporated.

Traction Sand Traps
Traction sand trap BMPs are not appropriate for the project alternatives because traction sand is not applied within the project limits.

Media Filters
Media filter BMPs are not feasible for the project alternatives for the primary reason that the seasonally high groundwater table is likely to be too close to the invert of the filter. Depending on the specific location within the project limits, there are two other reasons that media filters are not an appropriate consideration: 1) there is not enough hydraulic head available for proper design, and 2) along most of the project area, there is no room within the right-of-way, and areas beyond the right-of-way are completely developed.

Multi-Chambered Treatment Trains
Multi-chambered treatment train BMPs are used to treat stormwater in critical source areas. Critical source areas are more common in urbanized environments and are established to facilitate the treatment stormwater runoff in particularly vulnerable or polluted areas. The project alternatives are not considered to be located in a critical source area.

Wet Basins
Wet basin BMPs are not feasible for the project alternatives for the following reasons:

- There is not enough hydraulic head available for proper design.
- There are several locations where the groundwater is high along much of the project area.
- There is limited ability to purchase additional right-of-way, and areas beyond the right-of-way are largely developed.
- Along most of the project area, there is no permanent source of water available to maintain a permanent wet pool.

Maintenance BMPs (Drain Inlet Stenciling)
Nearly all the improvements under both alternatives are located within the highway right-of-way. However, no drain inlet stenciling is necessary for these inlets. At locations where ramp termini meet local streets where pedestrian access is possible, inlet stenciling will be placed on inlets. This stenciling will inform the public that no dumping is allowed and will help protect water quality.

Hydromodification Control
All state or local transportation projects and some non-transportation projects must incorporate hydromodification measures to ensure that hydraulics and flooding are not affected by the new construction.

Potential Water Quality, Erosion and Sediment Control Issues during Construction

Disturbed soil could cause potential erosion and sediment control issues during the construction of all build alternatives. During the storm season, disturbed soil is exposed and can erode into rills and transport sediment to waterways.

Construction of the project alternatives would involve the use of construction equipment and associated fuels, solvents, lubricants, and other pollutants. These substances may be released into the environment during construction and could result in adverse effects to water quality.

Proper erosion and sediment control measures would be effective because of the relatively flat terrain and low grading heights. Preparing and implementing a SWPPP and implementing best management practices would reduce the severity of this effect.

Under the fundable first phases, there would also be potential water quality, erosion, and sediment control issues, however, to a lesser extent because the project footprints are not as large.

The follow construction site BMPs will be in place during construction.

Construction Site BMPs

Construction site BMPs would be applied during construction activities to reduce the pollutants in the stormwater discharges throughout construction. Temporary construction BMPs included in the Department's *Storm Water Quality Handbook* will be included in the SWPPP. Such BMPs may include the following:

- Hydraulic mulch.
- Hydroseeding.
- Soil binders.
- Silt fence.
- Sediment traps.
- Sand bags.
- Fiber rolls.
- Straw bale barrier.

One critical construction activity, dewatering, may be necessary for the proposed project because of the high groundwater levels. Early discussion will be initiated regarding the handling and disposal of this water during the design phase. A project-specific Low Threat Discharge and Dewatering NPDES permit that would contain Waste Discharge Requirements to ensure that the groundwater meets or exceeds water quality standards prior to discharge may be required from the RWQCB if substantial dewatering is to be done.

It is anticipated that dewatering will need to occur at all bridge locations involved in the chosen project alternative. A Notice of Intent shall be submitted and a NPDES Low Threat Discharge and Dewatering Permit obtained from the San Francisco Bay RWQCB prior to any dewatering.

At this phase of the project development process, no specific coordination with the Department's Division of Construction has occurred for the stormwater management issues.

Potential to Require Dewatering during Construction

According to the SWDR for the project, groundwater levels in the project area range from three feet to 18 feet below ground surface. As such, groundwater may be encountered during structure excavations. Proper handling, treatment, and discharge of groundwater would be performed as necessary. It is anticipated that dewatering of groundwater would need to be done at all bridge locations involved in the chosen project alternative. Groundwater in the general area is used for local domestic and agricultural use. Quality is generally good with typically minimal treatment.

There would be no construction under the No-Build Alternative and therefore no potential to require dewatering.

Conclusion

The project alternatives would increase the amount of stormwater runoff within the state right-of-way by increasing the total impervious surface. As a result, the increased stormwater runoff could lead to additional pollutants entering waterways. The project alternatives will incorporate approved stormwater treatment BMPs to minimize potential water quality impacts by reducing discharges into waterways and/or filtering out pollutants prior to discharging. These BMPs fall into three categories: design pollution prevention BMPs, permanent treatment BMPs, and temporary site BMPs during construction. Avoidance, Minimization, and/or Mitigation Measures With implementation of BMPs no avoidance, minimization or mitigation measures would be necessary.

3.2.3 Geology/Soils/Seismic/Topography

Regulatory Setting

For geologic and topographic features, the key federal law is the Historic Sites Act of 1935, which establishes a national registry of natural landmarks and protects "outstanding examples of major geological features." Topographic and geologic features are also protected under the California Environmental Quality Act.

This section also discusses geology, soils, and seismic concerns as they relate to public safety and project design. Earthquakes are prime considerations in the design and retrofit of structures. The Department's Office of Earthquake Engineering is responsible for assessing the seismic hazard for Department projects. The current policy is to use the anticipated Maximum Credible Earthquake (MCE) from young faults in and near California. The MCE is defined as the largest earthquake that can be expected to occur on a fault over a particular period of time.

State Standards

Alquist-Priolo Earthquake Fault Zoning Act

California's Alquist-Priolo Act (PRC 2621 et seq.), originally enacted in 1972 as the Alquist-Priolo Special Studies Zones Act and renamed in 1994, is intended to reduce the risk to life and property from surface fault rupture during earthquakes. The Alquist-Priolo Act prohibits the location of most types of structures intended for human occupancy across the traces of active faults and strictly regulates construction in the corridors along active faults (Earthquake Fault Zones). It also defines criteria for identifying active faults, giving legal weight to terms such as *active*, and establishes a process for reviewing building proposals in and adjacent to Earthquake Fault Zones.

Under the Alquist-Priolo Act, faults are zoned, and construction along or across them is strictly regulated if they are *sufficiently active* and *well-defined*. A fault is considered sufficiently active if one or more of its segments or strands shows evidence of surface displacement during Holocene time (defined for the purposes of the act as within the last 11,000 years). A fault is considered well-defined if its trace can be clearly identified by a trained geologist at the ground surface or in the shallow subsurface, using standard professional techniques, criteria, and judgment (Hart and Bryant 1997).

Seismic Hazards Mapping Act

Like the Alquist-Priolo Act, the Seismic Hazards Mapping Act of 1990 (PRC 2690–2699.6) is intended to reduce damage resulting from earthquakes. While the Alquist-Priolo Act addresses surface fault rupture, the Seismic Hazards Mapping Act addresses other earthquake-related hazards, including strong ground shaking, liquefaction, and seismically induced landslides. Its provisions are similar in concept to those of the Alquist-Priolo Act: the State is charged with identifying and mapping areas at risk of strong ground shaking, liquefaction, landslides, and other corollary hazards, and cities and counties are required to regulate development within mapped Seismic Hazard Zones.

Under the Seismic Hazards Mapping Act, permit review is the primary mechanism for local regulation of development. Specifically, cities and counties are prohibited from issuing development permits for sites in Seismic Hazard Zones until appropriate site-specific geologic or geotechnical investigations have been carried out, and measures to reduce potential damage have been incorporated into the development plans.

California Building Standards Code

The State of California's minimum standards for structural design and construction are given in the California Building Standards Code (CBSC) (24 CCR). The CBSC is based on the Uniform Building Code (UBC) (International Code Council 1997), which is used widely throughout the United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed or more stringent regulations. The CBSC requires that "classification of the soil at each building site will be determined when required by the building official" and that "the classification will be based on observation and any necessary test of the materials disclosed by borings or excavations." In addition, the CBSC states that "the soil classification and design-bearing capacity will be shown on the (building) plans, unless the foundation conforms to specified requirements." The CBSC provides standards for various aspects of construction, including (i.e., not limited to) excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. New structures constructed as part of the project would be required to comply with all applicable provisions of the CBSC.

California Department of Transportation Standards

In addition to the CBSC, the Department's highway and bridge facilities are subject to numerous standards, including *Caltrans Guidelines for Structures Foundations Report, Version 2* (California Department of Transportation 2006a); *Caltrans Seismic Design Criteria* (California Department of Transportation 2006b); *Caltrans Highway Design Manual (Topic 829)* (California Department of Transportation 2008); *Caltrans Bridge Design Specifications (Section 8)* (California Department of Transportation 2004); and *Caltrans Standard Specifications* (California Department of Transportation 2006c). These standards were developed to ensure that all Department facilities are constructed and maintained to the highest safety standards.

Landslide Hazard Identification Program

The Landslide Hazard Identification Program requires the State Geologist to prepare maps of landslide hazards within urbanizing areas. According to Public Resources Code Section 2687(a), public agencies are encouraged to use these maps for land use planning and for decisions regarding building, grading, and development permits.

Local Standards

Geotechnical Investigations

Local jurisdictions typically regulate construction activities through a multistage permitting process that may require the preparation of a site-specific geotechnical investigation. The purpose of a site-specific geotechnical investigation is to provide a geologic basis for the development of appropriate construction design. Geotechnical investigations typically assess bedrock and Quaternary geology, geologic structure, soils, and the previous history of excavation and fill placement.

Regulation HS.I-22 of the Public Health and Safety Element of the Solano County General Plan (Solano County 2008) requires geotechnical evaluations and recommendations before new development occurs in areas with geologic, soils, or seismic hazards (see the section titled "Solano County General Plan").

Solano County General Plan

Goals, policies, and implementation programs contained in the Public Health and Safety Element of the Solano County General Plan (Solano County 2008) that are applicable to the proposed project are as follows:

> **HS.G-1:** Minimize the potential for loss of life and property resulting from natural or human-caused hazards.
>
> **SEISMIC SAFETY AND LAND STABILITY**
>
> **Policies**
>
> **HS.P-12:** Require new development proposals in moderate or high seismic hazard areas to consider risks caused by seismic activity and to include project features that minimize these risks.
>
> **HS.P-13:** Review and limit the location and intensity of development and placement of infrastructure in identified earthquake fault zones.
>
> **HS.P-14:** Identify and minimize potential hazards to life and property caused by fault displacement and its impact on facilities that attract large numbers of people, are open to the general public, or provide essential community services and that are located within identified earthquake fault zones.
>
> **HS.P-15:** Reduce risk of failure and reduce potential effects of failure during seismic events through standards for the construction and placement of utilities, pipelines, or other public facilities located on or crossing active fault zones.
>
> **HS.P-16:** Require minimum setbacks for construction along creeks between the creek bank and structure, except for farm structures that are not dwellings or places of work, based on the susceptibility of the bank to lurching caused by seismic shaking.
>
> **HS.P-17:** Restrict the crossing of ground failure areas by new public and private transmission facilities, including power and water distribution lines, sewer lines, and gas and oil transmission lines.
>
> **HS.P-18:** Make information about soils with a high shrink-swell potential readily available. Require proper foundation designs in these areas.
>
> **HS.P-19:** Minimize development in areas with high landslide susceptibility.

Implementation Programs

Regulations

HS.I-19: Adopt and enforce the most current versions of the International Building Codes, as modified by the California Building Standards Commission.

HS.I-21: Require geotechnical investigation and recommendations for buildings meant for public occupancy within geologic hazard areas. A state certified Engineering Geologist shall produce a report examining development issues that considers:

- soil, slope, or other geologic hazard conditions found on site;
- potential off-site development impacts, such as increased runoff and/or slope instability; and
- requirements of any regulations concerning the hazard area.

HS.I-22: Require geotechnical evaluation and recommendations before new development in moderate or higher-hazard areas. Such geotechnical evaluation shall analyze the potential hazards from:

- landslides
- liquefaction
- expansive soils
- steep slopes
- erosion
- subsidence
- Alquist-Priolo Earthquake Fault Zones or other identified fault zones
- tsunamis
- seiches

Require new development to incorporate project features that avoid or minimize the identified hazards. Costs related to providing or confirming required geotechnical reports will be borne by the applicant.

Affected Environment

The *Assessment of Fault Rupture and Analysis of Displacement Hazard, Solano Transportation Authority Interchange Project, Cordelia, California (I-80/I-680/SR 12 Interchange)* (Fault Rupture Assessment) and the *Environmental Geotechnical Memorandum, I-80/I-680/SR 12 Interchange Project, Solano County, California, 04-Sol-12, 680, 80 PM Var.* (Environmental Geotechnical Memorandum) were prepared for the project alternatives in 2009. Addenda to the Environmental Geotechnical Memorandum were prepared in July and August of 2010. All suggested and applicable measures have been incorporated into the section below. However, as mentioned in both of these studies, additional site-specific study will be required during latter phases of project development. These future studies are also mentioned in the section below.

The project area is located in the Coast Ranges geomorphic province (California Geological Survey 2002). The analysis presented herein focuses on the Quaternary sediments and geologic hazards pertaining to the project area, except for the ground shaking analysis. This analysis requires a broader view of the region due to the potential for other primary impacts should fault rupture or displacement occur in outlying areas.

Geology and Topography of the Project Area

Surface Geology

Because of the geographical extent of the project alternatives, the project area is divided into three segments: western, central, and eastern. The western segment begins just west of the I-80/Red Top Road interchange and ends at the I-80/Suisun Valley Road interchange. The central segment begins at the I-80/Suisun Valley Road interchange and ends at the SR 12E/Chadbourne Road interchange. The eastern segment begins at the SR 12E/Chadbourne Road interchange and ends at the Fairfield Overhead where SR 12E crosses over the UPRR tracks west of Suisun City.

The Environmental Geotechnical Memorandum indicates that the project area is underlain by alluvial and bedrock units. Bedrock consists of sedimentary rock formations, metamorphic rocks, and volcanic rock units that extend across Solano County from the marshlands on the east to the foothills on the west. Geologic units and structures in the vicinity of the project area have been mapped by several geologists, including Wagner and Bortugno (1982), Manson (1998), Bezore et al. (1988), and Graymer et al. (2002).[1] Based on the published geologic maps, the central and eastern portions of the project area are underlain by late Pleistocene to Holocene age alluvial fan deposits (Qf) and Holocene fan deposits (Qhf), which are the most extensive Quaternary age units in the project area. The alluvial fan deposits consist of sediments deposited by streams that originate from mountain canyons and flow onto alluvial valley floors or alluvial plains in the form of debris flows, hyperconcentrated mudflows, or stream flows. The particle size of these deposits typically decreases downslope from the fan apex. In some places, Holocene fan deposits (Qhf) may be only a thin veneer over late Pleistocene to Holocene fan deposits (Qf). Holocene-age natural levee deposits (Qhl) were formed by streams that overtopped their banks and deposited sediment adjacent to their channels.

The southwestern (western segment) portion of the project area is located on hillside terrain underlain by bedrock units that consist primarily of sedimentary and volcanic formations that have been folded and faulted as well as having been influenced by local landslides. The Eocene-age Markley Formation (Tmk) consists of micaceous marine sandstones. The overlying Pleistocene-age Sonoma volcanics contain extrusive basalt and ryholite flows, agglomerates and tuffs, ash-flow tuffs, and andesitic-flow breccias and agglomerates. Potassium/argon radiometric dating of the Sonoma volcanics exposed locally near St. Helena indicates an age of 2.9 million years.

Figure 3.2.3-1 depicts lithologic descriptions, as shown in the Environmental Geotechnical Memorandum for the project alternatives. The main geologic units, as described by Bezore et.al. (1998), mapped within the project area include:

[1] Relevant portions of these published maps are shown on Plates 4, 5, and 6 of the Environmental Geotechnical Memorandum.

- Qhf—Fan deposits (Holocene): Moderately sorted to poorly sorted and moderately bedded to poorly bedded sand, gravel, silt, and clay deposited where streams emanate from upland regions onto more gently sloping valley floors or plains.
- Qhl—Natural levee deposits (Holocene): Moderately sorted to well-sorted sand with some silt and clay deposited by streams that overtop their banks during flooding.
- Qf—Fan deposits (late Pleistocene to Holocene): Poorly sorted, moderately bedded to poorly bedded sand, gravel, silt, and clay deposited in gently sloping alluvial fans. These deposits are about 10% denser and have 50% greater penetration resistance than unit Qhf.
- Qls—Landslide deposits (Holocene and Pleistocene): Chaotic deposits of sand, silt, clay, angular boulders, and blocks of bedrock up to hundreds of feet long deposited by gravity-driven skidding and flow.
- Tsv—Sonoma volcanics, undivided (Pleistocene): Basalt to rhyolite flows, agglomerates, and tuffs.
- Tst—Ash-flow tuff (Pliocene): Pumicitic, locally welded, with agglomeritic tuff.
- Tsa—Andesites (Pliocene): Andesitic flows, breccias, and agglomerates.
- Tss—Sandstone and volcanic gravel (Pliocene): Poorly consolidated, tuffaceous sandstone with lenses of volcanic conglomerate.
- Tmk—Markley formation (Eocene): Gray to yellow-brown, micaceous marine arkosic sandstone. Massive to well-bedded; contains abundant muscovite.
- Ku—Undivided sandstone, siltstone, and shale of the Great Valley Complex (late Cretaceous): Interbedded carbonaceous−biotite wacke, white−mica−carbonaceous sandstone, greenish−gray mudstone and shale, laminated fine−grained sandstone and gray shale, carbonaceous siltstone, black shale, and fine−grained mica wacke.

Subsurface Geology

According to published geologic maps and as reported in the project's Environmental Geotechnical Memorandum, the geologic units beneath specific portions of the project area are those shown in Table 3.2.3-1.

Table 3.2.3-1. Subsurface Geologic Units for the Project Area[a]

Approximate Location and Segment	Geology
I-80/SR 12W interchange and its vicinity (eastern and central segments)	Fan deposits (Qf) (late Pleistocene to Holocene); alluvium, undivided (Qa) (late Pleistocene to Holocene); artificial fill (af); Markley formation (Tmk) (Eocene); andesites (Tsa) (Pliocene); Sonoma volcanics, undivided (Tsv) (Plioecene)
Future I-680/Red Top Road interchange and its vicinity (western segment)	Fan deposits (Qf) (late Pleistocene to Holocene); fan deposits (Qhf) (Holocene); some modern stream channel deposits (Qhc) (Holocene)
Green Valley Road and its vicinity (western segment)	Fan deposits (Qf) (late Pleistocene to Holocene); fan deposits (Qhf) (Holocene); ash-flow tuff (Tst) (Pliocene); some modern stream channel deposits (Qhc) (Holocene)
Suisun Valley Road and its vicinity (western and central segments)	Fan deposits (Qhf) (Holocene); ash-flow tuff (Tst) (Pliocene)
I-80/SR 12E interchange and SR 12E (eastern segment)	Mainly alluvial fan deposits (Qhf) (Holocene); natural levee deposits (Qhl) (Holocene)

[a] Adapted from the first table shown on page 4 of the project's Environmental Geotechnical Memorandum.

For more information on subsurface geology and structure, including a detailed explanation of bedding planes, folds, and faults, refer to the Environmental Geotechnical Memorandum prepared for the proposed project.

Topography

Review of the 1980 United States Geologic Survey (USGS) map for the Fairfield South and Cordelia, California quadrangles indicates that the project area is located at approximate elevations between more than ten and more than 250 feet above mean sea level. The project area generally slopes to the east, toward wetlands and sloughs associated with Suisun Bay. The general terrain of the project area consists of hills on the north and northwest sides near Red Top Road and relatively level areas (Suisun Valley and Green Valley) in the central and eastern segment of the project area.

Seismicity

The project area is located in a region of California characterized by locally high historical seismic activity and is within UBC Seismic Hazard Zone 4. A number of active faults and fault zones are present in and adjacent to the project area. Consequently, the project area is subject to surface fault rupture and ground shaking (primary hazards), and seismically induced ground failure (a secondary hazard).

Fault Rupture Hazard

The purpose of the Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) is to regulate development near active faults to mitigate the hazard of surface rupture. Faults in an Alquist-Priolo Earthquake Fault Zone are active faults. As defined under the Alquist-Priolo Act, an active fault is one that has had surface displacement within Holocene time.

The dominant tectonic features in the project area are the Green Valley fault[2, 3] and the Cordelia fault zone, both of which are zoned by the State of California pursuant to the Alquist-Priolo Earthquake Fault Zoning Act (Hart and Bryant 1997), and are considered a Type A (highest risk) seismic source by the UBC and California Building Codes (International Conference of Building Officials 1998[4]).

The Green Valley fault extends from Suisun Bay northwest to Wooden Valley, traversing the rapidly developing I-680 corridor in central and eastern Solano County, near Fairfield. Along its length, the Green Valley fault intersects several major transportation routes, rail lines, power transmission lines, pipelines, and levees.

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[2] The Green Valley fault is often grouped together with the Concord fault and referred to as the Concord-Green Valley fault system. Part of the eastern San Andreas fault system, it is composed of at least two major fault segments, from south to north: the Concord fault (10–15 miles long) and the Green Valley fault (18–27 miles long).

[3] The Green Valley fault in the vicinity of the project area consists of four distinct fault strands (Fault Rupture Assessment; Environmental Geotechnical Memorandum).

[4] The 1998 International Conference of Building Officials maps have recently been superseded by an interactive U.S. Geological Survey website (http://gldims.cr.usgs.gov/webapps/cfusion/Sites/qfault/index.cfm) that plays the same role relative to the International Building Code (IBC) and the later (post-1997) versions of the CBSC, which are based on IBC instead of UBC. The older information and classification of these faults is provided herein to stress their high seismic potential.

The Cordelia fault zone, located approximately 5,800 feet east of the Green Valley fault, has a well-defined north-striking surface expression, and may represent a secondary trace of the Green Valley fault, according to the Fault Rupture Assessment. See Plate 7 of the Environmental Geotechnical Memorandum for images of these earthquake fault zones as they relate to the project area. Also see Plate 3 of the Environmental Geotechnical Memorandum for a map of the regional faults surrounding the project area.

Both of the faults are generally located in the western segment of the project area. The Green Valley fault and the Cordelia fault zone cross the project alignment of Alternative B. These faults are within State (Alquist-Priolo) Earthquake Fault Zones. No fault is directly beneath any proposed elevated structures that are proposed for Alternative B or Alternative B, Phase 1.[5,6] However, under Alternative C and Alternative C, Phase 1, several proposed structures are located in the vicinity of the Green Valley fault.

In summary, the potential for surface fault rupture in the vicinity of the project area is generally high.

Ground-Shaking Hazard

The project area is located within UBC Seismic Hazard Zone 4 and is located in a region of California characterized by locally high historical seismic activity. The State of California (Hart and Bryant 1997) and the U.S. Geological Survey (U.S. Geological Survey 2008) recognize various active seismic sources in the project area vicinity. As described above, the risk of surface rupture in the study area is generally high because of its proximity to active faults. Earthquake-induced ground shaking also poses a substantial hazard.

The intensity of ground shaking that would occur in the project area as a result of an earthquake is partly related to the size of the earthquake, its distance from the project area, and the response of the geologic materials within the project area. As a rule, the greater the earthquake magnitude and the closer the fault rupture to the site, the greater the intensity of ground shaking. When various earthquake scenarios are considered, ground-shaking intensities will reflect both the effects of strong ground accelerations and the consequences of ground failure.

Estimates of Earthquake Shaking

Based on the seismic hazard map prepared by Mualchin (1996), the peak bedrock acceleration in the project area ranges from 0.5 *g* to 0.6 *g* (where one *g* equals the force of gravity). According to the *Caltrans Guidelines for Structures Foundation Report* (California Department of Transportation 2006a), the value of peak bedrock acceleration (for a specific project site or area) from the seismic hazard map should be verified using the attenuation relation by Sadigh et al.

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[5] The primary rupture zone for the Cordelia fault does not intersect the proposed elevated structure, and thus the risk for surface-fault rupture is considered low. However, to account for uncertainty in the borehole and geophysical data and the spacing between boreholes that led to these conclusions, the proposed structure should be designed to accommodate minor secondary displacement (e.g., tilting, shearing, and settlement) associated with an earthquake on the Cordelia fault, as recommended in the Fault Rupture Assessment. See the section titled "Avoidance, Minimization, and/or Mitigation Measures" for more information.

[6] Several primary active faults directly impact the proposed structures within the Green Valley fault, but Alternative C has more proposed structures in the vicinity of the Green Valley fault compared to Alternative B (Fault Rupture Assessment; Environmental Geotechnical Memorandum).

(1997). Based on the attenuation relation, the controlling fault is the Cordelia fault, and peak bedrock acceleration of 0.6 *g* is anticipated in the project area. Furthermore, based on a probabilistic seismic hazard map that depicts the peak horizontal ground acceleration values exceeded at a 10% probability in 50 years (Cao et al. 2003; California Geological Survey 2003), the probabilistic peak horizontal ground acceleration values in the project area range from 0.5 *g* to 0.6 *g*, thus confirming that the possibility of the project area experiencing strong ground shaking may be considered moderate to high.

Based on existing published data on officially recognized faults, the following faults are considered to have the greatest potential to affect the project area due to both fault rupture and ground shaking: the Cordelia fault, the Green Valley fault, and the Vaca-Kirby Hill–Montezuma Hills faults (these latter faults are considered early Quaternary and therefore "potentially active").[7] Maximum credible earthquake magnitudes for some of the major faults in the vicinity of the project area determined by Mualchin (1996) are summarized in Table 3.2.3-2. Based on the project's Environmental Geotechnical Memorandum, these maximum credible earthquake magnitudes represent the largest earthquakes that could occur on the given fault based on the current understanding of the regional tectonic structure.

Table 3.2.3-2. Characteristics of Local Faults[a]

Fault/Faults	Maximum Credible Earthquake Magnitude[b]	Distance between Fault/ Faults and Project Area (miles)	Peak Bedrock Acceleration (*g*)[b]	Zoned by State of California
Cordelia	6.5	0	0.6	Yes
Green Valley	6.75	0	0.6	Yes
Vaca-Kirby Hill–Montezuma Hills	6.75	~7	0.6	Yes

[a] Adapted from Table 1 on page 11 of the Environmental Geotechnical Memorandum prepared for the proposed project.
[b] Mualchin 1996.

Accordingly, based on available geological and seismic data, the possibility of the project area experiencing strong ground shaking may be considered moderate to high.

Liquefaction Susceptibility

Liquefaction is a phenomenon in which the strength and stiffness of unconsolidated sediments are reduced by earthquake shaking or other rapid loading. Poorly consolidated, water-saturated fine sands and silts having low plasticity and within 50 feet of the ground surface are typically considered to be the most susceptible to liquefaction. Soils and sediments that are not water saturated and that consist of coarser or finer materials are generally less susceptible. Geologic age also influences the potential for liquefaction. Sediments deposited within the past few thousand years are generally much more susceptible than older Holocene sediments; Pleistocene sediments are even more resistant; and pre-Pleistocene sediments are generally immune (California Division of Mines and Geology 1997).

[7] Based on research conducted on the earthquake probabilities in the San Francisco Bay region, the Working Group on California Earthquake Probabilities (2003) suggests the Green Valley fault has a 4% probability of one or more major (i.e., magnitude greater than 6.7) earthquakes during the coming 30 years. According to the same study, there is a 62% probability of at least one earthquake of magnitude 6.7 or greater striking the San Francisco Bay region before 2031.

The potential for liquefaction in the project area was preliminarily evaluated by the project's Environmental Geotechnical Memorandum. Based on available boring information, the project area is generally underlain by stiff to very stiff clay with occasional pockets/lenses/layers of loose to medium dense sands. Also, based on the Liquefaction Susceptibility Map included as Plates No. 8-1 and 8-2 in the project's Environmental Geotechnical Memorandum, the liquefaction potential within the project area corridor is considered moderate, with the exception of areas along the eastern portion of Jameson Canyon Creek; at Suisun Creek, Green Valley Creek, and Ledgewood Creek; and in the eastern segment of the project area, where it is considered high. See Plate 8 of the project's Environmental Geotechnical Memorandum for the liquefaction susceptibility map for the project area.

Two potential ground failure types associated with liquefaction are lateral spreading and differential settlement (Association of Bay Area Governments 2001). Lateral spreading involves a layer of ground at the surface being carried on an underlying layer of liquefied material over a nearly level surface toward a river channel or other open face. Differential settlement occurs when the layers that liquefy are not of uniform thickness, a common problem when the liquefaction occurs in artificial fills. Settlement can range from 1% to 5%, depending on the cohesiveness of the sediments (Tokimatsu and Seed 1984). The moderate liquefaction susceptibility in the project area and the soil characteristics equate to a high risk of lateral spreading along the creek areas and a moderate risk of differential settlement elsewhere.

Seismically Induced Ground Failure and General Slope Stability

The project alternatives would extend across hillsides and slopes that may pose some risk from landslides or debris flows. According to the State's Landslide Hazard Report for the Cordelia Quadrangle (Manson 1998), there are landslide deposits, elevated landslide potential, and some debris-flow potential in the southwestern portion of the project area (see Parikh 2009, Plates 10-1 and 10-2 for Manson's [1998] Landslide Inventory Map; Plates 11-1 and 11-2 for the Landslide Susceptibility Map; and Plates 12-1 and 12-2 for the Debris-Flow Susceptibility Map).

Approximately 400 to 1,400 feet northwest of its intersection with I-80, the proposed extension of Red Top Road under both alternatives would cross a large mapped landslide which appears to have moved toward the east. Where the proposed extension of Red Top Road intersects SR 12W, it would cross onto a series of mapped landslides that, except for 450 feet of apparently intact bedrock ridgeline, extend approximately 1,400 feet to the northeast where the proposed road will curve around and reach the valley margin. Where the Red Top Road extension is planned, Manson (1998) categorized the hillsides as "Area 4—most susceptible to landsliding" and the eastern half of that area as "Area C—most susceptible to debris flows."

Soils

Surface Soil Conditions

According to the Soil Survey of Solano County, California (Bates 1977), the predominant surface soil materials within the project area are the Clear Lake clay (CeA), Conejo gravelly loam (Co), Sycamore silty clay loam (Sr), and Yolo silty clay loam (Ys)[8]. These soils are

[8] See Plate 9 of the Environmental Geotechnical Memorandum for a figure showing all surface soil map units in the project area.

generally fine-textured, poorly drained to well drained, have slopes between 0%–2%, very slow runoff to slow runoff; low to high shrink-swell potential; and generally a slight hazard of water erosion.

Based on Table 3.2.3-3 and on Plate 9 of the project's Environmental Geotechnical Memorandum, the soils in the project area are mainly silty clay loams and clay loams. Permeability or hydraulic connectivity is moderately low to high and runoff rate is very slow to rapid. Soils are poorly drained to well drained and erosion hazard is low to moderately high. Shrink-swell potential varies depending on texture, but is considered high for any soils with a high clay content.

Subsurface Soil Conditions

The underlying native soil map units and their characteristics are shown in Table 3.2.3-3. Additional subsurface soil conditions and groundwater conditions[9] within the project area limits are shown in the first table on page 7 of the project's Environmental Geotechnical Memorandum.

Table 3.2.3-3. Underlying Native Soil Map Unit Characteristics of the Project Area[a]

Soil Map Unit	Soil Map Unit Name	Surface Texture	Permeability	Slope (%)	Drainage	Available Water Holding Capacity	Erosion Hazard	Shrink-Swell Potential
Sr	Sycamore silty clay loam	Silty clay loam	Moderately high	0–2	Poorly drained	High	Low	Moderate
Ss	Sycamore silty clay loam, drained	Silty clay loam	Moderately high	0–2	Poorly drained	High	Low	Moderate
CeA	Clear Lake clay	Clay	Moderately low to high	0–2	Poorly drained	Moderate	Moderate	High
HaF	Hambright loam	Loam to cobbly loam	Moderately high to high	15–40	Well drained	Very low	Moderately high	Low to moderate
CiA	Clear Lake clay, saline	Clay	Moderately low to high	0–2	Poorly drained	Low	Moderate	High
BrA	Brentwood clay loam	Clay loam	Moderately high	0–2	Well drained	High	Low	High
AoA	Antioch–San Ysidro complex	Sandy loam to clay loam	Very low to moderately low	0–2	Moderately well drained	Very low	Moderately high	Low to high

[a] Adapted from the first table shown on page 13 of the project's Environmental Geotechnical Memorandum and Soil Survey of Solano County, California (Bates 1977).

Environmental Consequences

Risk of Fault Rupture during Operations

Based on available knowledge of fault locations and fault rupture hazard, the risk of surface fault rupture in the project area is generally high because of its proximity to active faults. Fault rupture has the potential to compromise the structural integrity of proposed new facilities and cause injury to construction workers. Effects of the project alternatives related to potential structural

[9] Groundwater depths in the project area typically range from 10–15 feet below ground surface.

damage and injury caused by fault rupture would be minimized with implementation of state and local requirements and recommendations from the draft geotechnical reports.

The No-Build Alternative would not result in new structures in the project area. There would be no potential structural damage or resulting injury caused by fault rupture associated with the No-Build Alternative.

Risk from Ground Shaking during Operation

Based on available knowledge of fault locations and ground shaking potential, the possibility of the project area experiencing strong ground shaking may be considered moderate to high because of its proximity to active faults. Without proper seismic engineering, a large earthquake on a nearby fault could cause moderate ground shaking in the project area, potentially resulting in liquefaction and associated ground failure, such as lateral spreading or differential settlement, which in turn could increase the risk of structural loss, injury, or death. Effects of the project alternatives related to potential structural damage and injury caused by ground shaking would be minimized with implementation of state and local requirements and recommendations from the draft geotechnical reports.

The No-Build Alternative would not result in new structures in the project area. There would be no potential structural damage or resulting injury caused by ground shaking associated with the No-Build Alternative.

Risks from Development on Unstable Materials

Liquefaction in the project area could increase the risk of structural loss, injury, or death. Effects of the project alternatives related to potential structural damage and injury caused by liquefaction would be minimized with implementation of state and local requirements and recommendations from the draft geotechnical reports.

The impact of the post-liquefaction settlement on the roadway portions of the project alternatives is relatively small because the potentially liquefiable soil layers are generally covered by cohesive soils, which tend to serve as a “soil mat” and should reduce the potential impact of liquefaction. Any potential post-liquefaction settlement at abutments, bents, or piers of proposed bridge structures may cause downdrag (due to the clay above the liquefiable sand layer) and reduce the load carrying capacity of the piles. Typical mitigation (described below) is to design the foundation for such conditions. Based on the Environmental Geotechnical Memorandum prepared for the project alternatives, liquefaction should not have a significant affect on pavement surfaces because the resulting settlements are generally aerial in type and localized.

The No-Build Alternative would not result in new construction in the project area. There would be no potential structural damage or resulting injury resulting from development on materials prone to ground failure, including materials subject to liquefaction associated with the No-Build Alternative.

Risk from Landslides or Other Slope Failure during Operation

The project alternatives would extend across hillsides and slopes that may pose some risk from landslides or debris flows. As such, new construction in the project area would be at risk for structural damage or personal injury resulting from landslides or other slope failure.

Effects of the project alternatives related to potential structural damage and injury caused by landslides or other slope failures would be minimized with implementation of state and local requirements and recommendations from the draft geotechnical reports.

The No-Build Alternative would not result in new construction in the project area. There would be no potential structural damage or resulting injury resulting from landslides or other slope failure associated with the No-Build Alternative.

Risk during Operation as a Result of Development on Expansive Soils

Various soil map units (both surface and subsurface) in the project area have been identified as having moderate to high shrink-swell potential and therefore have the potential to compromise the structural integrity of proposed new facilities (including roadways, bridges, and other associated features). Effects of the project alternatives related to potential structural damage caused by shrink-swell would be minimized with implementation of state and local requirements and recommendations from the draft geotechnical reports. Furthermore, project activities would cause no change in current conditions with respect to the current shrink-swell hazards.

The No-Build Alternative would not result in new construction in the project area. There would be no potential structural damage or resulting injury resulting from development on expansive soils associated with the No-Build Alternative.

Risk during Operation as a Result of Weak Foundation Materials and Postconstruction Settlement

In general, short-term and long-term consolidation settlements do not appear to be a reason for concern in the project area, except near Suisun Valley Road and Dan Wilson Creek where soft clays are indicated in test borings. In these areas, consolidation settlements may pose a substantial hazard to the immediate structures. Conducting future geotechnical investigations and implementing recommendations from the draft geotechnical reports would lessen the severity of this potential hazard.

The No-Build Alternative would not result in new construction in the project area and therefore, there would be no potential structural damage or resulting injury resulting from weak foundation materials and postconstruction settlement associated with the No-Build Alternative.

Runoff, Erosion, and Sedimentation from Grading Activities Associated with Construction

Grading, excavation, removal of vegetation cover, and loading activities associated with construction activities could temporarily increase erosion and sedimentation. Construction

activities also could result in soil compaction and wind erosion effects that could adversely affect soils and reduce the revegetation potential at the construction sites and staging areas.

A SWPPP will be developed by a qualified engineer or erosion control specialist and implemented before construction as described in Section 3.2.2, "Water Quality and Stormwater Runoff." Furthermore, compliance with the County's Grading Ordinance also would minimize any negative effects associated with erosion and sedimentation. A grading permit as required by Chapter 31 of the Solano County Code (Solano County 2009) will be required for this project. As part of this permit, the project applicant will be required to submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Additionally, standard conditions in the grading permit include an extensive list of BMPs similar to those described in a SWPPP above.

The No-Build Alternative would not result in new construction in the project area. There would be no effects from runoff, erosion, and sedimentation from grading activities associated with construction.

Avoidance, Minimization, and/or Mitigation Measures

Future measures need to be conducted/developed prior to/or during the plans, specification, and estimate phase for any build alternative.

Implement Requirements from State and Local Standards into Final Project Design

UBC Seismic Hazard Zone 4/CBSC, Department, and County General Plan standards are required to be implemented and incorporated into the project design for applicable features to minimize the potential fault rupture, ground shaking, liquefaction, and shrink-swell hazards on associated project features. Structures must and will be designed to meet the regulations and standards associated with UBC Seismic Hazard Zone 4 hazards.

Implement Recommendations from Draft Geotechnical Reports to Accommodate Permanent Fault-Related Ground Deformation Effects from Surface Fault Rupture on Project Facilities and to Accommodate Effects of Ground Shaking on Project Facilities

Recommendations from both the Fault Rupture Assessment and the Environmental Geotechnical Memorandum for the proposed project will be incorporated in to the final project design.

The primary rupture zone for the Cordelia fault does not intersect proposed elevated structures, and thus the risk for surface-fault rupture is considered low. However, to account for uncertainty in the borehole and geophysical data that led to these conclusions, proposed structures should be designed to accommodate minor secondary displacement (e.g., tilting, shearing, and settlement) associated with an earthquake on the Cordelia fault.

The following recommendations from the Fault Rupture Assessment report and project's Environmental Geotechnical Memorandum will be incorporated in to the final project design to accommodate permanent fault-related ground deformation effects from surface fault rupture on project facilities.

- As described in the Fault Rupture Assessment, fault rupture hazard maps prepared for both the Cordelia and Green Valley Project sites should be considered during design of the proposed elevated structures for mitigation of surface-fault rupture. This could include avoidance where possible, or if not possible, special design to accommodate the estimated coseismic displacement yielded by the two approaches.[10]
- As described in the Environmental Geotechnical Memorandum, if avoidance is not possible, special design should be considered to accommodate the displacement estimated by the Department and based on scenario-based fault displacement hazard (FDHA) analysis approach.
- Department engineers responsible for the design of the elevated structures should evaluate the state's recommended criteria, Draft Memo to Designers 20-10 (California Department of Transportation 2007) for surface-fault rupture with regard to the results of the fault hazard displacement analysis. A geotechnical engineer and/or structural engineer should review the results of the two methods, consider an appropriate factor of safety and design the structures with respect to permanent ground deformation, as recommended in the Fault Rupture Assessment.
- On the basis of the Department's Draft Memo to Designers 20-10 (California Department of Transportation 2007), a fault displacement of 1.9 feet from the Green Valley fault should be considered in the design of elevated structures crossing the fault zone.

Based on the attenuation relation by Sadigh et al. (1997), the controlling fault is the Cordelia fault, and peak bedrock acceleration of 0.6 *g* is anticipated in the project area. The following recommendations from the Fault Rupture Assessment and the Environmental Geotechnical Memorandum will be incorporated in to the final project design to accommodate effects of ground shaking on project facilities:

- Structures should be designed based on the Acceleration Response Spectrum (ARS) Curve according to the *Caltrans Seismic Design Criteria Manual*.[11]
- Geologic conditions encountered at the Cordelia project site included lenses of saturated granular deposits. The Cordelia project site should be evaluated for liquefaction, lateral spreading and settlement associated with strong ground shaking.
- Geologic conditions encountered at the Green Valley project site included lenses of saturated fine- to coarse-grained deposits along the western and eastern margins of Quarry Hill. Portions of the Green Valley site should be evaluated for liquefaction, lateral spreading, and settlement associated with strong ground shaking.

[10] The fault displacement hazard analysis and the resulting displacement values for the multiple fault traces comprising the Green Valley fault depend on site information and results from previous studies. Future investigations (trenches and boreholes) may allow refinement of the calculations, an improved model of uncertainties, and revised fault rupture hazard maps.

[11] The criteria include, but are not limited to, designing infrastructure that can withstand an earthquake of magnitude 7.5 and a peak bedrock acceleration of 0.6 *g* with modifications. Other specific design criteria are further described in the *Caltrans Seismic Design Criteria Manual* (California Department of Transportation 2006b).

Conduct Future Geotechnical Investigations

In accordance with applicable state and local laws, a final geotechnical investigation (or investigations) will be conducted to evaluate the engineering properties of the subsurface soil materials for recommendation of geotechnical parameters, to address geotechnical hazards (e.g., slope stability, differential settlement) associated with different design elements, as well as hazards associated with potential fault rupture/creep or strong ground motion (e.g., shaking, liquefaction, earthquake-induced landslides).[12] The final geotechnical investigation will include recommendations for designing specific project elements to accommodate the effects of fault rupture and ground shaking.

Implement Recommendations from Draft Geotechnical Report to Accommodate Effects of Liquefaction on Project Facilities/Design Specific Project Elements to Accommodate Effects of Liquefaction

The following recommendations from the project's Environmental Geotechnical Memorandum will be incorporated into the final project design.

- Design foundations to withstand the effects of liquefaction. Any downdrag load on the piles due to potential post-liquefaction settlement should be considered in the vertical pile capacity analyses.
- Shallow zones of liquefiable materials can be removed and replaced or treated with materials that can improve their properties (such as by grouting).
- Site-specific liquefaction potential in areas with moderate and/or high liquefaction susceptibility should be evaluated in the plans, specifications, and estimates phase.

If shallow zones of liquefiable soils or soils susceptible to seismically induced settlement are determined to be present at any location where project activities would occur, corrective actions shall be taken, including removal and replacement of soils; on-site densification; grouting; and design of special foundations or other similar measures, depending on the extent and depth of susceptible soils. All of these measures reduce pore water pressure during ground shaking by densifying the soil or improving its drainage capacity.

Conduct Future Geotechnical Investigation/Implement Preliminary Recommendations from Draft Geotechnical Report to Accommodate Effects of Slope Failure on Project Facilities

The following recommendations from the project's Environmental Geotechnical Memorandum will be incorporated into the final project design.

- Because significant grading can be expected for construction of the roadway, site-specific investigation of those mapped landslides will be needed to assess the potential impacts and formulate appropriate mitigation measures.

[12] The last section of the Environmental Geotechnical Memorandum provides a recommended scope of geotechnical investigation.

- Specific recommendations pertaining to cut slopes and fill slopes/embankments should be incorporated into the final project design. For cut slopes, recommendations pertaining to suggested slope gradients, rock bedding and joint evaluation, drilling and geophysical testing, and slope stabilization measures should be implemented. For fill slopes/embankments, recommendations pertaining to suggested slope gradients and slope stabilization measures should be implemented.

Implement Preliminary Recommendations from Draft Geotechnical Report to Accommodate Effects of Consolidation Settlements on Project Facilities

The following recommendations from the project's Environmental Geotechnical Memorandum report will be incorporated into the final project design.

- Department embankment construction standards as outlined in Section 19 of the California Department of Transportation Standards Specifications (California Department of Transportation 2006c) should be followed.
- If further investigation shows that consolidation settlement may become critical to the other project improvements, mitigation measures such as phased construction, implementation of waiting periods, surcharge fill, wick drain installation, and monitoring may be required.

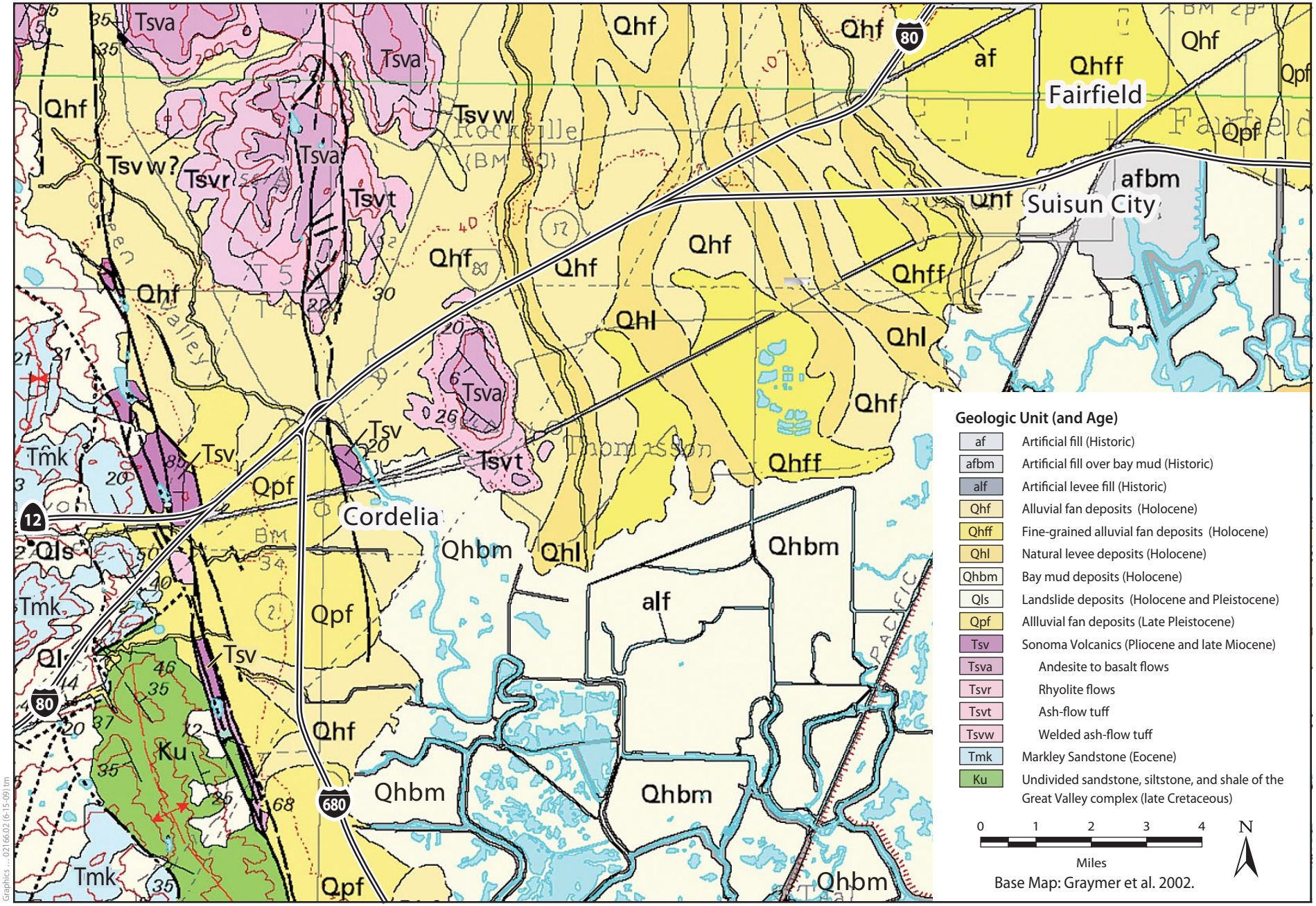

Figure 3.2.3-1
Geologic Map of the Project Vicinity

3.2.4 Paleontology

Regulatory Setting

Paleontology is the study of life in past geologic time based on fossil plants and animals. A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized or funded projects (e.g., Antiquities Act of 1906 [16 USC 431-433], Federal-Aid Highway Act of 1960 [23 USC 305], and the Omnibus Public Land Management Act of 2009 [16 USC 470aaa]). Under California law, paleontological resources are protected by the California Environmental Quality Act.

Federal Regulations

Omnibus Public Lands Act of 2009

The Omnibus Public Lands Act of 2009 (H.R. 146 [2009], Pub. L. No. 111-11) includes provisions for the protection and preservation of paleontological resources. Under this law, the Secretaries of both the Department of the Interior and the Department of Agriculture are directed to inventory, manage, and protect paleontological resources on the public lands they administer. In addition, the Secretaries are directed to coordinate these efforts and to establish education programs to increase public awareness of the significance of paleontological resources. The law also prohibits the collection of paleontological resources from federal land without a permit, except in the case of noncommercial collecting that complies with other regulations for that federal land.

State Regulations

California Environmental Quality Act

CEQA encourages the protection of all aspects of the environment by requiring state and local agencies to prepare multidisciplinary analyses of the environmental impacts of a proposed project and to make decisions based on the findings of those analyses.

CEQA includes in its definition of *historical resources* "any object [or] site … that has yielded or may be likely to yield information important in prehistory" (State CEQA Guidelines 15064.5[3]), which typically is interpreted as including fossil materials and other paleontological resources. More specifically, destruction of a "unique paleontological resource or site or unique geologic feature" constitutes a significant impact under CEQA (State CEQA Guidelines, Appendix G). The treatment of paleontological resources under CEQA is generally similar to the treatment of cultural resources, requiring an evaluation of resources in a project's area of potential effects; an assessment of potential impacts on significant or unique resources; and the development of mitigation measures for potentially significant impacts, which may include monitoring combined with data recovery or avoidance.

California Public Resources Code

Several sections of the California Public Resources Code (PRC) protect paleontological resources. PRC 5097.5 prohibits "knowing and willful" excavation, removal, destruction, injury, and defacement of any paleontologic feature on public lands (lands under the jurisdiction of a state, county, city, district, or public authority or under the jurisdiction of a public corporation), except where the agency with jurisdiction has granted express permission. PRC 30244 requires reasonable mitigation for impacts on paleontological resources that occur as a result of development on public lands. The sections of the California Administrative Code relating to the state Division of Beaches and Parks afford protection to geologic features and "paleontological materials" but grant the director of the state park system authority to issue permits for specific activities that may result in damage to such resources, if the activities are in the interest of the state park system and for state park purposes (California Administrative Code 4307–4309).

Local Regulations

The Solano County General Plan does not have policies related to paleontological resources. However, the background report prepared for the Solano County General Plan update (EDAW 2006:7-23–7-26) assigns a paleontological sensitivity to geologic units found in the county. The sensitivity evaluations are based on the Society of Vertebrate Paleontology (SVP) guidelines and record searches of the University of California Museum of Paleontology (UCMP) database (EDAW 2006:7-20 and 7-26). In addition, the EIR written for the general plan update provides mitigation measures to protect paleontological resources (EDAW 2008:4.10-39–4.10-40).

Professional Standards and Guidelines

In response to a recognized need for standard guidance, the SVP published *Standard Guidelines for the Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources*, a set of standard guidelines that are now widely followed (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995, updated 2007). These guidelines are generally consistent with Caltrans criteria and represent the accepted standard of care for paleontological resources. The SVP guidelines identify two key phases in the process for protecting paleontological resources from project impacts.

1. Assess the likelihood that the project's area of potential effect contains significant nonrenewable paleontological resources that could be directly or indirectly affected, damaged, or destroyed as a result of the project.
2. Formulate and implement measures to mitigate potential adverse impacts.

An important strength of the SVP's approach to assessing potential impacts on paleontological resources is that the SVP guidelines provide some standardization in evaluating a project area's paleontological sensitivity. Table 3.2.4-1 defines the SVP's sensitivity categories for paleontological resources and summarizes SVP's recommended treatments to avoid adverse impacts in each sensitivity category.

Table 3.2.4-1. Society of Vertebrate Paleontology's Definitions of Sensitivity Categories and Recommended Treatment for Paleontological Resources

Sensitivity Category	Definition	Recommended Mitigation Treatment
High	Areas underlain by geologic units from which vertebrate or significant invertebrate fossils or suites of plant fossils have been recovered	• Preliminary survey and surface salvage before construction begins • Monitoring and salvage during construction • Specimen preparation; identification, cataloging, curation, and storage of materials recovered • Preparation of final report describing finds and discussing their significance • All work should be supervised by a professional paleontologist who maintains the necessary collecting permits and repository agreements
Undetermined	Areas underlain by geologic units for which little information is available	• Preliminary field surveys by a qualified vertebrate paleontologist to assess the project area's sensitivity • Design and implementation of mitigation if needed, based on the results of field survey
Low	Areas underlain by geologic units that are not known to have produced a substantial body of significant paleontologic material	Protection and salvage generally are not required; however, a qualified paleontologist should be contacted if fossils are discovered during construction, in order to salvage finds and assess the need for further mitigation

Source: Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995 and 2007.

SVP's guidelines also provide a working definition of *significance* as applied to paleontological resources. According to SVP, significant paleontological resources are those that fulfill one or more of the following criteria (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995 and 2007).

- Provide important information shedding light on evolutionary trends and/or helping to relate living organisms to extinct organisms.
- Provide important information regarding the development of biological communities.
- Demonstrate unusual circumstances in the history of life.
- Represent a rare taxon or a rare or unique occurrence; are in short supply and in danger of being destroyed or depleted.
- Have a special and particular quality, such as being the oldest of their type or the best available example of their type.
- Provide important information used to correlate strata for which it may be difficult to obtain other types of age dates.

Significant paleontological resources may include vertebrate fossils and their associated taphonomic and environmental indicators; invertebrate fossils; and/or plant fossils.

Affected Environment

The information in this section is taken from the *I-80/I-680/SR 12 Interchange Project, Paleontological Sensitivity Analysis* conducted for the proposed project in 2009.

Site Geology

Site geology is provided in Section 3.2.3, "Geology/Soils/Seismic/Topography," Figure 3.2.3-1 is a generalized geologic map of the project site, based on the work of Graymer et al. (2002).

Paleontological Sensitivity

Most of the project alternatives would be located on Holocene alluvial fan deposits (Qhf or Qhff) or levee deposits (Qhl) (Graymer et al. 2002) (Figure 3.2.4-1). These deposits are young and have low potential to contain paleontological resources (in contrast to older sediments of Pleistocene age), and there are no known records of vertebrate fossils in these deposits in Solano County (University of California Museum of Paleontology 2007). Although the alluvial fan deposits (Qhf) are not considered highly sensitive, they may overlie relatively shallow Pleistocene sediments that could be sensitive. The depth of the Holocene alluvial fan deposits ranges from approximately 0 to 25 feet.

The results of database and literature searches indicate that units are highly sensitive for paleontological resources. Table 3.2.4-2 summarizes paleontological resources and sensitivity of geological units in the project area.

Some of the western and southern portion of the project area is located in Late Pleistocene alluvial fan deposits (Qpf). Although there are no known fossils records from this deposit within Solano County, diverse vertebrate faunas have been collected from similar Pleistocene alluvial units in other parts of northern California. These deposits are sensitive for paleontological resources because they tend to contain vertebrate fossils. In addition, Pleistocene units containing nonmarine fossil are considered highly sensitive.

Outcrops of the Sonoma Volcanics (Tsvt and Tsva) occur in the western portion of the project area, west of Suisun Creek, and in the vicinity of the I-80/SR 12W interchange. Of the 69 records of vertebrate fossils in Solano County (University of California Museum of Paleontology 2007a), 29 are from the Sonoma Volcanics unit. These records include horse, deer, and unidentified mammals. The unit is sensitive for paleontological resources because it is known to contain vertebrate fossils.

The Markley Sandstone occurs on the western edge of the project area. This unit is a marine deposit containing bony fish (Osteichthyes) fossils, as well as gastropods and microfossils. The UCMP (2007a) database has no records of fossils from the Markley Formation in Solano County, but it does have four records of Osteichthyes in this unit in neighboring Contra Costa County. The unit is sensitive for paleontological resources because it contains vertebrate fossils (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995).

Table 3.2.4-2. Preliminary Summary of Paleontological Resource Sensitivity for Geologic Units in the I-80/I-680/SR 12 Interchange Project Area[a]

Geologic Unit	Age	Fossil Content and Fossils	Solano County General Plan Background Report Description of Sensitivity[b]	Potential to Contain Significant Fossils
Artificial fill (af)	Historic	Deposits are artificial and will not contain fossils	Holocene alluvium does not contain paleontologically sensitive resources	No potential for fossils
Artificial fill over bay mud (afbm)	Historic	Deposits are artificial and will not contain fossils		No potential for fossils
Alluvial fan deposits (Qhf)	Holocene	No record of fossils in the project area; in general, these younger alluvial units do not contain significant vertebrate fossils		Low; however, it may form only a thin veneer over sensitive Pleistocene sedi-ments (Graymer et al. 2002)
Fine-grained alluvial fan deposits (Qhff)	Holocene	No record of fossils in the project area; in general, these younger alluvial units do not contain significant vertebrate fossils		Low
Natural levee deposits (Qhl)	Holocene	No record of fossils in the project area; most likely no significant fossils in this unit		Low
Landslide deposits (Qls)	Holocene and Pleistocene	No record of fossils in the project area; these deposits are shed from the hills to the northwest; it is possible that landslide units of Pleistocene age could contain significant vertebrate fossils	Not applicable	Unknown and monitoring or detailed geologic mapping of this unit should occur
Allluvial fan deposits (Qpf)	Late Pleistocene	No record of fossils in the project area; however, diverse vertebrate faunas have been collected from other similar Pleistocene alluvial units in northern California; Pleistocene alluvial units tend to contain vertebrate fossils	Pleistocene alluvium is highly sensitive for paleontological resources	High
Sonoma Volcanics (Tsv) and ash-flow tuff (Tsvt)—subdivision of Sonoma volcanics	Pliocene and late Miocene	This unit is well known for its fossils; the UCMP (2007a) database includes 29 records of vertebrate fossils in this unit in Solano County alone; records are of unidentified mammals, one horse (*Equus occidentalis*), and deer (Cervidae)	Sonoma Volcanics are highly sensitive for paleontological resources	High
Markley Sandstone (Tmk)	Eocene	This unit is a marine deposit and contains bony fish (Osteichthyes) fossils, as well as gastropods and microfossils; no records of fossils from the unit in Solano County, but the UCMP (2007a) database contains four records of Osteichthyes (bony fishes) in neighboring Contra Costa County	Fossils commonly found in the Markley Formation are not highly sensitive because of their abundance, but there is potential for significant resources	High
Undivided sandstone, siltstone, and shale of the Great Valley complex (Ku)	Late Cretaceous	The UCMP database contains no records of fossils from the Great Valley complex (or sequence), and there is only one record of a Cretaceous fossil not assigned to a unit; however, strata of Great Valley complex in other areas are known to contain Cretaceous marine fossils, including invertebrates and marine reptiles (University of California Museum of Paleontology 2007b)		High

[a] Information is based on geologic formations identified in the project area from the geologic map of Graymer et al. (2002), UCMP database searches (2007), and a review of the *Solano County General Plan* (EDAW 2006).
[b] EDAW 2006.

Environmental Consequences

Impacts on paleontological resources were analyzed qualitatively, based on professional judgment. This analysis focuses on (1) identifying activities with the potential to disturb, damage, or destroy paleontological resources if any are present on the work site and (2) developing a strategy to ensure that mitigation requiring paleontological sensitivity assessment and appropriate treatment developed on a site-specific basis is in place for those activities identified as likely to result in damage.

Two factors are considered when evaluating a proposed project's potential to disturb or damage significant paleontological resources. First, most vertebrate fossils are rare and are therefore considered important paleontological resources. Second, unlike archaeological sites, which are narrowly defined, paleontological sites are defined by the entire extent (both areal and stratigraphic) of a unit or formation. In other words, once a unit is identified as containing vertebrate fossils or other rare fossils, the entire unit is a paleontological site (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995 and 2007).

Because excavation can disturb or destroy paleontological resources, the potential for impacts on paleontological resources is based on the depth and extent of excavation and the paleontological sensitivity of the units. Figures 3.2.4-2, 3.2.4-3a and b, and 3.2.4-4a and b show areas where bridge work will occur and the area where excavation for the Red Top Road expansion will occur. These areas are overlain on the sensitivity of the geologic units for paleontological resources. Note that not all the ground in the bridge areas will be excavated (i.e., excavation for footings will occur in localized areas within the bridge areas), but the entire Red Top Road expansion area will be excavated. The figures evaluate the potential to encounter paleontological resources during excavation. Three designations are given to excavation:

- Excavation in areas with high potential for paleontological resources (i.e., areas of paleontologically sensitive high-potential units such as the Sonoma Volcanics and Late Pleistocene alluvial deposits, and areas with shallow low-potential units—Holocene deposits believed to be less than 15 feet thick—overlying high-potential units such as Late Pleistocene alluvial deposits).
- Excavation in areas with low potential for paleontological resources (i.e., Holocene deposits believed to be greater than 15 feet thick).
- Excavation in areas with unknown potential for paleontological resources (i.e., thickness of Holocene deposits is unknown).

Although Figures 3.2.4-2, 3.2.4-3a and b, and 3.2.4-4a and b provide more detailed information on the potential to encounter paleontological resources, the figures are approximate (i.e., they are not georectified and the exact boundaries and depths of geologic units is not known).

Destruction of Vertebrate or Otherwise Scientifically Significant Paleontological Resources as a Result of Construction Activities

Several units are sensitive for paleontological resources and fossils could be present in the project area. Figure 3.2.4-2, Figure 3.2.4-3a, and Figure 3.2.4-3b show the locations of the following sensitive units.

- Relatively shallow Pleistocene sediments that could be sensitive underlying Holocene alluvial fan deposits (Qhf), which range in depth from approximately 0 to 25 feet, in the central and eastern portion of the project area—the likelihood of encountering sensitive deposits increases with depth and with proximity to surficial exposures of sensitive deposits.
- Late Pleistocene alluvial fan (Qpf) deposits that are highly sensitive in the western portion of the project area—although there are no known fossils records from this deposit within Solano County, diverse vertebrate faunas have been collected from similar Pleistocene alluvial units in other parts of northern California. These deposits are sensitive for paleontological resources because they tend to contain vertebrate fossils.
- Outcrops of Sonoma Volcanics (Tsvt and Tsva) that are highly sensitive in the western portion of the project area, west of Suisun Creek, and in the vicinity of the I-80/SR 12W interchange—of the 69 records of vertebrate fossils in Solano County (University of California Museum of Paleontology 2007), 29 of them are from the Sonoma Volcanics unit, including horse, deer, and unidentified mammals (Table 3.2.4-2).

If fossils are present in the project area, they could be damaged during project construction. Substantial damage to or destruction of significant paleontological resources as defined by the SVP (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995and 2007) would represent an impact.

The effect under Alternative C would be the same as under Alternative B but to a greater extent (Figure 3.2.4-2, Figure 3.2.4-4a, and Figure 3.2.4-4b). Table 3.2.4-3 compares the impacts of major excavation areas for Alternatives B and C on paleontological resources based on depth and extent of excavation and the paleontological sensitivity of the unit. Only project components that differ between alternatives are included. It should be noted, however, that both alternatives involve extensive, deep grading associated with the Red Top Road expansion in the paleontologically sensitive Markley Sandstone (Eocene), Sonoma Volcanics (Pliocene and late Miocene), and alluvial fan deposits (Late Pleistocene). It would not be possible to avoid paleontologically sensitive units in the project area because they are widespread. Any improvements involving excavation for bridge or overcrossing footings in the vicinity of the I-80/I-680 or I-80/SR 12W interchanges would, therefore, have the potential to affect significant paleontological resources.

Table 3.2.4-3. Comparison of Paleontological Impacts by Alternative

Project Component	Alternative B		Alternative C		Comment
	Activity	Sensitivity of Work Area	Activity	Sensitivity of Work Area	
New Interchange at SR 12W and I-80	Excavation of bridge footings excavated for improvements	High	Excavation of numerous bridge footings for new interchange and expansion	High	Alternative C involves many more footings and greater excavation area
Realignment of I-680	None	None	Grading	High	Alternative C involves extensive ground-disturbing activities
Improvements of I-80 and I-680	Grading for expanded interchange and excavation of footings for new bridge over Green Valley Creek	High to low	Excavation of footings for new bridge over Green Valley Creek	Low	Alternative B involves more extensive excavation, including excavation in a sensitive unit
New Single-Span Bridges over Green Valley Creek	None	None	Excavation of bridge footings	Low at surface but unknown at depth	
New Bridge at Suisun Creek	Excavation of bridge footings	Low	None	None	Alternative B would involve more excavation but only in low-sensitivity units
Truck Scale On-Ramp to Eastbound I-80	Excavation of bridge footings	Low at surface but unknown at depth	None	None	All impacts are related to Alternative B; impacts will depend on depth of excavation relative to depth of Holocene deposits
New Central Interchange					
Widened Bridge at Myer Lane over Ledgewood Creek					
New Overcrossing at Beck Avenue	None	None	Excavation of bridge footings for new overcrossing	Low at surface but unknown at depth	All impacts are related to Alternative C; impacts will depend on depth of excavation relative to depth of Holocene deposits

Notes: Project components common to both alternatives are not included in this table.
Alternative with greater impact is shaded.

The effect under the fundable first phases of the alternatives would be the same as the full-build alternatives but to a lesser extent, given the smaller project footprint and the smaller amount of excavation. Implementation of avoidance and minimization measures listed below would result in no adverse effect relating to destruction of vertebrate or otherwise scientifically significant paleontological resources under all build alternatives.

There would be no excavation or other ground disturbance under the No-Build Alternative. Therefore, there would be no potential for adverse effect relating to paleontological resources under the No-Build Alternative.

Avoidance, Minimization, and/or Mitigation

Avoidance or minimization would not be possible because paleontologically sensitive units in the project area are widespread. Any improvements involving excavation for bridge or overcrossing footings in the vicinity of the I-80/I-680 or I-80/SR 12W interchanges would, therefore, have the potential to affect significant paleontological resources.

Mitigation measures that will be used to reduce project effects are described below. As part of the monitoring and mitigation strategy, further geotechnical data will be reviewed as they become available, and this information will be used to develop and refine an appropriate, effective, and feasible monitoring and mitigation strategy.

Conduct Preconstruction Surveys

The Department will conduct preconstruction studies to ensure that paleontological materials exposed at the surface are recovered and properly prepared and curated, or protected from damage using exclusion fencing or other appropriate means, and to further assess potential for impacts.

Educate Construction Personnel in Recognizing Fossil Material

The applicant will ensure that all construction personnel receive training provided by a qualified professional paleontologist experienced in teaching non-specialists, to ensure that they can recognize fossil materials in the event any are discovered during construction.

Retain a Qualified Professional Paleontologist to Monitor Ground-Disturbing Activities

In accordance with the Department's standard mitigation procedures for construction in units with the potential to contain fossils, the applicant will retain a qualified professional paleontologist as defined by the Department's Standard Environmental Reference to monitor activities during key portions of the project (typically, those involving substantial disturbance in previously undisturbed materials with paleontological sensitivity). Data gathered during preconstruction surveys for paleontological resources, and detailed project design, will be used to determine the activities that will require the presence of a monitor. In general, these activities include any ground-disturbing activities involving excavation in areas with high potential to contain fossils or excavation deeper than three feet in areas with low or unknown potential to contain fossils. Recovered fossils will be prepared so that they can be properly documented. Recovered fossils will then be curated at a facility that will properly house and label them, maintain the association between the fossils and field data about their provenance, and make the information available to the scientific community.

Stop Work and Conduct Appropriate Treatment if Substantial Fossil Remains Are Encountered During Construction

In accordance with the Department's standard mitigation procedures for construction in units with the potential to contain fossils, when requested by the paleontological monitor, earth-disturbing activities will be stopped in an area or diverted to allow for the safe recovery of fossil specimens. Additionally, if construction personnel observe fossils in an area where

paleontological resources were not anticipated and paleontological monitors are therefore not present, earth-disturbing activities will be stopped until the material can be evaluated by a monitor and appropriate treatment taken. Recovered fossils will be prepared so that they can be properly documented. Recovered fossils will then be curated at a facility that will properly house and label them, maintain the association between the fossils and field data about their provenance, and make the information available to the scientific community. The applicant will be responsible for ensuring that monitor's recommendations regarding treatment and reporting are implemented.

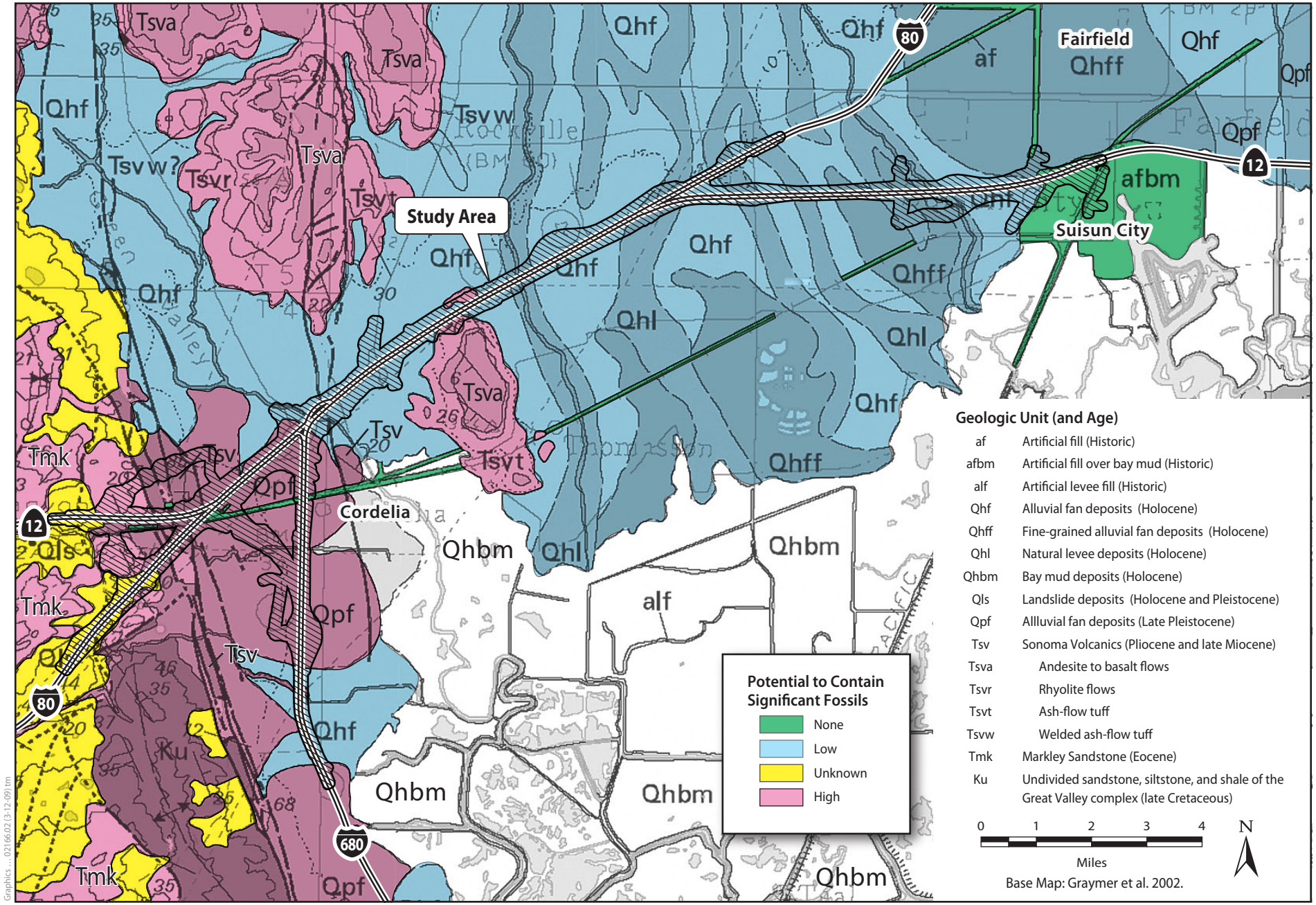

Figure 3.2.4-1
Paleontological Sensitivity Map of the Project Area

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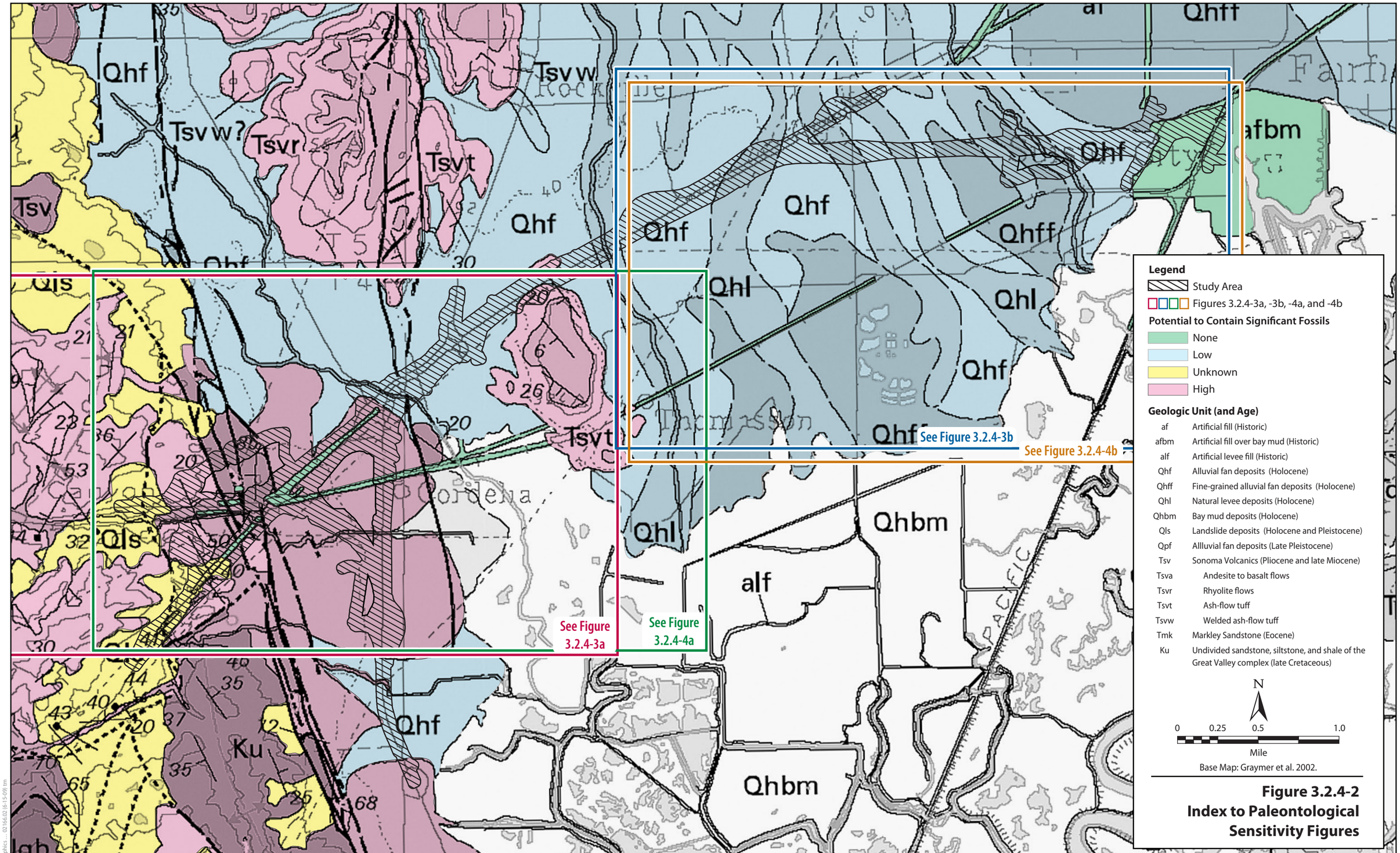

Figure 3.2.4-2
Index to Paleontological Sensitivity Figures

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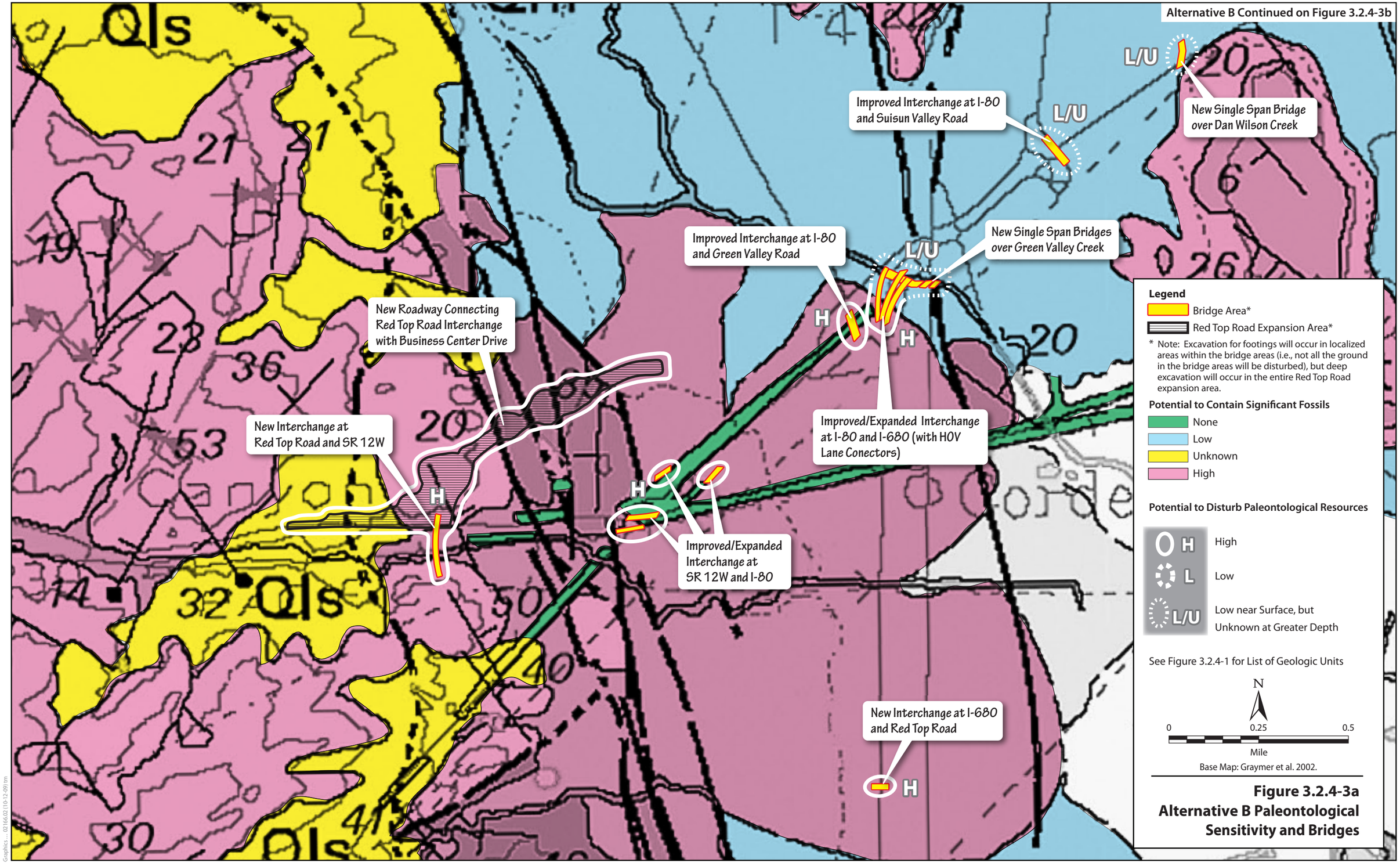

Figure 3.2.4-3a
Alternative B Paleontological Sensitivity and Bridges

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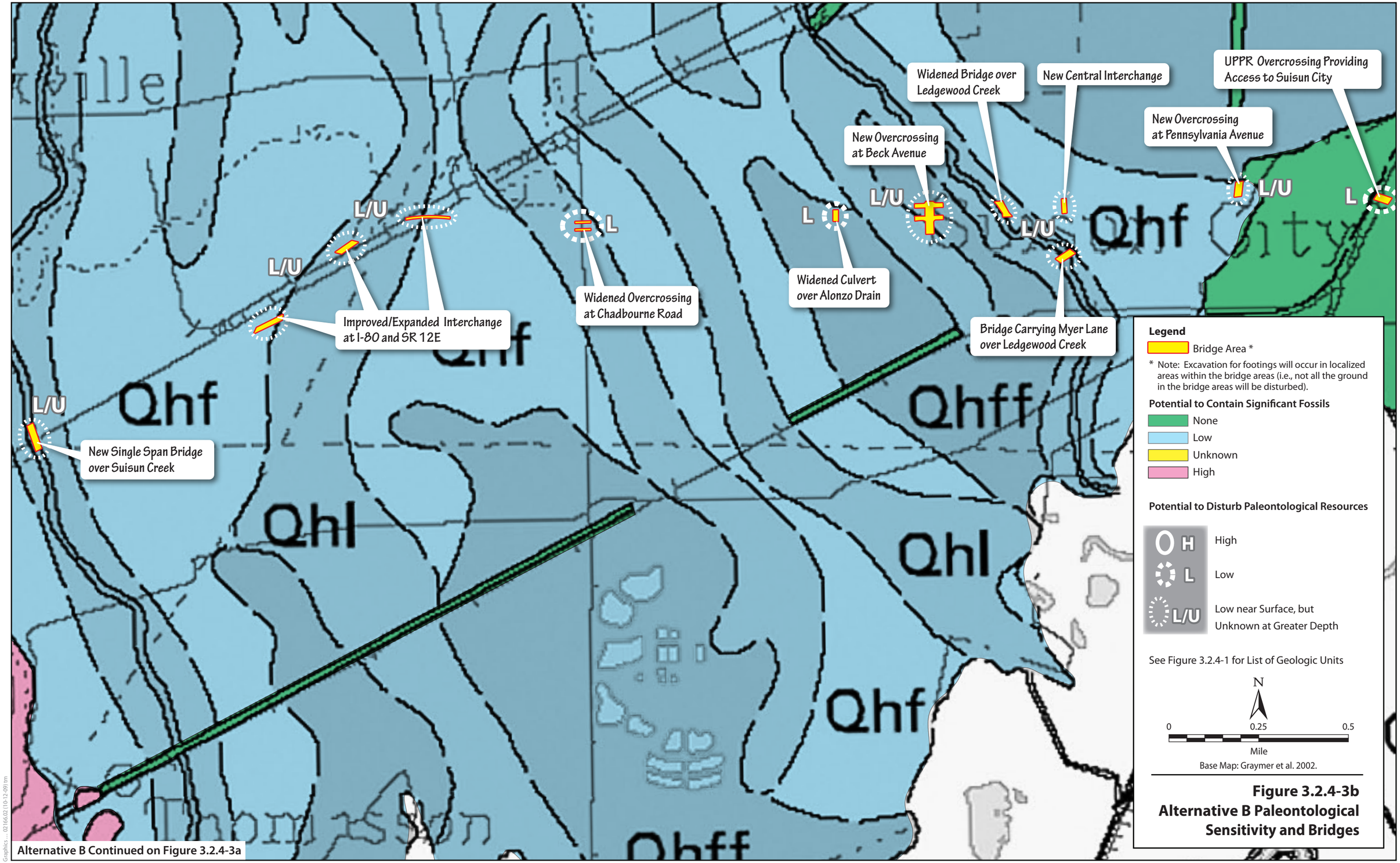

Figure 3.2.4-3b
Alternative B Paleontological Sensitivity and Bridges

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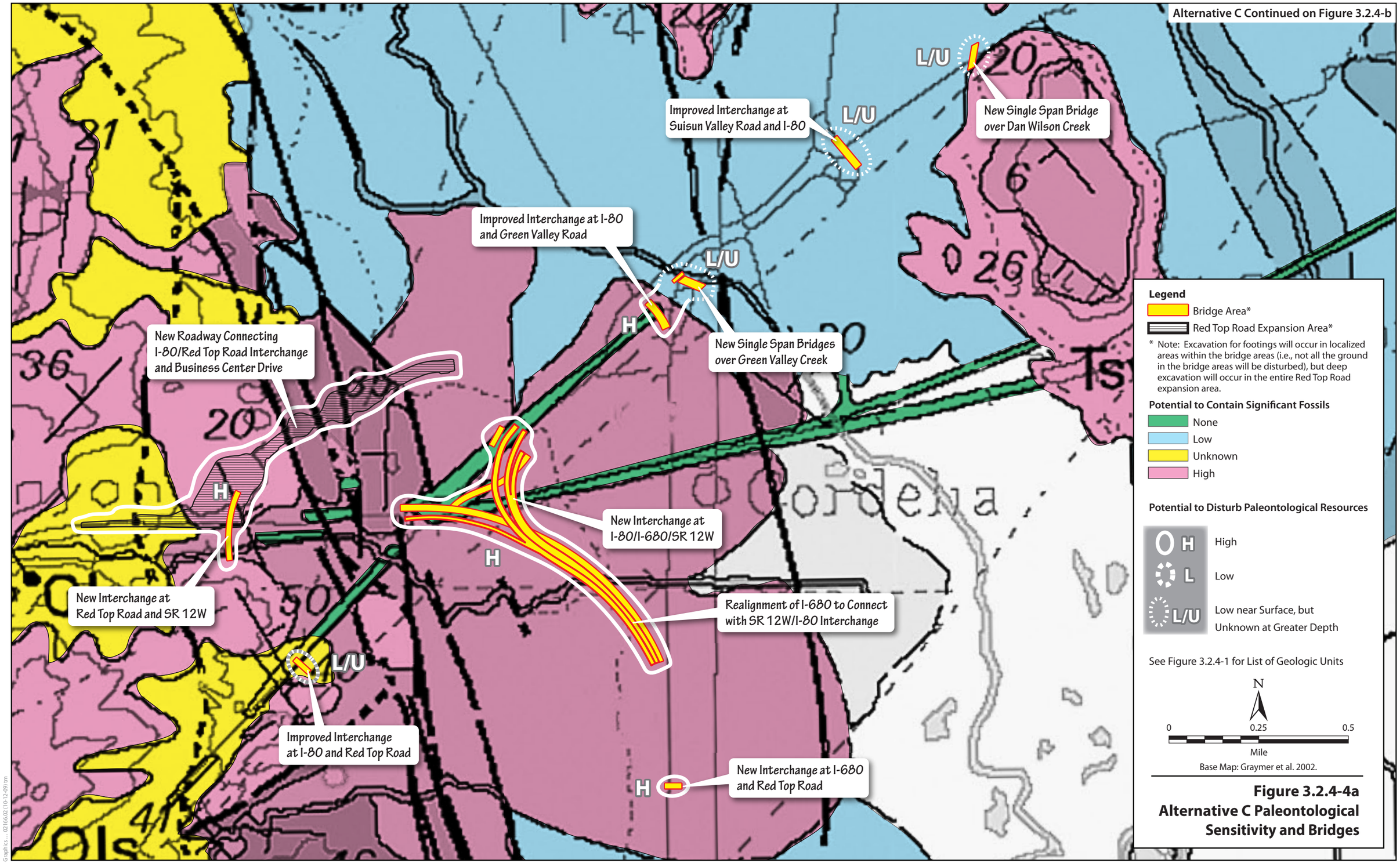

Figure 3.2.4-4a
Alternative C Paleontological Sensitivity and Bridges

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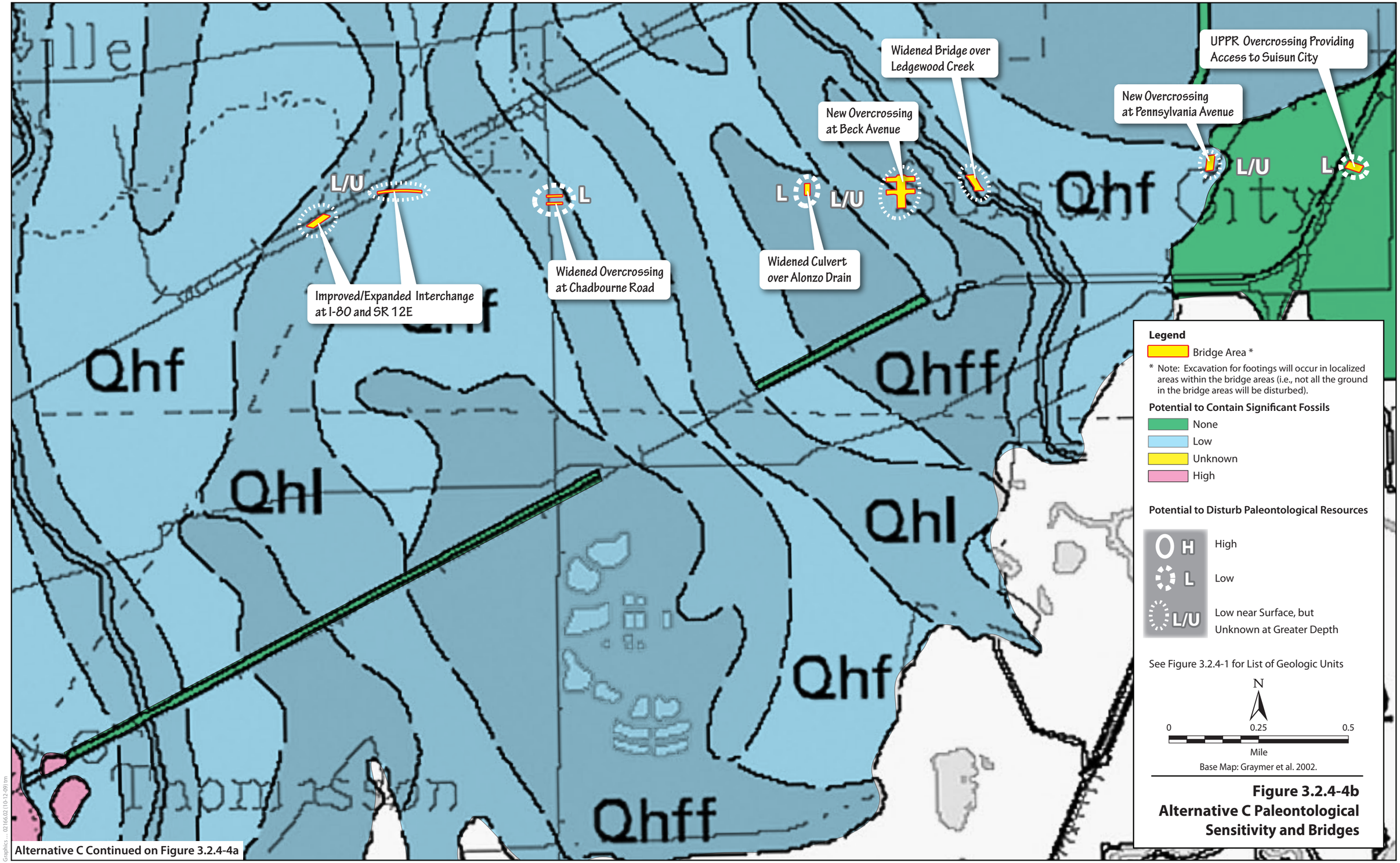

Figure 3.2.4-4b
Alternative C Paleontological Sensitivity and Bridges

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