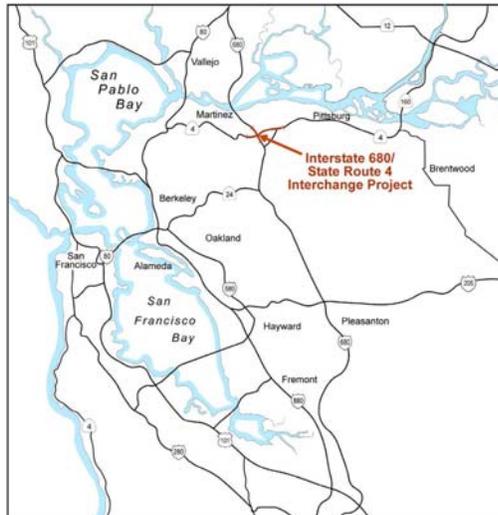


Interstate 680/State Route 4 Interchange Improvement Project

CONTRA COSTA COUNTY, CALIFORNIA
DISTRICT 4 – CC – 680 (PM 20.2/22.2), DISTRICT 4 – CC – 4 (PM R10.5/R15.1)
229100

Initial Study with Negative Declaration / Environmental Assessment with Finding of No Significant Impact



**Prepared for the
State of California Department of Transportation
in cooperation with the Contra Costa Transportation Authority**

The environmental review, consultation, and any other action required in accordance with applicable Federal laws for this project is being, or has been, carried out by Caltrans under its assumption of responsibility pursuant to 23 U.S.C. 327.



November 2008

General Information About This Document

For individuals with sensory disabilities, this document is available in Braille, large print, on audiocassette, or computer disk. To obtain a copy in one of these alternate formats, please call or write to Department of Transportation, Attn: Brigetta Smith, Office of Public Information, P.O. Box 23660, Oakland, CA, 94623-0660, email: Brigetta_Smith@dot.ca.gov, or use the California Relay Service TTY number 1 (800) 735-2929 (TTY), 1 (800) 735-2929 (Voice), or 711.

It should be noted that at a future date, the Department acting through FHWA or another federal agency may publish a notice in the Federal Register, pursuant to 23 USC §139(l), indicating that a final action has been taken on this project by the Department or another federal agency. If such notice is published, a lawsuit or other legal claim will be barred unless it is filed within 180 days after the date of publication of the notice (or within such shorter time period as is specified in the Federal laws pursuant to which judicial review of the federal agency action is allowed). If no notice is published, then the lawsuit or claim can be filed as long as the periods of time provided by other Federal laws that govern claims are met.

State Clearinghouse Number: 2006082017
04-CC-680, KP32.5/35.8
04-CC-004, KP16.9/24.3
EA 229100

Located at the interchange of Interstate 680 (Kilometer Post 32.5/35.8) and
State Route 4 (Kilometer Post R16.9/24.3)

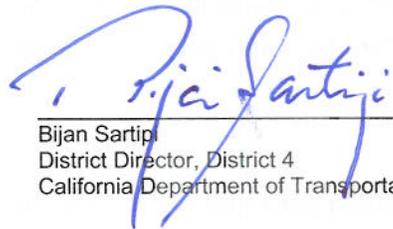
**Initial Study with Negative Declaration / Environmental Assessment with
Finding of No Significant Impact**

Submitted Pursuant to: (State) Division 13, California Public Resources Code
(Federal) 42 USC 4332(2)(C)

THE STATE OF CALIFORNIA
Department of Transportation and
CONTRA COSTA TRANSPORTATION AUTHORITY

11-26-08

Date of Approval



Bijan Sartipi
District Director, District 4
California Department of Transportation



Negative Declaration (ND)

Pursuant to: Division 13, Public Resources Code

Project Description

The proposed project is to construct a phased sequence of improvements to the I-680/SR-4 interchange in Contra Costa County, California, to alleviate operational deficiencies currently experienced through the facility.

The project would consist of five phases of improvements. All phases are included in the MTC's *Transportation 2030 Plan* (MTC 2005). The plan anticipates that Phases 1 and 2 would be operational by 2015 and Phases 3 through 5 would be operational by 2017. Phase 1 would construct a two-lane flyover direct connector from northbound I-680 to westbound SR-4. The existing northbound I-680 to westbound SR-4 loop would be removed. Phase 2 would construct a two-lane connector from eastbound SR-4 to southbound I-680. The current eastbound SR-4 to southbound I-680 diagonal ramp would be removed. Both Phases 1 and 2 would provide new direct local access to and from I-680.

Phase 3 would add a new lane to the median in both the eastbound and westbound directions of SR-4 within the project limits to provide additional weaving capacity. Phase 4 would replace the southbound I-680 to eastbound SR-4 loop ramp with a direct connector and remove the existing southbound I-680 to eastbound SR-4 loop ramp. It would also construct an auxiliary lane on eastbound SR-4 from the connector to the Solano Way off-ramp. Phase 5 would replace the existing one-lane northbound I-680 to eastbound SR-4 diagonal ramp with a slightly relocated two-lane diagonal ramp, replace the westbound SR-4 to northbound I-680 diagonal ramp with a two-lane diagonal connector, and widen the westbound SR-4 to southbound I-680 loop ramp from a single lane to two lanes.

Determination

The Department has prepared an Initial Study for this project, and following public review, has determined from this study that the proposed project would not have a significant impact on the environment for the following reasons:

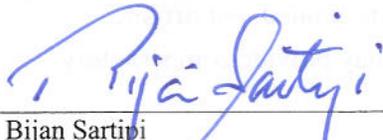
The proposed project would have no effect on Agricultural Resources, Cultural Resources, Land Use and Planning, Mineral Resources, Public Services, and Recreation.

In addition, the proposed project would have no significant effect on Air Quality, Hazards and Hazardous Materials, Transportation and Traffic, and Utility and Service Systems.

The proposed project would have no significantly adverse effect on Aesthetics (including the appearance of new soundwalls and tree removal), Biological Resources (including wetlands and fisheries), Geology and Soils, Hydrology and Water Quality, Flood Risk, Noise, and Population and Housing because the following mitigation measures would reduce potential effects to insignificance:

- **Aesthetics:** Landscape planning and subsequent landscaping would be incorporated into the project design, including the placement of trees, shrubs, and groundcover within the project right-of-way. Landscaping would be provided on Pacheco Boulevard in the vicinity of the intersection with the proposed slip ramps, pending a maintenance agreement between the local entity and the State. Soundwalls and retaining walls would be aesthetically treated with color, texture and patterns to help the walls blend into the environment and provide visual unity for the corridor. Soundwalls could be treated with vine plantings to reduce glare and graffiti and to enhance aesthetics. Aesthetic wall treatments would be similar to existing walls within the highway corridors. The design and aesthetic treatment of the overhead freeway structure (including the flyover and its ramps, columns, walls, etc.) shall be determined with input from public outreach meeting(s) to be held during the design phase of the project.
- **Biological Resources:** The total wetland permanent impacts are relatively small and would be mitigated. Wetlands and waters of the United States outside of the construction zone but on the border or nearby would be fenced off and designated for avoidance. Work within Grayson and Walnut Creeks would be restricted to the seasonal work period specified in regulatory permits for the project to avoid potential impacts to the Central Valley evolutionarily significant unit (ESU) steelhead and chinook salmon. Work within a given area of the creeks shall be limited to a single work window to avoid long-term effects. Work should occur only in a dry channel. If work in a live stream is necessary, the construction work space would be isolated from flowing water, shall not dewater the entire stream,

- and would allow fish passage through the project area. On-site mitigation opportunities for permanent, unavoidable wetland fill are limited, but off-site conservation banks and in-lieu fees are identified that may provide compensatory mitigation.
- **Geology and Soils:** Geotechnical and foundation studies would be performed for the final design, and the recommendations would be incorporated into the project plans. Project structures would be designed for seismic loading identified in the geotechnical studies.
 - **Water Quality:** Construction requirements for water quality are the conditions of the National Pollutant Discharge Elimination System (NPDES) permit, other planning agreements, and the county storm water management programs. A Storm Water Pollution Prevention Plan (SWPPP) would be developed and approved for this project and applied to project construction. The SWPPP would include best management practices (BMPs) for erosion and runoff controls, which would be incorporated into the project design and operations controls prior to project construction. Long-term mitigation would meet NPDES discharge requirements for permanent Design Pollution Prevention BMPs for soil stabilization and storm water runoff treatment.
 - **Flood Risk:** Existing flood risk would not be substantially changed by the project, and design measures can be incorporated to reduce the profile of the structure with respect to water passage.
 - **Noise:** Soundwalls would be constructed to mitigate for long-term noise impacts. Construction contract requirements would include work restrictions.
 - **Population and Housing:** Relocation assistance, including finding and obtaining replacement housing, relocation and business impact payments, and relocation services and counseling would be provided to eligible persons and businesses in accordance with the Federal Uniform Relocation Assistance and Real Properties Acquisition Policies Act, as amended.
 - **Transportation and Traffic:** Contractor requirements would include measures to avoid and minimize regional and local traffic disruption through notification of upcoming work and posting of detour or closure plans.



Bijan Sartipi
District Director, District 4
California Department of Transportation

11-26-08

Date

CALIFORNIA DEPARTMENT OF TRANSPORTATION

FINDING OF NO SIGNIFICANT IMPACT

for

I-680 and State Route 4 Interchange Improvement Project

The California Department of Transportation (Caltrans) has determined that the build alternative of the Interstate 680/State Route 4 Interchange Improvement Project will have no significant impact on the human environment. This FONSI is based on the attached Environmental Assessment (EA), dated November 2008, which has been independently evaluated by Caltrans and determined to adequately and accurately discuss the need, environmental issues, and impacts of the proposed project and appropriate mitigation measures. The EA provides sufficient evidence and analysis for determining that an Environmental Impact Statement is not required. Caltrans takes full responsibility for the accuracy, scope, and content of the attached EA.

The environmental review, consultation, and any other action required in accordance with applicable Federal laws for this project is being, or has been carried-out by Caltrans under its assumption or responsibility pursuant to 23 U.S.C.327.

11-26-08

Date



Bijan Sartipi
Caltrans District 4 Director



Summary

The California Department of Transportation (Caltrans) is the lead California Environmental Quality Act (CEQA) agency for the project. Effective July 1, 2007, Caltrans has been assigned environmental review and consultation responsibilities under the National Environmental Policy Act (NEPA) pursuant to 23 U.S.C. 327. In cooperation with the Contra Costa Transportation Authority (CCTA), Caltrans proposes a phased sequence of improvements to the Interstate 680 (I-680)/State Route 4 (SR-4) interchange in Contra Costa County, California, to alleviate operational deficiencies currently experienced throughout the interchange. The configuration of the existing interchange, coupled with less-than-desirable interchange spacing on SR-4, does not adequately handle existing traffic and will not meet anticipated future need. Improvements to the interchange are needed to improve safety and increase capacity to decrease congestion and accommodate both near-term and design year (2030) traffic volumes, while improving the efficiency of related widening projects within the project vicinity.

Five phases of improvements for this interchange have been identified that can be implemented independently as funding is available. The *proposed project* refers to all five phases, although each of the phases could be constructed alone and meet the purpose and need. All five phases are included in the Metropolitan Transportation Commission's (MTC's) long-range *Transportation 2030 Plan* (MTC 2005). The project is included in MTC's 2007 Transportation Improvement Program (TIP)¹ for initial right-of-way acquisition. The 2009 TIP, expected to be approved in November 2008, also includes funding for environmental clearance of all phases of the project and for initial right-of-way acquisition for Phases 1 and 2 within the TIP period. Other phases are included in the plan outside of the TIP period.

- Phase 1 – Construct a two-lane flyover direct connector from northbound I-680 to westbound SR-4. The northbound I-680 to westbound SR-4 loop ramp would be removed in this phase.
- Phase 2 – Construct a two-lane connector from eastbound SR-4 to southbound I-680. The current eastbound SR-4 to southbound I-680 diagonal ramp would be removed. Both Phases 1 and 2 would provide new direct local access to and from I-680.

¹ MTC's *Transportation 2030 Plan* (MTC 2005) serves as the current program for long-range planning of Bay Area transportation projects over the next 25 years while the TIP identifies the region's priorities for specific project funding.

- Phase 3 – Widen SR-4 within the project limits to add eastbound and westbound lanes to improve on-ramp and off-ramp merging actions.
- Phase 4 – Replace the southbound I-680 to eastbound SR-4 loop ramp with a two-lane flyover direct connector. Construct an auxiliary lane on eastbound SR-4 from the connector to the Solano Way off-ramp.
- Phase 5 – Replace the westbound SR-4 to northbound I-680 single-lane diagonal ramp with a new two-lane diagonal connector. Replace the northbound I-680 to eastbound SR-4 single-lane diagonal ramp with a two-lane relocated diagonal connector. Widen the westbound SR-4 to southbound I-680 loop ramp from a single lane to two lanes.

Cumulative impacts are evaluated in Section 2.21 of this document. That evaluation consists of all five phases of the interchange improvement project considered together with other proposed projects. Other recent and planned projects that were considered for cumulative impacts included the new high-occupancy vehicle (HOV) lanes added to I-680 between Martinez and Walnut Creek, the second Benicia-Martinez Bridge, the Burlington Northern–Santa Fe Railroad crossing reconstruction, local road improvements at Pacheco Boulevard and Arnold Drive, and improvements in eastern Contra Costa County to SR-4.

This Initial Study/Environmental Assessment (IS/EA) addresses the proposed action’s potential to have adverse impacts on the environment that are mitigated to less-than-significant impacts. Potential impacts and mitigation/minimization measures are summarized in Table S-1 (see next page).

This IS/EA has been prepared to meet the requirements of NEPA and CEQA. The project is also subject to other Federal, State, and local laws, policies, and guidelines that are addressed in this document. Applicable regulatory consultation or approvals have been completed or identified from the U.S. Fish and Wildlife Service (concurrence received that the project is unlikely to impact red-legged frog), U.S. Army Corps of Engineers (Nationwide Permit authorization required), National Oceanic and Atmospheric Administration (provided construction impact avoidance measures), State Historic Preservation Officer (consultation concluded that the project would not affect any historic property), California Department of Fish and Game (Streambed Alteration Agreement permit required), Regional Water Quality Control Board and State Water Resources Control Board (a water quality certification or waiver, and NPDES permit required).

Table S-1 Summary of Major Potential Impacts From Alternatives

Potential Impact		Phases 1 and 2		Phases 3, 4, 5	No Project Alternative	Cumulative	Mitigation/ Minimization
		Without Slip Ramps*	With Slip Ramps*				
Land Use	Consistency with the Martinez General Plan	Yes	Yes	Yes	Yes	None	None
	Consistency with the Contra Costa County General Plan	Yes	Yes	Yes	Yes	None	None
Farmland		None	None	None	None	None	None
Social and Economic		Increased capacity on roadways	Increased capacity on roadways	Increased capacity on roadways	None	No additional impacts	None
Relocation	Business Displacements	Portions of several properties required that do not affect continued use. One partial take affecting a warehouse might be necessary. A Caltrans-owned property currently leased to a self-storage business would not have its lease renewed.	Same, but with the addition of a full take of a truck camper/shell business/parcel, and the partial take of some parking spaces at a retail business on Pacheco Blvd.	None	None	No additional impacts	Assistance would be provided in accordance with the Federal Uniform Relocation Assistance and Real Properties Acquisition Polices Act
	Housing Displacements	Residents of 5 to 7 homes may be relocated	Residents of 5 to 7 homes may be relocated	None	None	No additional impacts	Assistance would be provided in accordance with the Federal Uniform Relocation Assistance and Real Properties Acquisition Polices Act

* Slip ramps are entry or exit ramps that connect local streets with freeway-to-freeway direct connector ramps.

Table S-1 Summary of Major Potential Impacts From Alternatives

Potential Impact		Phases 1 and 2		Phases 3, 4, 5	No Project Alternative	Cumulative	Mitigation/ Minimization
		Without Slip Ramps*	With Slip Ramps*				
Relocation	Utility Service Relocation	84-inch sanitary sewer line along Berry Drive would be relocated. Other smaller-diameter (6- to 12-inch diameter) sanitary sewer lines may also need to be relocated	84-inch sanitary sewer line along Berry Drive would be relocated. Other smaller-diameter (6- to 12-inch diameter) sanitary sewer lines may also need to be relocated	Four sanitary sewer lines beneath SR-4 and between I-680 and the Walnut Creek channel may require protection during Phases 4 and 5. Phase 5 may also impact use of frontage road near Central Contra Costa Sanitary District treatment plant tanks and impact some employee parking at plant	None	None	Coordination with affected utility service providers would take place when developing plans, specifications, and estimates (PS&E).
Air Quality		Fugitive dust during construction	Fugitive dust during construction	Same as Phases 1 and 2	None	No additional impacts	Dust control practices listed in Section 2.3.5 would be incorporated
Noise		Noise level would increase by 1 decibel. Existing and future noise levels would exceed thresholds for consideration of noise abatement at some locations	Noise level would increase by 1 decibel. Existing and future noise levels would exceed thresholds for consideration of noise abatement at some locations	Same as Phases 1 and 2	None	All five phases of interchange plus existing traffic and new I-680 HOV lane considered in evaluation.	Soundwalls are included where they meet minimum sound abatement criteria and were determined to be cost-effective. Measures outlined in Section 2.4.4.5 would minimize construction impacts
Waterways and Hydrologic Systems		Drainage patterns would change	Drainage patterns would change	Same as Phases 1 and 2	None	No additional impacts	Retention basins would be added to design (Section 2.12.4)

* Slip ramps are entry or exit ramps that connect local streets with freeway-to-freeway direct connector ramps.

Table S-1 Summary of Major Potential Impacts From Alternatives

Potential Impact	Phases 1 and 2		Phases 3, 4, 5	No Project Alternative	Cumulative	Mitigation/ Minimization
	Without Slip Ramps*	With Slip Ramps*				
Water Quality	Construction activities could increase organic pollutants or suspended/ dissolved solids in nearby creeks or Contra Costa Canal	Construction activities could increase organic pollutants or suspended/ dissolved solids in nearby creeks or Contra Costa Canal	Same as Phases 1 and 2	None	No additional impacts	Pollution control and soil erosion measures would be taken; and a Storm Water Pollution Prevention Plan would be implemented during construction (see Section 2.12.4)
Wetlands and Waters of the United States	0.005 ha (0.011 acre) of wetlands would be permanently impacted	0.005 ha (0.011 acre) of wetlands would be permanently impacted	0.004 ha (0.012 acre) of wetlands would be permanently impacted	None	0.009 ha (0.023 acre) wetland impacts by all 5 phases. (Total cumulative permanent fill is under the 0.2 ha [0.5 acre] limit consistent with a USACE Nationwide Permit #14)	Temporary and permanent impacts would be minimized and avoidance measures would be instituted as indicated in Section 2.6.4. Seasonal work windows shall be required for activities in Grayson and Walnut Creek channels (June 1 to October 31). Unavoidable permanent wetland fill may be mitigated through use of available conservation banks or in-lieu fees.

* Slip ramps are entry or exit ramps that connect local streets with freeway-to-freeway direct connector ramps.

Table S-1 Summary of Major Potential Impacts From Alternatives

Potential Impact	Phases 1 and 2		Phases 3, 4, 5	No Project Alternative	Cumulative	Mitigation/ Minimization
	Without Slip Ramps*	With Slip Ramps*				
Wildlife and Vegetation	Construction activities would require the removal of some trees	Construction activities would require the removal of some trees	Construction activities would require the removal of some trees	None	No additional impacts	Trees that provide nesting habitat would be avoided, if possible. If infeasible, replacement and/or replanting would occur as part of landscaping. Tree removal would be done prior to Feb. 15 of each construction year to avoid impacts to nesting birds. Contractor would be directed to control rodent populations prior to and during construction.
Floodplain	New pier at Grayson Creek would have minor increase (estimated at 1 inch) in flood water elevation	New pier at Grayson Creek would have minor increase (estimated at 1 inch) in flood water elevation	Additional piers and median widening encroach on floodplain	None	All five phases increase flood flow elevation by an estimated 3 inches	Project design revised to reduce restrictions in channel
Threatened or Endangered Species	Steelhead and chinook salmon may be affected if construction takes place when these species are present	Steelhead and chinook salmon may be affected if construction takes place when these species are present	Same as Phases 1 and 2	None	No additional impacts	Avoidance and minimization measures listed in Section 2.8.3 would be required of the contractor. These include seasonal restrictions or “work windows,” restrictions on working within the creek channel area, requirements for storage and use of construction materials and equipment, erosion control, and monitoring if dewatering is necessary within a creek channel. The project may affect, but is not likely to adversely affect, these species with the implementation of required avoidance and minimization measures.

* Slip ramps are entry or exit ramps that connect local streets with freeway-to-freeway direct connector ramps.

Table S-1 Summary of Major Potential Impacts From Alternatives

Potential Impact	Phases 1 and 2		Phases 3, 4, 5	No Project Alternative	Cumulative	Mitigation/ Minimization
	Without Slip Ramps*	With Slip Ramps*				
Historic and Archaeological Preservation	Contra Costa Canal, a historical resource, is crossed by the project in Phases 1 and 2. Findings of the Historical Property Survey Report conclude that no historic properties would be affected.	Contra Costa Canal, a historical resource, is crossed by the project in Phases 1 and 2. Findings of the Historical Property Survey Report conclude that no historic properties would be affected.	Canal is also crossed by Phases 4 and 5; no historic properties affected	None	No additional impacts	No impacts are anticipated; however, if any cultural material is encountered or subject to impact, all work would stop until a qualified archaeologist makes an assessment and follows the appropriate protocol for the resource
Hazardous Waste Sites	Soils within project area may contain residual pesticides and lead.	Soils within project area may contain residual pesticides and lead.	Same as Phases 1 and 2	None	No additional impacts	All buildings acquired for the project would be investigated for contamination; soil and groundwater sampling may be carried out for four sites and for soils identified for grading or excavation; see Section 2.2.3

* Slip ramps are entry or exit ramps that connect local streets with freeway-to-freeway direct connector ramps.

Table S-1 Summary of Major Potential Impacts From Alternatives

Potential Impact	Phases 1 and 2		Phases 3, 4, 5	No Project Alternative	Cumulative	Mitigation/ Minimization
	Without Slip Ramps*	With Slip Ramps*				
Visual	Phase 1 and 2 connectors would be visible from residential areas near freeways. Soundwalls would be added at specific locations	Phase 1 and 2 connectors would be visible from residential areas near freeways. Soundwalls would be added at specific locations	Phases 4 and 5 introduce additional ramps and soundwalls	None	Phases 1 through 5 add structures to already visible cloverleaf interchange.	Landscaping would be incorporated into the project to reduce visual impacts. Native oak replacement planting would be included. Vines would be planted on soundwalls to reduce glare and visual dominance and to deter graffiti. Aesthetic treatments (color, texture and pattern) that are similar in design to existing walls within the corridor would be applied to all sound and retaining walls. Landscaping would be provided on Pacheco Boulevard in the vicinity of the intersection with the proposed slip ramps, pending a maintenance agreement between the local entity and the State.
Traffic and Transportation	Construction could result in some temporary traffic detours/delays	Construction could result in some temporary traffic detours/delays	Same as Phases 1 and 2	None	No additional impacts	Contractor would be required to minimize local traffic interruptions, and provide notification and signing
Energy	None	None	None	None	None	None
Growth Inducement	Possible	Possible	Possible	None	None	Existing land use controls

* Slip ramps are entry or exit ramps that connect local streets with freeway-to-freeway direct connector ramps.

Preferred Alternative

The preferred alternative is Alternative D2A, consisting of the five phases of interchange improvements described in Sections 1.1.3 and 1.3.1. The preferred alternative includes construction of slip ramps connecting Pacheco Boulevard to the proposed high-speed northbound I-680 to westbound SR-4 and eastbound SR-4 to southbound I-680 ramps.

The preferred alternative was developed as a result of conceptual engineering and environmental studies with input and oversight from local cities, Contra Costa County, the Pacheco Municipal Advisory Committee, and the regional Transportation Partnership and Coordination – Central County (TRANSPAC) committee.

Alternative D2A was identified as the preferred alternative because it meets the purpose and need for the project and best achieves the design objectives for capacity and safety improvements through a phased sequence of construction. The preferred alternative would provide additional capacity for the principal directional traffic movements by constructing freeway-to-freeway high-speed ramps between I-680 and SR-4 that would supplement and/or replace (depending on the quadrant of the interchange) the existing tight-radius, lower-capacity loop and diagonal ramps. The preferred alternative would add new slip ramps that directly connect Pacheco Boulevard with the northbound I-680 to westbound SR-4 and eastbound SR-4 to southbound I-680 freeway connector ramps, providing important freeway access for the community of Pacheco and the nearby County Sheriff and California Highway Patrol offices. The alternative would improve safety by eliminating many of the existing interchange's congested merging and weaving sections. The preferred alternative is consistent with the long-range planning for this interchange and was ranked as one of the more economical alternatives studied. Environmental review of the project was integrated with the development of design options and selection of the preferred alternative, and is documented in this IS/EA.

The evaluation of alternatives considered improvements that could be made to the existing interchange, or to connecting or local roads, that would achieve the purpose and need of the project. The project does not involve relocation of either I-680 or SR-4, and therefore alternatives were limited to various design options, involving different ramp connections and configurations. Development of alternatives involved a sequence of evaluation steps during the Conceptual Engineering Studies phase (described in detail in Section 1.4) that first identified a range of possible modifications, resulting in 17 design options that were considered for short- and long-term improvements. Factors used for evaluation included the ability of each

alternative to meet the project's purpose and need, geometric considerations, traffic operations, constructability, right-of-way required, and costs and benefits. The alternatives considered but not proceeding further involved variations or combinations of reconfiguring the existing loop ramps, closing (or partially closing) the existing Pacheco Boulevard interchange, constructing interchange ramps at Glacier Road, and constructing variations of levels of connector ramps between I-680 and SR-4. These design alternatives were rejected for various reasons, including failure to resolve the already poor weaving conditions at the interchange, elimination of local freeway access at Pacheco Boulevard, unacceptable right-of-way requirements or relatively high costs, introduction of out-of-direction travel for some movements, inadequate spacing between the interchange and local road intersections, and unacceptable impacts to local streets.

Following completion of the initial concept design phase, additional design options for the proposed slip ramps and project geometrics were developed and reviewed during preparation of the Project Report. Features that would further enhance capacity and safety were identified and incorporated into the preferred alternative. These features involved widening the northbound I-680 to eastbound SR-4 diagonal ramp to two lanes and making improvements to enhance sight distance, and including the westbound SR-4 to southbound I-680 two-lane loop ramp. Several options for improving local intersections at nearby interchanges were also considered as possible alternatives to installing the proposed slip ramps at Pacheco Boulevard. Although some of these options could provide benefits to local traffic circulation and could be implemented by city or county jurisdictions independent of this project, they were ultimately rejected as inadequate substitutes for the access to and from the freeway system at Pacheco Boulevard that would be provided by the proposed slip ramps.

The project phases were designed and selected to achieve independent traffic operation benefits, such that each phase can be individually advanced. This necessary aspect of the preferred alternative provides flexibility for planning and implementing the improvements as funding is available.

Table of Contents

Cover Sheet	i
Negative Declaration (ND)	iii
Summary	vii
Table of Contents	xvii
List of Figures	xx
List of Tables	xxi
List of Abbreviated Terms	xxii
Chapter 1 Proposed Project	1-1
1.1 Project Description	1-1
1.1.1 Introduction	1-1
1.1.2 Background	1-1
1.1.3 Interchange Improvement Phases	1-3
1.2 Purpose and Need	1-15
1.2.1 Project Purpose	1-15
1.2.2 Project Need	1-15
1.2.3 Safety Concerns	1-17
1.3 Viable Alternatives	1-18
1.3.1 Alternative D2A	1-18
1.3.2 No Project Alternative	1-25
1.3.3 Preferred Alternative	1-25
1.4 Alternatives Considered and Withdrawn	1-27
1.5 Related Transportation Projects	1-35
Chapter 2 Affected Environment, Environmental Consequences, and Mitigation Measures	2-1
2.1 Land Use, Planning, and Growth	2-1
2.1.1 Affected Environment	2-1
2.1.2 Permanent and Construction Impacts	2-8
2.1.3 Parks and Recreation	2-12
2.1.4 Mitigation Measures	2-12
2.2 Hazardous Waste and Materials	2-12
2.2.1 Affected Environment	2-13
2.2.2 Permanent and Temporary Impacts	2-16
2.2.3 Mitigation Measures	2-16
2.3 Air Quality	2-17
2.3.1 Affected Environment	2-18
2.3.2 Permanent Impacts	2-26
2.3.3 Mobile Source Air Toxics	2-29
2.3.4 Construction Impacts	2-31
2.3.5 Mitigation	2-32
2.4 Noise	2-33
2.4.1 Affected Environment	2-36
2.4.2 Permanent Impacts	2-39
2.4.3 Construction and Temporary Impacts	2-40
2.4.4 Mitigation	2-40
2.5 Energy	2-50
2.5.1 Affected Environment and Impacts	2-51
2.5.2 Mitigation	2-51
2.6 Wetlands and Other Waters of the United States	2-52

	2.6.1	Affected Environment.....	2-53
	2.6.2	Permanent Impacts.....	2-57
	2.6.3	Temporary and Construction-Phase Impacts	2-57
	2.6.4	Mitigation Measures	2-58
	2.6.5	Wetlands Only Practicable Alternative Finding	2-61
2.7		Vegetation and Wildlife	2-61
	2.7.1	Vegetation.....	2-61
	2.7.2	Wildlife	2-63
	2.7.3	Permanent and Temporary Impacts	2-64
	2.7.4	Avoidance Measures.....	2-65
	2.7.5	Invasive Species.....	2-66
2.8		Threatened and Endangered Species.....	2-66
	2.8.1	Affected Environment.....	2-67
	2.8.2	Permanent and Construction Impacts	2-71
	2.8.3	Mitigation Measures	2-71
2.9		Geology.....	2-73
	2.9.1	Affected Environment.....	2-74
	2.9.2	Permanent Impacts.....	2-80
	2.9.3	Temporary and Construction-Phase Impacts	2-81
	2.9.4	Mitigation Measures	2-81
2.10		Floodplains	2-83
	2.10.1	Affected Environment.....	2-83
	2.10.2	Permanent Impacts	2-86
	2.10.3	Construction and Other Temporary Impacts	2-89
	2.10.4	Mitigation Measures.....	2-89
2.11		Section 4(f) Parks, Recreational Areas, Wildlife and Waterfowl Refuges, and Wild and Scenic Rivers	2-89
2.12		Hydrology, Water Quality and Storm Water Runoff	2-90
	2.12.1	Affected Environment.....	2-91
	2.12.2	Permanent Impacts	2-99
	2.12.3	Construction and Other Temporary Impacts	2-99
	2.12.4	Mitigation Measures.....	2-100
2.13		Farmlands/Agricultural Lands.....	2-103
	2.13.1	Affected Environment.....	2-103
	2.13.2	Permanent and Temporary	2-103
	2.13.3	Mitigation Measures.....	2-103
2.14		Community Impacts (Social, Economic) and Environmental Justice.....	2-103
	2.14.1	Affected Environment.....	2-104
	2.14.2	Community Services and Facilities.....	2-108
	2.14.3	Permanent Impacts	2-109
	2.14.4	Community Character and Cohesion	2-117
	2.14.5	Employment and Unemployment.....	2-118
	2.14.6	Construction and Other Temporary Impacts	2-118
	2.14.7	Mitigation and Avoidance Measures.....	2-119
2.15		Utilities and Emergency Services	2-119
	2.15.1	Affected Environment.....	2-119
	2.15.2	Permanent Impacts	2-120
	2.15.3	Temporary Impacts	2-122
	2.15.4	Mitigation Measures.....	2-122
2.16		Traffic and Transportation	2-123

	2.16.1	Affected Environment	2-123
	2.16.2	Permanent Impacts	2-124
	2.16.3	Temporary Impacts.....	2-126
	2.16.4	Mitigation Measures	2-127
2.17		Visual/Aesthetics	2-127
	2.17.1	Methodology.....	2-127
	2.17.2	Affected Environment	2-128
	2.17.3	Permanent and Temporary Impacts	2-133
	2.17.4	Mitigation Measures	2-135
2.18		Cultural Resources.....	2-136
	2.18.1	Affected Environment	2-137
	2.18.2	Mitigation Measures	2-141
2.19		Archaeological Resources	2-142
	2.19.1	Affected Environment	2-142
	2.19.2	Permanent and Temporary Impacts	2-144
	2.19.3	Mitigation Measures	2-144
2.20		Climate Change	2-144
2.21		Cumulative Impacts	2-147
	2.21.1	Projects Evaluated for Contribution to Cumulative Impacts	2-148
	2.21.2	Cumulative Impact Assessment.....	2-149
Chapter 3		Comments and Coordination, and Required Approvals	3-1
	3.1	Consultation and Coordination	3-1
		3.1.1 Coordination with Local Agencies During Project Development.....	3-1
		3.1.2 Public Coordination, Comments, and Review	3-1
	3.2	Regulatory Agency Coordination, and Required Permits and Approvals.....	3-2
	3.3	Distribution List for the IS/EA	3-5
Chapter 4		List of Preparers.....	4-1
Chapter 5		References.....	5-1
Chapter 6		List of Technical Studies	6-1
Appendix A		Project Phases and Details	A-1
Appendix B		CEQA Checklist	B-1
		Determining Significance Under CEQA	B-1
		CEQA Environmental Checklist.....	B-1
		Discussion of CEQA Checklist Responses and Summary of Mitigation Measures	B-12
Appendix C		Summary of Mitigation and Avoidance Measures	C-1
Appendix D		Summary of Relocation Benefits	D-1
Appendix E		Glossary of Technical Terms.....	E-1
Appendix F		Noise Measurements, Modeling Results, and Barrier Analysis	F-1
Appendix G		Title VI Policy Statement	G-1
Appendix H		Consultation and Coordination	H-1
Appendix I		Peak Traffic Volume Diagrams	I-1
Appendix J		Public Comments on the Initial Study/ Environmental Assessment.....	J-1
Appendix K		Wetlands Only Practicable Alternative Finding	K-1
Appendix L		Resources Evaluated Relative to the Requirements of Section 4(f)	L-1

List of Figures

Figure 1-1	Project Vicinity Map	1-2
Figure 1-2	Interchange Vicinity Map, Proposed Project Phases 1 and 2	1-5
Figure 1-3	Project Area Phases 1 and 2	1-7
Figure 1-4	I-680/SR-4 Future Phases 3, 4, and 5	1-9
Figure 1-5	Project Area with Future Phases 3, 4, and 5	1-11
Figure 1-6	Location and Cross Section Map	1-13
Figure 1-7	Interchange Improvements Evaluated at Concord Avenue/I-680 and Morello Avenue/SR-4	1-34
Figure 2.1-1	Project Study Area and Census Tracts	2-2
Figure 2.1-2	Study Area Land Use Map	2-5
Figure 2.6-1	Wetlands and Waters of the U.S. Crossed or in Vicinity of Phases 1 through 5	2-55
Figure 2.9-1	Major Active Faults in the Project Area	2-75
Figure 2.9-2	Alquist-Priolo Earthquake Fault Zone	2-78
Figure 2.12-1	Surface Water Resources	2-93
Figure 2.14-1	Community Impact Assessment Study Area	2-105
Figure 2.14-2	I-680/SR-4 Project Area Resources Potentially Affected	2-111
Figure 2.17-1	Location and Direction of Key Views 10 and 11	2-129
Figure 2.17-2	Photosimulation of Key View No. 10	2-131
Figure 2.17-3	Photosimulation of Key View No. 11	2-132

List of Tables

Table S-1	Summary of Major Potential Impacts From Alternatives	ix
Table 1-1	Summary of Local Roadway and Intersection Improvement Options Considered	1-30
Table 2.1-1	Study Area Populations	2-7
Table 2.2-1	Potential Hazardous Waste Sites	2-15
Table 2.3-1	Bay Area Attainment Status	2-19
Table 2.3-2	Ambient Pollutant Concentrations in the Project Vicinity.....	2-23
Table 2.3-3	Comparison of Project to an Existing Interchange per CO Protocol Criteria	2-28
Table 2.3-4	Calculated Daily Emissions and BAAQMD Significance Thresholds	2-29
Table 2.4-1	Federal Noise Abatement Criteria	2-34
Table 2.4-2	Phase 1 and 2 Soundwalls Preliminarily Evaluated as Feasible and Reasonable	2-41
Table 2.4-3	Phases 3 through 5 Soundwalls Preliminarily Evaluated as Feasible and Reasonable	2-42
Table 2.6-1	Summary of Permanent and Temporary Wetlands and Other Waters of the United States Impacted by All Five Project Phases	2-57
Table 2.7-1	Potentially Impacted Oak Trees.....	2-65
Table 2.12-1	Suisun Bay Water Quality	2-96
Table 2.12-2	Concentrations of Total Metals Collected Near Pacheco Creek, 1996-2000	2-97
Table 2.12-3	Storm Water Runoff Analysis at Various Locations in I-680 Just South of the Benicia Bridge	2-98
Table 2.14-1	Income in 2000	2-107
Table 2.14-2	Properties Potentially Impacted by the I-680/SR-4 Interchange Project Right-of-Way	2-113
Table 2.14-3	Racial/Ethnic Composition of the Study Area by Census Tract, 2000.....	2-115
Table 2.14-4	Racial/Ethnic Composition of Residential Areas by Blocks Bordering the Project, 2000	2-115
Table 2.14-5	Residents with Incomes Below the Poverty Level in Block Groups Bordering the Project, 2000	2-116
Table 2.16-1	Comparison of LOS on Freeway Facilities.....	2-125
Table 2.16-2	Comparison of Percent Volume Served.....	2-126
Table 3-1	Public Meeting Comment and Response Summaries	3-3

List of Abbreviated Terms

AB	Assembly Bill
ABAG	Association of Bay Area Governments
APE	Area of Potential Effect
ASR	Archaeological Survey Report
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BMP	best management practice
BNSF	Burlington Northern–Santa Fe (Railroad)
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCCSD	Central Contra Costa Sanitary District
CCTA	Contra Costa Transportation Authority
CCWD	Contra Costa Water District
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CFR	Code of Federal Regulations
CHP	California Highway Patrol
cm	centimeters
CO	carbon monoxide
CO Protocol	<i>Transportation Project-Level Carbon Monoxide Protocol (Garza, Graney, and Sperling 1998)</i>
CRHR	California Register of Historic Resources
CRLF	California red-legged frog
CT	census tract
CWA	Clean Water Act
dBA	A-weighted decibel
DBH	diameter at breast height
DPP	Design Pollution Prevention
EDR	Environmental Data Resources, Inc.
ESA	Endangered Species Act
ESU	evolutionarily significant unit
EO	Executive Order
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FHPM	Federal-aid Highway Program Manual
FHWA	Federal Highway Administration
GHG	greenhouse gas
ha	hectare
HOV	High-occupancy vehicle
I-680	Interstate 680
IPCC	Intergovernmental Panel on Climate Change
ISA	Initial Site Assessment
IS/EA	Initial Study/Environmental Assessment
km	kilometer(s)
L_{eq}	Equivalent Sound Level
LOS	Level of service
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
M	moment magnitude
MCE	Maximum Credible Earthquake
mg/m^3	milligrams per cubic meter

MSAT	mobile source air toxic
NAC	Noise Abatement Criteria
NAAQS	national ambient air quality standards
NEPA	National Environmental Policy Act
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NO ₂	nitrogen dioxide
NO _x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWP	Nationwide Permit (U.S. Army Corps of Engineers)
O ₃	ozone
Pb	lead
PM	Post mile
PM _{2.5}	particulate matter less than 2.5 micrometers in diameter
PM ₁₀	particulate matter less than 10 micrometers in diameter
ppm	parts per million
PRC	California Public Resources Code
PS&E	plans, specifications, and estimates
PSR	Project Study Report
RCRA	Resource Conservation and Recovery Act of 1976
ROG	reactive organic gases
RTP	Regional Transportation Plan
RV	recreational vehicle
RWQCB	Regional Water Quality Control Board
SIP	State Implementation Plan
SO ₂	sulfur dioxide
SO _x	sulfur oxides
SR	State Route
SR-4	State Route 4
SR-242	State Route 242
SWPPP	Storm Water Pollution Prevention Plan
TIP	Transportation Improvement Program
TNAP	Traffic Noise Analysis Protocol
TDM	Transportation Demand Management
TSM	Transportation System Management
US 101	U.S. Highway 101
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VMT	vehicle miles traveled
VOC	volatile organic compound



Chapter 1 Proposed Project

1.1 Project Description

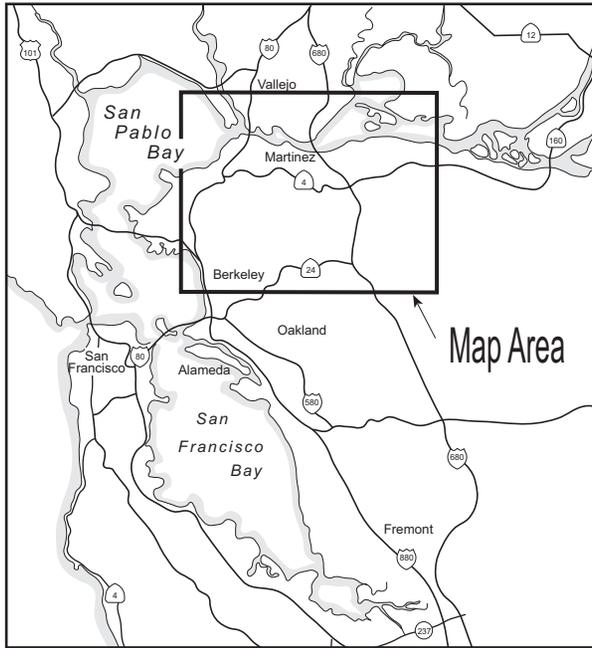
1.1.1 Introduction

The California Department of Transportation (Caltrans) is the California Environmental Quality Act (CEQA) lead agency and the National Environmental Policy Act (NEPA) lead agency. In this project, the Contra Costa Transportation Authority (CCTA), Caltrans, and FHWA propose to make improvements to the Interstate 680 (I-680)/State Route 4 (SR-4) interchange in Contra Costa County (Figure 1-1). The existing facility is a full cloverleaf freeway-to-freeway interchange. Growth in traffic since the original construction of this interchange four decades ago has exceeded the capacity of some directional movements. Traffic congestion is partly due to the high existing volumes but is also attributed to specific constraints associated with the current inadequate ramp spacing and lane configurations (primarily short weaving and merging sections, described in Section 1.2). Making capacity improvements to this interchange provides the opportunity to improve safety by eliminating some of the most congested weaving and merging locations.

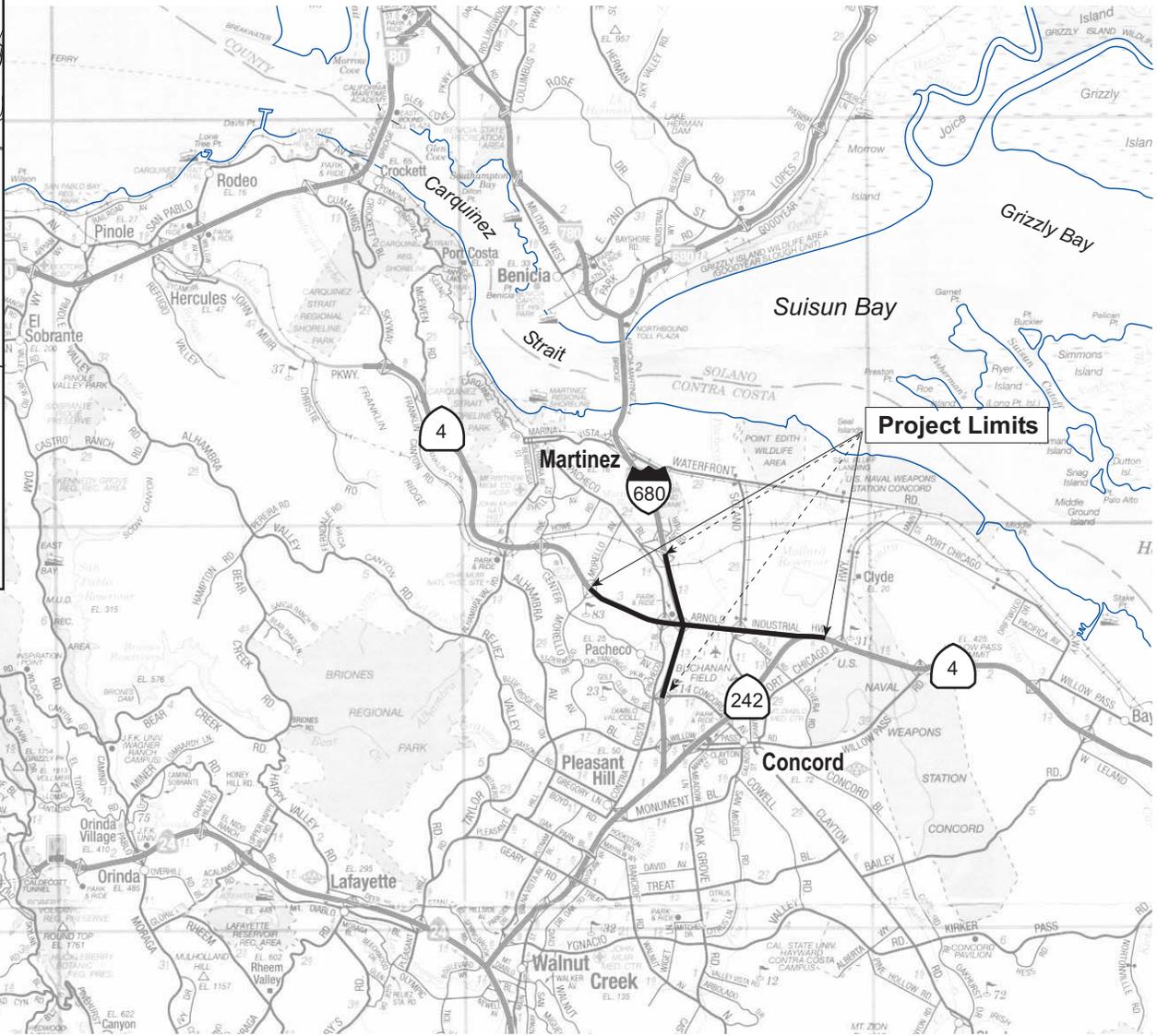
Effective July 1, 2007, Caltrans has been assigned environmental review and consultation responsibilities under NEPA pursuant to 23 U.S.C. 327.

1.1.2 Background

Reconstruction of this interchange has been formally considered since the early 1980s. As described in more detail in Section 1.4, preliminary concepts that would provide freeway-to-freeway connections with greater capacity were developed in the early 1990s that could replace the existing slower-speed loop ramps and closely spaced ramp configurations that currently constrain traffic flow. A lack of available funding limited planning for a future interchange and identifying the areas immediately surrounding the existing State right-of-way from potentially encroaching land use development. As traffic congestion and delays increased at this interchange due to growth in traffic volumes, a Project Development Team (PDT) consisting of Federal, State, and local transportation planning representatives evaluated and completed a Project Study Report (PSR) in 2001 that recommended specific actions that could be implemented to improve traffic conditions and accommodate anticipated future traffic volumes that will result from planned regional and local growth.



Map Area



Project Limits



Source: AAA, San Francisco Bay region, 1997

Project No. 26812934	PROJECT VICINITY MAP	Figure 1-1
I-680/SR-4		

The PSR resulted in identification of a preferred action, called Alternative D2A, which was used to prioritize the planned improvements evaluated in this report.

1.1.3 Interchange Improvement Phases

The planned improvements identified for Alternative D2A, the preferred alternative, consist of five independent phases that can be implemented as funding is available. The details of each of the phases are summarized below and illustrated in Appendix A. Additional features of Alternative D2A are described in Section 1.3.1.

The existing northbound I-680 to westbound SR-4 and eastbound SR-4 to southbound I-680 traffic movements are the most impacted by the existing interchange's design and capacity constraints (see Section 1.2.2). Figure 1-2 shows the entire interchange project limits, and Figure 1-3 shows an enlarged detail of the interchange connections. Phases 1 and 2 of the project would improve capacity and safety for those directional movements. Phases 3 through 5 are illustrated in Figures 1-4 and 1-5. Figure 1-6 shows existing and proposed typical cross sections of different segments of the interchange.

1.1.3.1 Phase 1

Phase 1 would replace the northbound I-680 to westbound SR-4 loop ramp with a two-lane connector ramp that passes over both I-680 and SR-4. Auxiliary lanes would be added on northbound I-680 from the Concord Avenue on-ramp to the connector ramp and from the connector ramp to Morello Avenue. The existing loop ramp would be removed and the existing auxiliary lane on westbound SR-4 would be lengthened to the divergence point of the westbound SR-4 to northbound I-680 diagonal ramp and SR-4. The design of Phase 1 (and Phase 2, described below) allows for the addition of local access ramps between Pacheco Boulevard and I-680, called "slip ramps." The slip ramps are described in detail in Section 1.3.1 and are shown in Figures 1-2 and 1-3 and in Figures A-i, A-ii, A-4, and A-11 within Appendix A. The Phase 1 slip ramp would require the relocation of the Blum Road/Pacheco Boulevard intersection 95 meters (312 feet) to the north and the modification of the existing Caltrans Park and Ride lot.

1.1.3.2 Phase 2

Phase 2 proposes a new eastbound SR-4 to southbound I-680 ramp with auxiliary lanes from the Morello Avenue on-ramp to the connector and from the connector to the Concord Avenue off-ramp. Phase 2 would also extend the existing auxiliary lane

from the Muir Road/Pacheco Boulevard intersection to the eastbound SR-4 on-ramp and the eastbound SR-4 to northbound I-680 loop ramp. The existing diagonal ramp would be removed in this phase. Including a slip ramp at this location would create a connection between I-680 and Pacheco Boulevard. The connector ramp would be two lanes wide, but if the slip ramp were included in the project, a total of three lanes would follow the point where the slip ramp merges with the connector ramp (see Appendix A, Figure A-4).

1.1.3.3 Phase 3

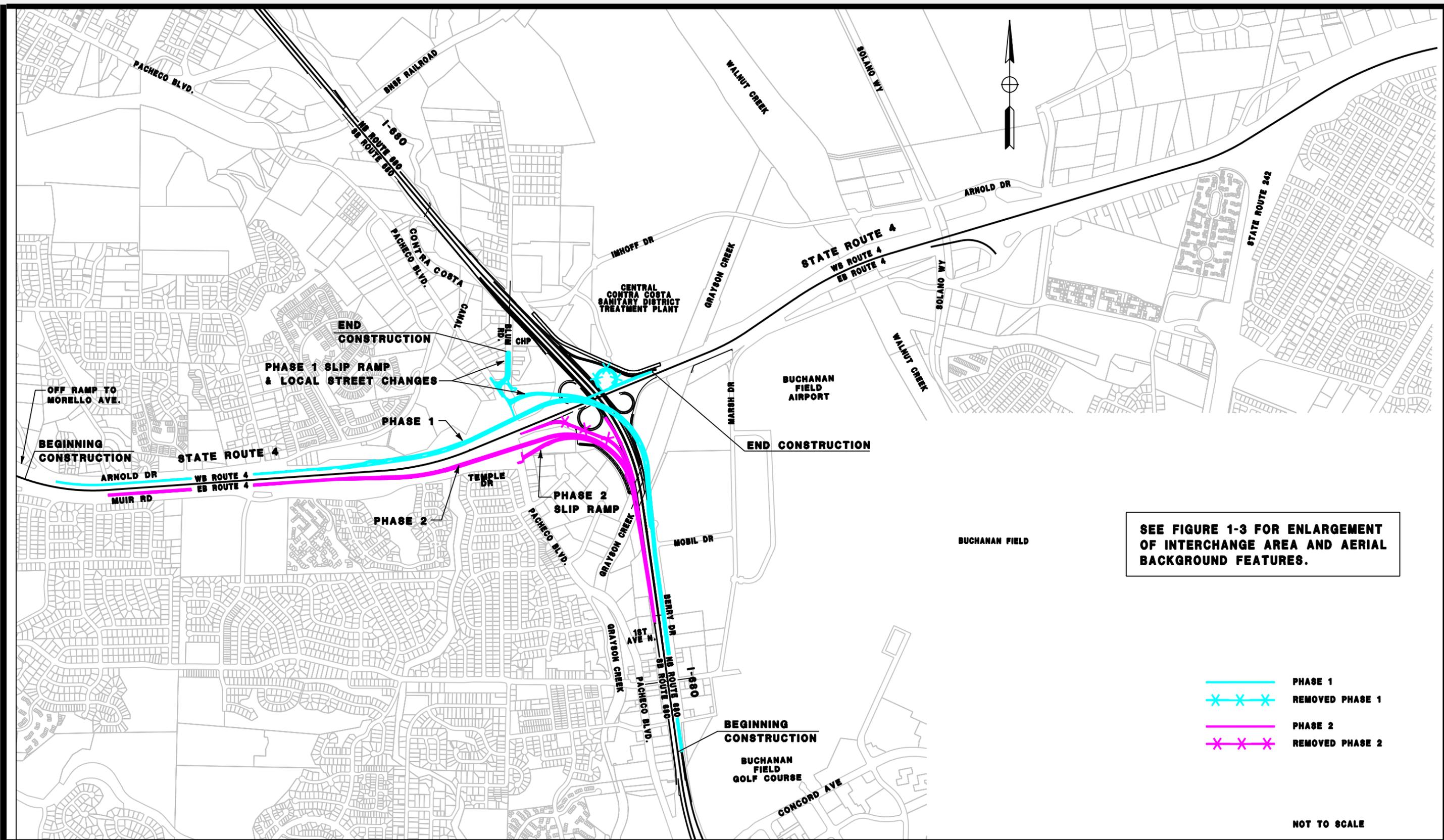
Phase 3 would add one eastbound lane and one westbound lane in the existing median of SR-4 in the vicinity of I-680. This phase adds capacity to SR-4 within the interchange area, allowing through traffic to better avoid on- and off-merging activity associated with the ramps and connections. The limits of this phase are from just west of the SR-4/Pacheco Boulevard and SR-4/Muir Road on- and off-ramps to just east of the State Route 242 (SR-242) interchange. Phase 3 would provide a longer distance in which drivers can change lanes outside of the immediate vicinity of the ramp connections, thereby spreading out some of the existing points of overlapping traffic movements and congestion.

1.1.3.4 Phase 4

Phase 4 would consist of a southbound I-680 to eastbound SR-4 direct-connector flyover ramp. It also would eliminate the existing southbound I-680 to eastbound SR-4 loop ramp. An auxiliary lane would be constructed on eastbound SR-4 from the connector to the Solano Way off-ramp. These changes result in a new higher-capacity direct connector and eliminates two congested weaving sections from the existing interchange (the existing southbound I-680 to SR-4 east off- and on-weaves, where southbound I-680 cars approach and enter the loop off-ramp, and then exit the same loop ramp onto eastbound SR-4).

1.1.3.5 Phase 5

Phase 5 would provide a westbound SR-4 to northbound I-680 direct connector to replace the existing diagonal ramp connection. This improvement provides a higher-capacity direct connector at a location that is functioning at very low levels of service in the morning commute direction. Two additional improvements would be made to the westbound SR-4 to southbound I-680 direction: the loop ramp in the northwest quadrant of the interchange (serving the westbound SR-4 to southbound I-680 movement) would be widened from a single lane to two lanes, and the existing one-lane diagonal ramp in the southeast quadrant would be replaced to



SEE FIGURE 1-3 FOR ENLARGEMENT OF INTERCHANGE AREA AND AERIAL BACKGROUND FEATURES.

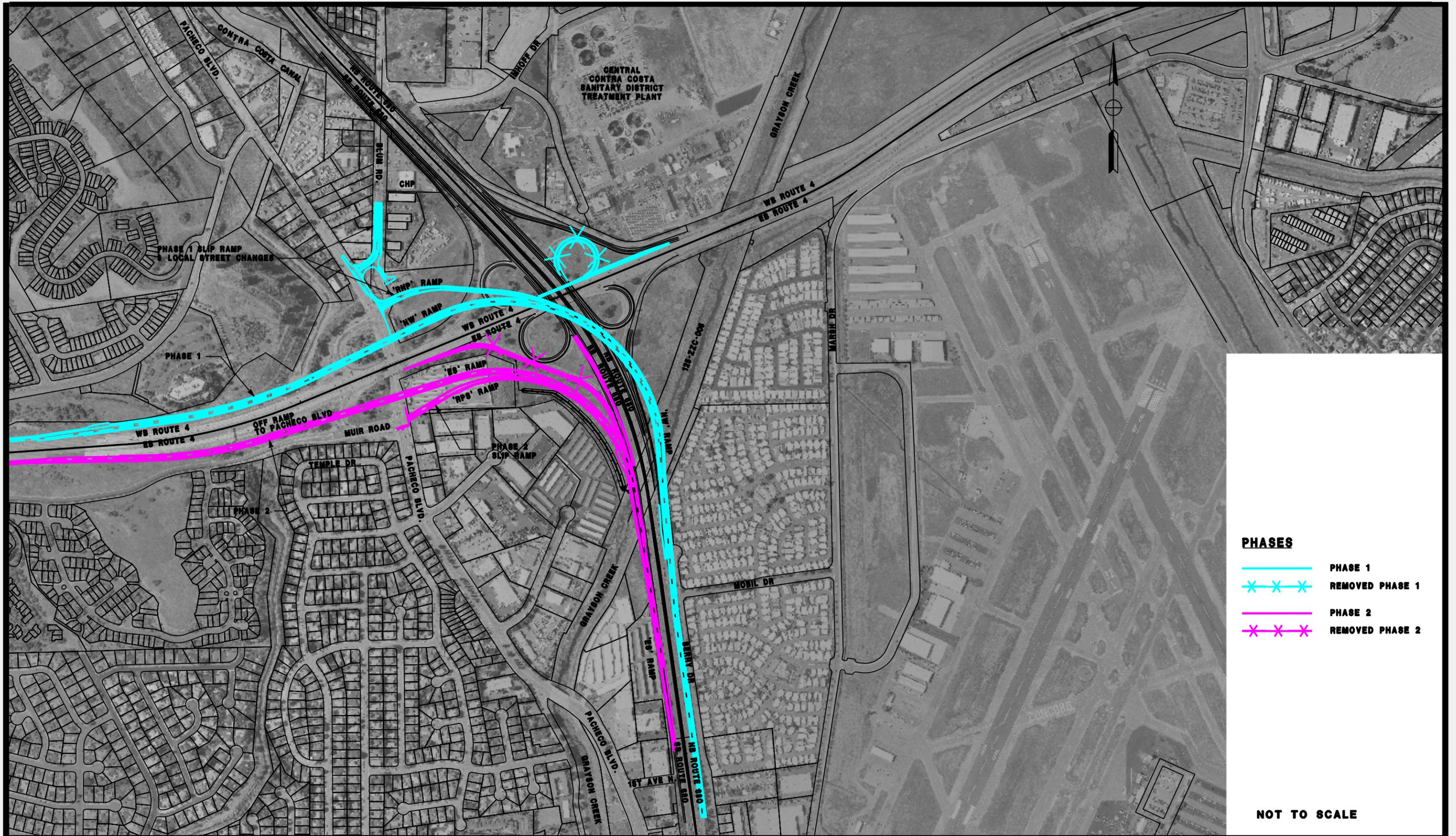
- PHASE 1
- - - X X X - - - REMOVED PHASE 1
- PHASE 2
- - - X X X - - - REMOVED PHASE 2

NOT TO SCALE

**Contra Costa
Transportation Authority**

**I-680/Rte4
Interchange Vicinity Map,
Proposed Project Phases 1 and 2**

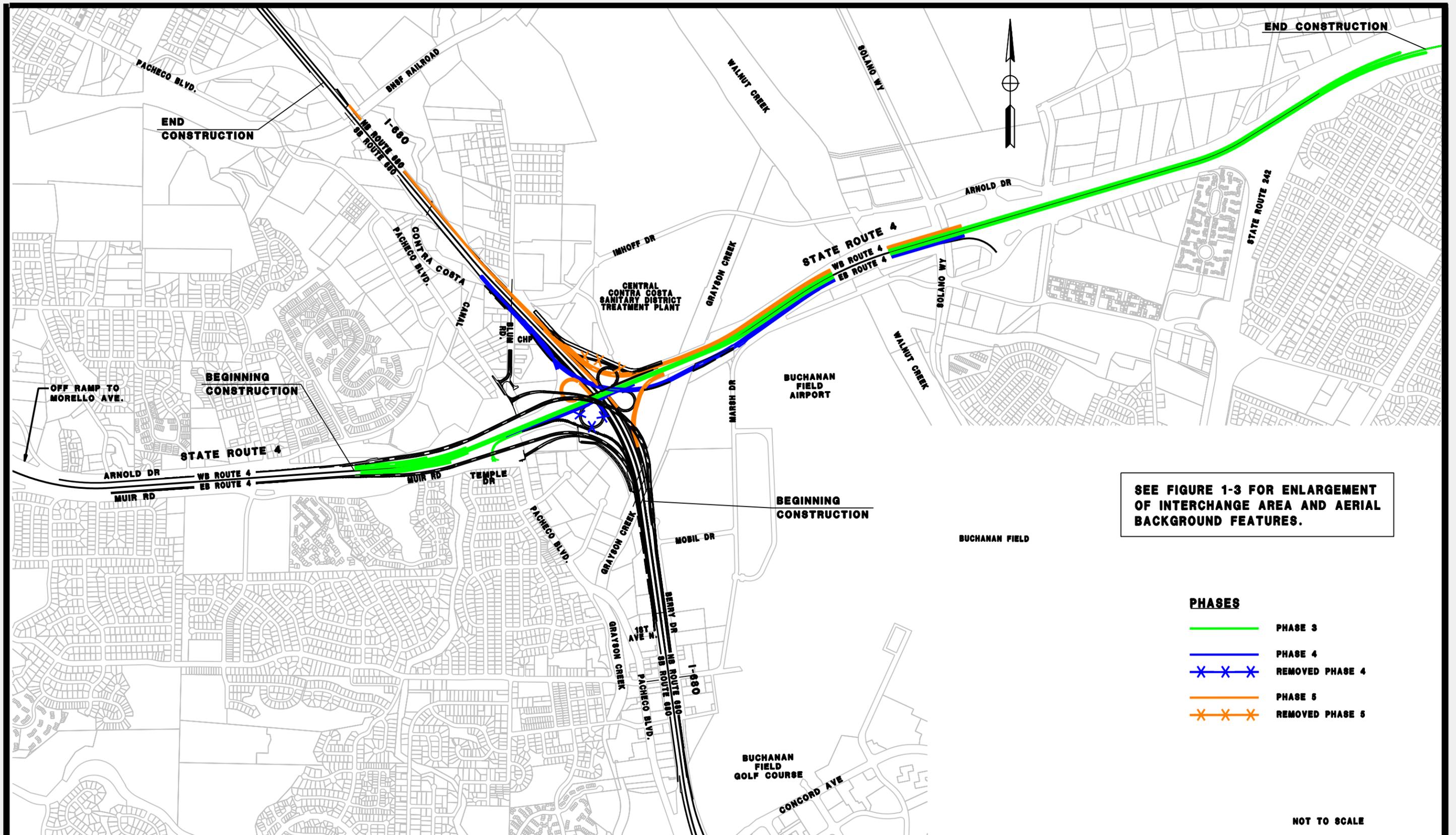
**Figure
1-2**



**Contra Costa
Transportation Authority**

Project Area Phases 1 and 2

**Figure
1-3**

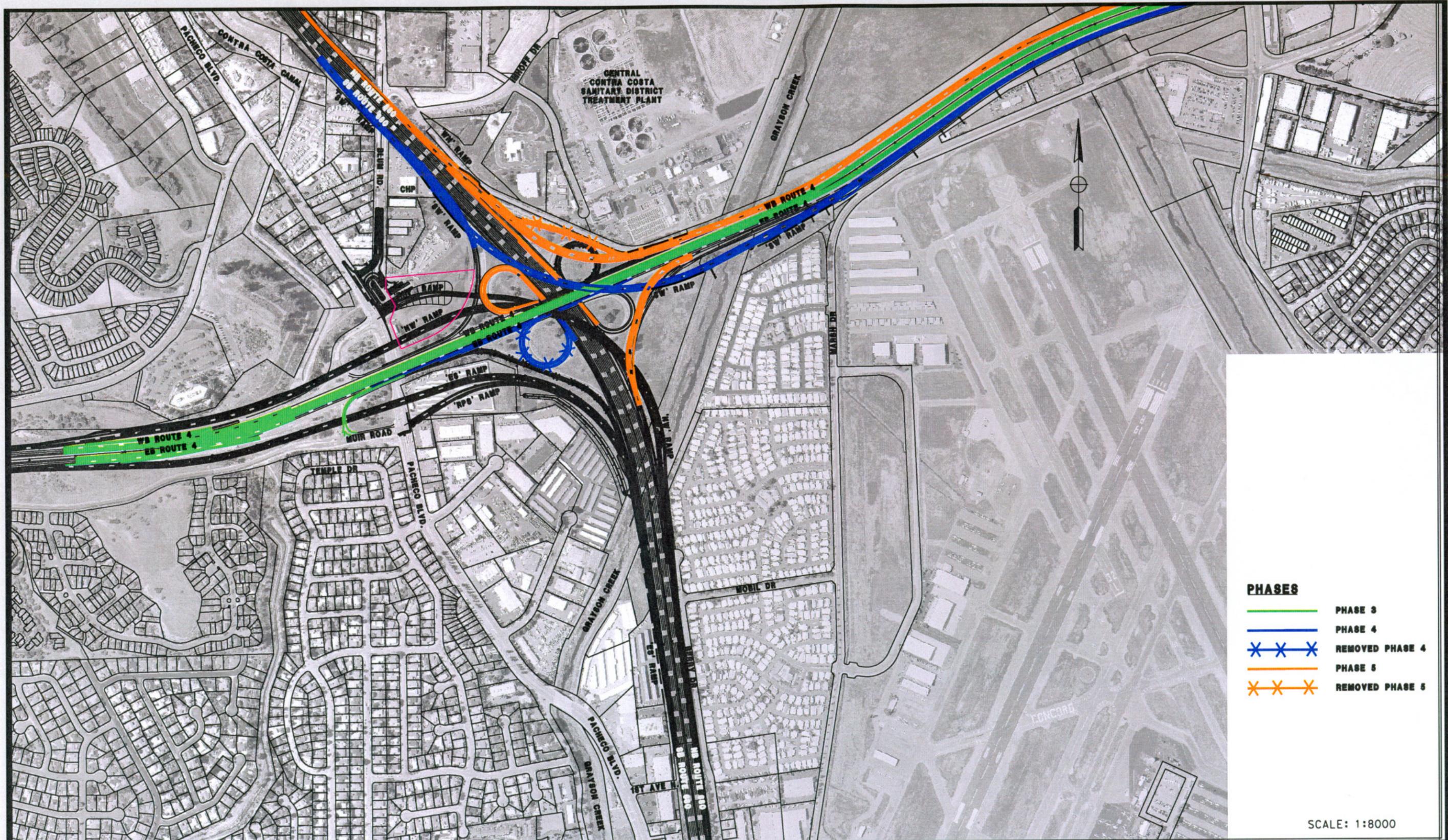


SEE FIGURE 1-3 FOR ENLARGEMENT OF INTERCHANGE AREA AND AERIAL BACKGROUND FEATURES.

**Contra Costa
Transportation Authority**

**I-680/Rte4
Future Phases 3, 4 and 5**

**Figure
1-4**



PHASES

	PHASE 3
	PHASE 4
	REMOVED PHASE 4
	PHASE 5
	REMOVED PHASE 5

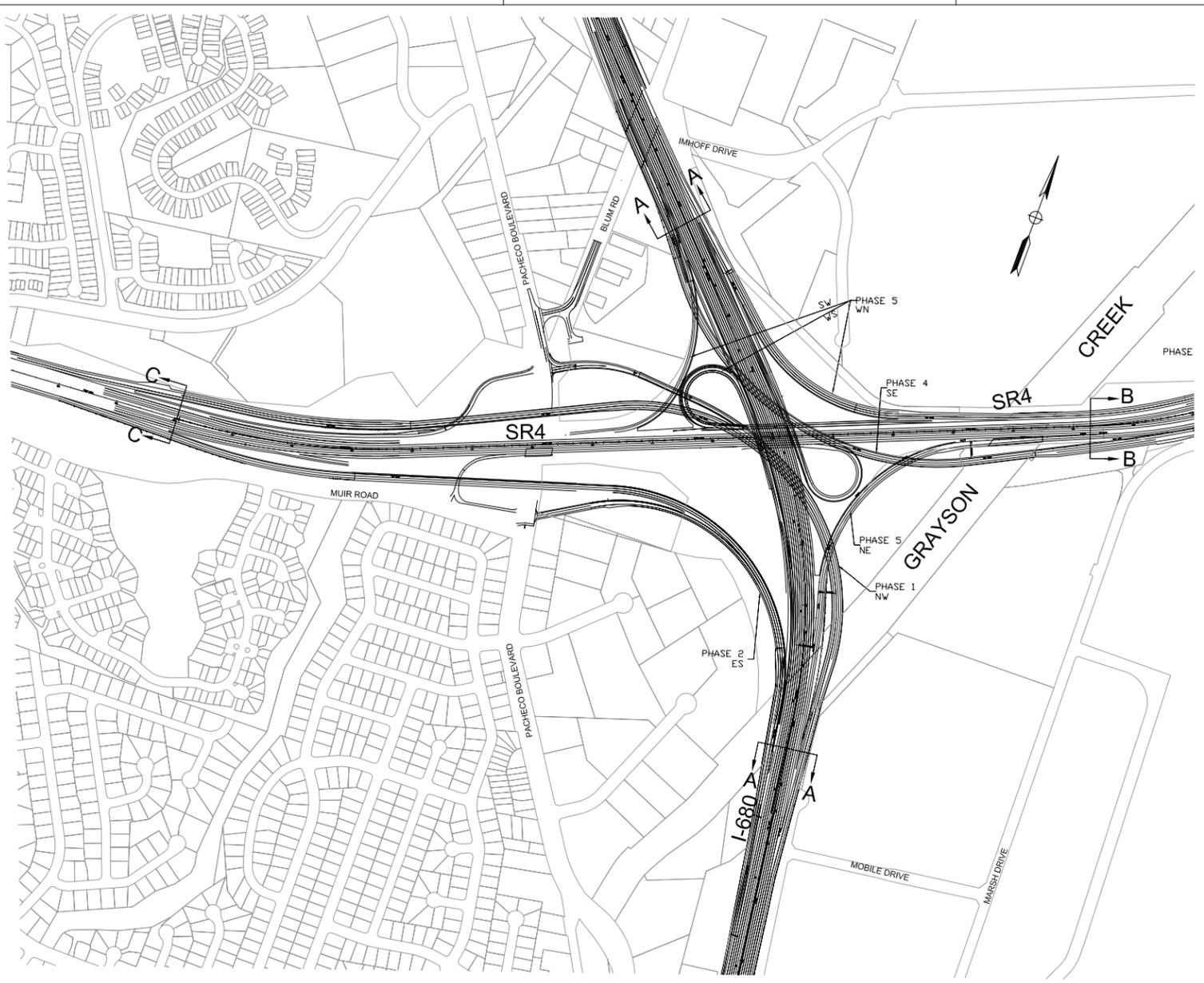
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**Contra Costa
Transportation Authority**

**Project Area with Future
Phases 3, 4, and 5**

**Figure
1-5**

PROJECT ENGINEER
 DEPARTMENT OF TRANSPORTATION
 STATE OF CALIFORNIA
 DATE REVISIONS BY
 ML SK
 CALCULATED/DESIGNED BY
 CHECKED BY
 DATE REVISIONS BY
 ML SK

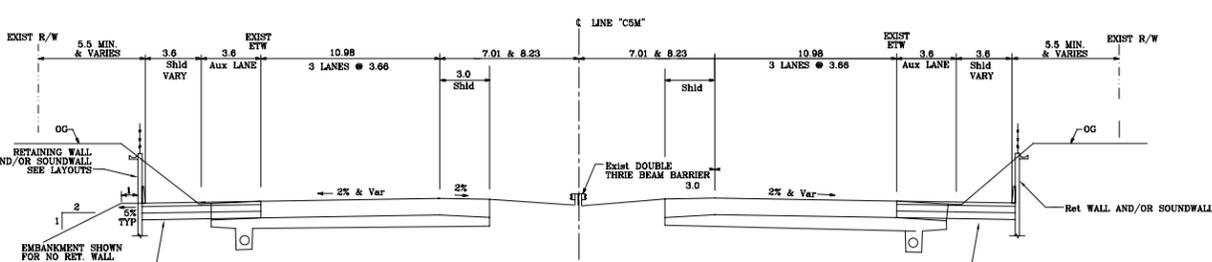
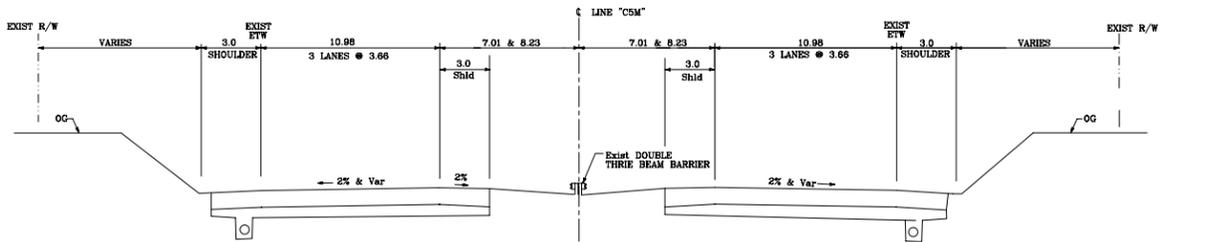
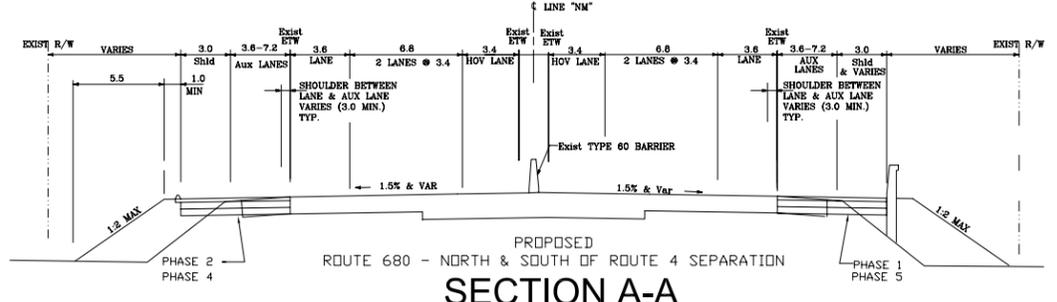
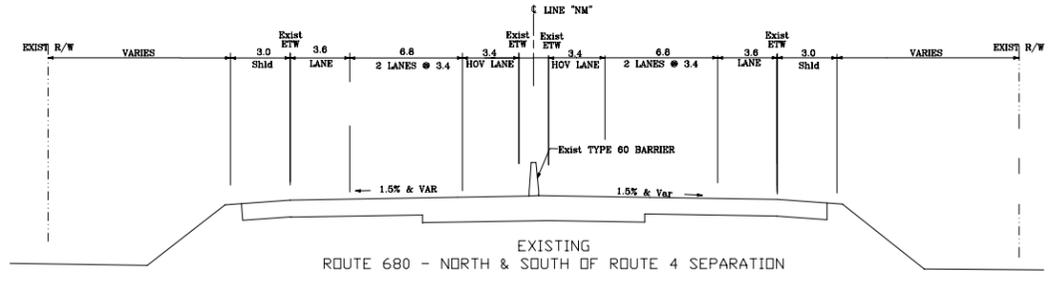
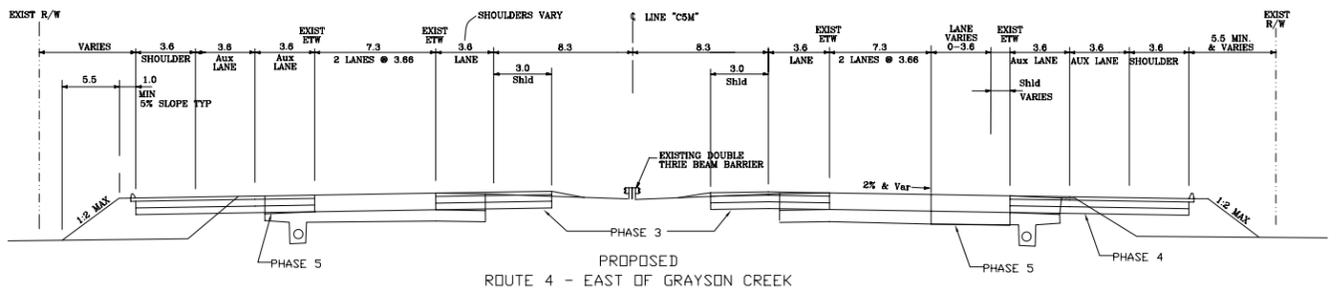
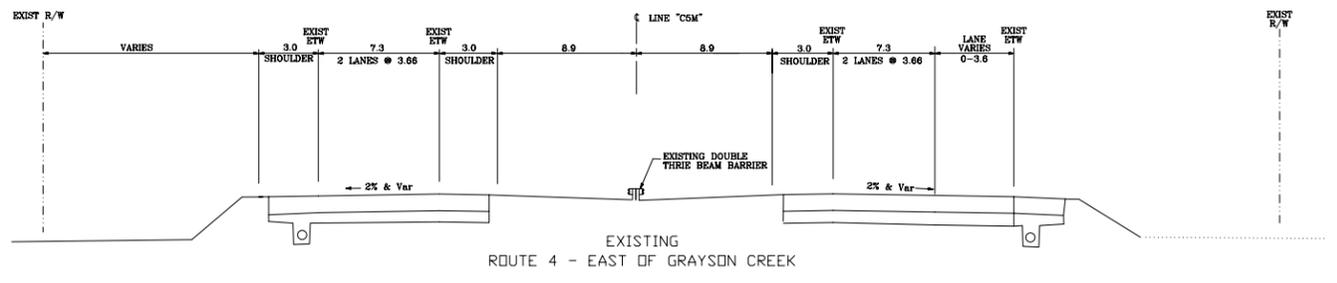


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	CC	680	32.0 - 36.5		
04	CC	004	16.6 - 23.6		

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

URS CORPORATION
 1333 Broadway Suite 800
 Oakland, CA 94612



SECTION C-C

SECTION B-B

SECTION A-A

**FIGURE 1-6
 LOCATION &
 CROSS SECTION MAP**

I680/SR4 INTERCHANGE

NO SCALE

LATEST REVISION

provide a two-lane ramp. During geometric review of the Draft Project Report, the replacement proposed for the diagonal ramp in the southeast quadrant was identified as a means to improve the curvature of the existing ramp, providing enhanced sight distance for motorists. These improvements are proposed to meet the anticipated future increase in traffic demand for the westbound SR-4 to southbound I-680 directional movement.

The proposed design is compatible with other recently completed and currently planned transportation improvements in the area, including the I-680 High-Occupancy Vehicle (HOV) Lane Project, the new Benicia-Martinez Bridge, the SR-242 widening project, and planned improvements along Pacheco Boulevard.

1.2 Purpose and Need

1.2.1 Project Purpose

The purpose of the project is to:

- Improve operational efficiency of the I-680/SR-4 interchange and reduce traffic congestion and delays
- Improve safety by eliminating short weaving and merging sections
- Provide direct local access between I-680 and Pacheco Boulevard
- Accommodate existing and planned growth in travel demand within these segments of I-680 and SR-4

1.2.2 Project Need

The I-680/SR-4 interchange, built in the 1960s, is unable to accommodate current traffic patterns and volumes. Contra Costa County has planned for growth through its General Plan process, Countywide Transportation Plan, and establishment of growth limit lines. Since the construction of this interchange, the county has subsequently experienced substantial residential and economic growth along both the I-680 and SR-4 corridors. These highways serve residents and workers who are traveling increased distances between their homes and jobs, both within the county and from more distant regional areas. The existing configuration of the interchange cannot adequately handle current or future projected traffic volumes or patterns, resulting in substantial congestion and travel delays and contributing to safety problems, as discussed below.

1.2.2.1 Capacity Constraints

The existing cloverleaf design of the interchange is a capacity constraint to both I-680 and SR-4. The loop ramps have a tight radius, which limits travel speed. The distances between the on-ramps and off-ramps in each direction are relatively short, which limits the distance in which exiting and entering vehicles can merge or “weave” and causes backups that extend onto the freeway ramps during peak periods. The traffic at these points can back up and contribute to congestion on the freeway mainlines. This is one of the primary causes of congestion at this location for both I-680 and SR-4, and the resulting congestion limits the traffic volume that can pass through the interchange. A contributing operational deficiency on SR-4 is the close spacing of the Pacheco Boulevard on- and off-ramps, which are just to the west of the I-680 on- and off-ramps. Thus, within a short distance along SR-4, drivers must contend with congestion and merging actions at the loop on- and off-ramps with I-680, the I-680 diagonal on- and off-ramps, and the Pacheco Boulevard hook on- and off-ramps.

1.2.2.2 Local Circulation and Freeway Access

Pacheco Boulevard is a primary north-south arterial that links Martinez to the north with Pleasant Hill and Concord to the south. (Pacheco Boulevard becomes Contra Costa Boulevard south of Concord Avenue.) Short hook ramps connect Pacheco Boulevard to SR-4 just west of I-680 and Muir Road. Pacheco Boulevard and Contra Costa Boulevard provide access to both residential and commercial uses. The hook ramp connections between SR-4 and Pacheco Boulevard provide the only regional freeway access between Contra Costa Boulevard and Arthur Road, which are about 4 kilometers (km) (2.5 miles) apart. The ramp connections also provide important access to commercial vehicles that would otherwise have to use routes through residential areas that have steep grades, impacting local roadway operation.

1.2.2.3 Traffic Volumes

In 2002, total mainline traffic volumes on I-680 within the project limits were approximately 109,000 vehicles per day north of the interchange and 133,000 vehicles per day south of the interchange.² On SR-4, the volumes were 86,000 west of the interchange and 81,000 east of the interchange. Within the interchange, some ramps are carrying traffic volumes and experiencing operational deficiencies that result in points of congestion. As noted in Section 1.2.2.1, traffic entering and exiting the interchange ramps must merge or weave with the highway mainline traffic, which

² These are the total volumes (both directions) as listed in the 2002 Traffic Volumes on the California Highway System Web site.

constrains the level of service (LOS). LOS is a measure of traffic flow that indicates how well a roadway or intersection is operating, based on the available capacity and the volume of predicted traffic. LOS is expressed using the letters A (representing the best conditions, with unrestricted or relatively free-flow traffic) through F (representing the worst conditions, with stop-and-go congestion and/or breakdown of traffic flow). Evaluation of weaving within the existing interchange showed that all but two of the weaving sections studied function at LOS F during both the morning and afternoon peak periods.

By the year 2030, peak hour demand will exceed mainline capacity on westbound SR-4 and southbound I-680 in the morning peak hour, and on northbound I-680 in the evening peak hour. In particular, northbound I-680 to westbound SR-4 and eastbound SR-4 to southbound I-680 will be limited by bottlenecks that will constrain flow through these directional movements. Appendix I includes line diagrams that show freeway peak hour volumes and lane configurations for the interchange and connecting roadways.

1.2.3 Safety Concerns

The short weaving distances between the on- and off-ramps in each direction are the primary location of accidents within the interchange. Evaluation of Traffic Accident Surveillance and Analysis System (TASAS) data for the project's Draft Project Report (Caltrans 2004) for the period July 2000 to June 2003 (for the SR-4 segment within the project limits) and October 2000 to September 2003 (for the I-680 segment) indicates that accidents take place at similar-to-average rates for similar facilities (i.e., cloverleaf interchanges) for the overall project limits, and some conditions within the project limits are above statewide averages. Areas of concern within the existing facility include the following:

- Eastbound SR-4:
 - Vicinity of the lane drop west of the Pacheco Boulevard exit ramp
 - Weave section between the Pacheco Boulevard on-ramp and SR-4 to the southbound I-680 slip ramp
 - Weave section between loop on- and off-ramps to and from I-680
- Westbound SR-4:
 - Weave section between the loop on- and off-ramps to and from I-680
 - Weave section between the I-680 slip on-ramp and the Pacheco Boulevard off-ramp

- Northbound I-680: Weave section between the loop on- and off-ramps to and from SR-4
- Southbound I-680:
 - Weave section between the loop on- and off-ramps to and from SR-4
 - Exit ramp to Concord Avenue interchange
- Loop Ramps: Northbound I-680 to westbound SR-4

1.3 Viable Alternatives

1.3.1 Alternative D2A

During preparation of the PSR, Alternative D2A was selected for further study. All other alternatives identified in the PSR were eliminated from further consideration (see Section 1.4). Alternative D2A is the identified preferred alternative.

Additional improvements have been added to the project since the completion of the PSR. These proposed improvements include features designed to improve the geometric layout of the interchange and accommodate future traffic flow. The improvements primarily affect Phase 5, although other refinements have been included in all phases of the project, described in Section 1.1.3.

The following subsections describe other components of the project phases, including the proposed slip ramps, the proposed work at the Contra Costa Canal crossings, soundwalls, and project funding and schedule.

1.3.1.1 Slip Ramps

The term slip ramp refers to local access entry or exit ramps that connect with freeway-to-freeway direct connector ramps. If approved, slip ramps could be included in Phases 1 and 2 to connect I-680 with Pacheco Boulevard. Section 1.3.1.3 describes Phases 1 and 2 of the project with and without slip ramps.

1.3.1.2 Approval Required for Change in Freeway Access Design

Access to the national freeway system (e.g., onto I-680) is carefully controlled for many reasons, among them to maintain integrity of the system, uniformity of design, and safety. Phases 1 and 2, with or without slip ramps, would change existing access to and from I-680. FHWA retains the approval rights to any request to access or modify an existing access to the national freeway system. Following review of the

project, FHWA granted conceptual approval of the slip ramps in November 2005 (FHWA 2005). If no changes are made to the preferred alternative and no major changes are made to the proposed design, FHWA would issue final approval of the slip ramps upon completion of the environmental review process.

1.3.1.3 Proposed Freeway Access Change

Northbound I-680 to Westbound SR-4

Currently, vehicles traveling northbound on I-680 exit the freeway on a short-radius loop ramp to connect to westbound SR-4, travel a short distance on SR-4 through a merge area for southbound I-680 to westbound SR-4 traffic, and then exit SR-4 on a short-radius hook ramp that connects to Pacheco Boulevard.³ Phase 1 would add a direct-connector flyover ramp for the I-680 northbound to SR-4 westbound movement, allowing removal of the existing loop ramp. Removal of this loop ramp eliminates one point of congestion and weaving caused by slow-moving vehicles exiting I-680 and entering SR-4 in relatively close proximity to the westbound SR-4 to southbound I-680 off-ramp, the southbound I-680 to westbound SR-4 on-ramp, and the westbound SR-4 to Pacheco Boulevard off-ramp. Removal of this loop ramp is consistent with the purpose and need of the project in that it eliminates two weaving sections at this interchange, one from westbound SR-4 and one from northbound I-680.

The proposed direct-connector flyover would allow drivers to take a relatively high-speed ramp connection from northbound I-680 to westbound SR-4, avoiding the existing short-radius loop ramp connection with the exiting and entering merging areas on SR-4. The proposed direct connector meets the purpose and need of the project by reducing congestion and subsequently improving the operational efficiency of the interchange. The direct connector is also intended to accommodate anticipated traffic growth in future years.

The approved slip ramp design, connecting the proposed Phase 1 freeway-to-freeway direct connector ramps to Pacheco Boulevard, helps maintain an important access point to and from the freeway system at this interchange, and is consistent with the purpose and need objective of providing access between I-680 and Pacheco Boulevard. The proposed slip ramp from the northbound I-680 to SR-4 connector to Pacheco Boulevard would address the purpose of providing freeway access to

³ The existing ramps and connections can be seen in the background of the aerial photos included in Appendix A. Specifically, Figures A-i, A-ii, A-3, and A-4 show the I-680/SR-4 and the SR-4/Pacheco Boulevard interchange ramps discussed in this section.

Pacheco Boulevard at this location. This slip ramp would enable travelers on northbound I-680 to first exit I-680 on the proposed direct-connector ramp to westbound SR-4, continue approximately 800 meters to 1 km (0.5 to 0.6 mile) to the north, and then exit the freeway on the slip ramp to Pacheco Boulevard. The slip ramp would provide a freeway connection to Pacheco Boulevard via the northbound I-680 to westbound SR-4 ramp, a connection that would be otherwise eliminated from the interchange due to the removal of the loop ramp. The direct freeway access would serve residents and businesses located near the existing I-680/SR-4 and I-680/Pacheco Boulevard interchanges, as well as the California Highway Patrol (CHP) and the Contra Costa County Sheriff. The CHP has an office on Blum Road just north of the interchange, and the Sheriff has an office on Muir Road west of the interchange (letters submitted by the CHP and Sheriff are included in Appendix H).

The slip ramp would introduce a new exit from the freeway system along a freeway-to-freeway connector, which is intended to function as a relatively high-speed facility. FHWA policy calls for freeway facilities to conform to established design standards that maximize safety and maintain the uniformity in the freeway system. Including slip ramps therefore requires approval from FHWA as an exception to national policy. As stated in Section 1.3.1.2, FHWA has reviewed and granted conceptual approval of this slip ramp in November 2005 (FHWA 2005).

Eastbound SR-4 to Southbound I-680

The current interchange has a single-lane diagonal connector ramp between eastbound SR-4 and southbound I-680. On- and off-ramps for eastbound SR-4 to Muir Road are located immediately preceding the diagonal connector, requiring travelers exiting to the eastbound SR-4 to southbound I-680 ramp to first pass through traffic exiting and entering Muir Road. This area of weaving is one point of congestion for the existing interchange.

Phase 2 would replace the existing diagonal connector ramp between eastbound SR-4 and southbound I-680 with a high-speed freeway-to-freeway direct-connector ramp. The exit point from SR-4 to this ramp would be west of and separate from the existing Muir Road ramps to reduce the overlapping merging and weaving that takes place at this location. This design would improve the traffic flow on SR-4 as well as help to maintain the speed of traffic heading onto the new connector ramp to southbound I-680.

The proposed slip ramp from Pacheco Boulevard to southbound I-680 would connect approximately midway along the new eastbound SR-4 to southbound I-680 direct connector. The slip ramp would provide access to I-680, similar to the access provided by the combination of the Pacheco Boulevard to eastbound SR-4 on-ramp and eastbound SR-4 to southbound I-680 ramp connections. This slip ramp had the potential to introduce a merging area that could increase unwanted congestion or conflicts midway along a connector ramp that is intended to maintain freeway-level speeds. To minimize this potential conflict, the length of the slip ramp from Pacheco Boulevard to the connector ramp was designed to allow maximum time for drivers to accelerate as they approach the merge area on the connector. The intersection of the proposed slip ramp at Pacheco Boulevard would also be signalized, which if necessary can be timed to control or meter groups of vehicles entering the freeway. FHWA granted conceptual approval of this slip ramp in November 2005 (FHWA 2005).

Without the proposed slip ramp, drivers would have to use the next-nearest entrance to the freeway system at either Concord Avenue on I-680, Morello Avenue on SR-4, or the I-680/Pacheco Boulevard ramps north of the project area. Officers traveling from the CHP station on Blum Road or the Sheriff's office on Muir Road could still access eastbound SR-4, but entering southbound I-680 would require taking Pacheco Boulevard south to the Concord Avenue/I-680 southbound on-ramp, which would add unwanted additional response time.

1.3.1.4 Contra Costa Canal Crossing

The SR-4/Contra Costa Canal crossing is located approximately 225 meters (740 feet) from the SR-4/Pacheco Boulevard crossing. The existing canal crosses under SR-4, the Pacheco Boulevard to westbound SR-4 on-ramp, the eastbound SR-4 to Pacheco Boulevard off-ramp, and Muir Road through a box culvert siphon structure. The SR-4/Contra Costa Canal crossing includes the placement of bridge abutments for the Phase 1 and Phase 2 structures. The PSR and Advanced Planning Studies⁴ indicate that the proposed bridge abutments may conflict with the Contra Costa Canal siphon. It was determined in the Project Report phase that either the Contra Costa Canal siphon/culvert structure would need to be slightly relocated or bridge abutments would need to be relocated to resolve the conflict. The selection of the

⁴ The PSR is an engineering report that documents agreement on scope, schedule, and estimated cost for advancement of a project concept for future funding and design studies. Advanced Planning Studies are structural engineering reports that are completed in early project development or design stages to determine whether any roadway structures or features involved in the project need to be rehabilitated or upgraded as part of the project.

accommodating procedure will be completed during the design of the project in the PS&E stage.

1.3.1.5 Soundwalls and Aesthetic Design of Structures

Within the project limits, I-680 has existing soundwalls and SR-4 has one existing soundwall. Additional soundwalls are included in a separate project to add HOV lanes on I-680. Soundwalls included in the I-680/SR-4 interchange improvements are discussed in Section 2.4. Soundwall locations evaluated for the I-680/SR-4 interchange project are shown in Appendix A, Figures A-1 through A-13.

The design and aesthetic treatment of the overhead freeway structure (including the flyover and its ramps, columns, walls, etc.) shall be determined with input from public outreach meeting(s) to be held during the design phase of the project. New soundwalls would be similar in design and aesthetic treatment to adjacent existing soundwalls to be visually consistent within the I-680/SR-4 freeway corridor

1.3.1.6 Project Funding and Schedule

Phases 1 through 5 are included in MTC's long-range regional transportation plan (RTP), the *Transportation 2030 Plan* (MTC 2005). The RTP anticipates that Phases 1 and 2 will be operational by 2015 and Phases 3, 4, and 5 will be operational by 2017. The MTC 2009 Transportation Improvement Program (TIP) includes environmental clearance for all phases of the project and initial funding for right-of-way acquisition for Phases 1 and 2 within the TIP period. Other phases are shown outside of the TIP period. The 2005 RTP designates all five phases of this project as Financially Constrained Elements.

The voters of Contra Costa County approved Measure C in 1988 to provide funding for transportation improvements, and CCTA is responsible for distributing Measure C funds for proposed projects. The 2008 Measure C Strategic Plan has programmed \$3.5 million for project development activities. The current Measure C sales tax is scheduled to expire in 2009. Measure J, which passed on November 2, 2004, extends the existing sales tax by 25 years to fund additional transportation projects and improvements. The 2007 Measure J Strategic Plan includes \$36 million for the I-680/SR-4 interchange improvements.

In addition, \$1.3 million for the design of Phase 1 is programmed in the 2008 State Transportation Improvement Program for the 2012/2013 fiscal year. CCTA is also actively seeking supplemental funding including Federal demonstration funds, future State Transportation Improvement Program funds, and other local funds.

The following lists the major schedule steps for the project.

Milestone	Date
Phases 1 and 2:	
Approve PSR	November 2001
Project Approval and Environmental Document	October 2008
Complete Design and Right-of-Way Certification	September 2012
Ready to List	December 2012
Approve Contract	March 2013
Job Completion	December 2015
Phase 3 Completion	2017
Phase 4 Completion	2017
Phase 5 Completion	2017

A schedule for Phases 3 through 5 has not been formulated, but these phases are generally anticipated to be completed by 2017, as funding is obtained.

Preliminary cost estimates for the proposed phases (with slip ramps included in Phases 1 and 2) are as follows.

Phase 1:	
Roadway:	\$29,974,000
Structure:	\$35,012,000
<u>Right of Way:</u>	<u>\$ 3,350,000</u>
Cost:	\$68,336,000
Phase 2:	
Roadway:	\$25,328,000
Structure:	\$15,446,000
<u>Right of Way:</u>	<u>\$ 2,071,000</u>
Cost:	\$42,845,000
Phase 3:	
Roadway:	\$23,028,000
Structure:	\$12,676,000
<u>Right of Way:</u>	<u>\$ 13,000</u>
Cost:	\$35,717,000

Phase 4:

Roadway:	\$19,850,000
Structure:	\$20,711,000
<u>Right of Way:</u>	<u>\$ 672,000</u>
Cost:	\$41,233,000

Phase 5:

Roadway:	\$26,348,000
Structure:	\$ 5,722,000
<u>Right of Way:</u>	<u>\$ 143,000</u>
Cost:	\$32,213,000

Total Capital Cost of Project excluding Support Cost (Phases 1–5): \$220,344,000

1.3.1.7 Independent Utility and Logical Termini

The project phases were also designed and selected to achieve independent utility within logical termini (or limits). Each phase can be individually completed and achieve traffic benefits within the limits of each phase, independent of whether the remaining phases are completed. The limits of each phase were extended on I-680 and SR-4 beyond the immediate interchange area to allow consideration of all potential improvements to the freeways and local roads that could achieve the purpose of the project. This provided flexibility for planning and implementing the improvements as funding is available.

1.3.1.8 Transportation System Management and Transportation Demand Management Alternatives

The project would include Transportation System Management (TSM) facilities, which increase the efficiency of transportation facilities by increasing the number of vehicle trips a facility can accommodate without increasing the number of through-lanes. Although TSM measures alone could not satisfy the purpose and need of the project, the following TSM measures have been incorporated into the project: ramp metering and auxiliary lanes, where feasible.

Transportation Demand Management (TDM) alternatives focus on regional strategies for reducing the number of vehicle trips and vehicle miles traveled as well as increasing vehicle occupancy. The project includes HOV lanes, which in combination with ramp metering will help encourage carpooling.

1.3.2 No Project Alternative

The No Project Alternative would make no improvements to the interchange. The existing constraints described in Section 1.2 would continue, but traffic conditions are expected to worsen over time as the number of drivers using the facility increases due to local and regional growth. Projected traffic growth for the year 2030 based on Association of Bay Area Governments (ABAG) regional population and economic estimates will result in freeway volumes that approach or exceed capacity at several locations in the interchange vicinity: southbound I-680 just south of SR-4 (AM), westbound SR-4 just east of I-680 (AM), northbound I-680 just south of SR-4 (PM), and eastbound SR-4 just east of I-680 (PM). A number of freeway facilities or segments would also experience continued impacts, and levels of service would deteriorate due to constrained areas of weaving and merging.

The No Project Alternative would have none of the impacts that have been identified for the various phases, although all of these impacts can be mitigated as described in Section 2. The soundwalls identified in this report would not be constructed under the No Project Alternative, which would leave some homes exposed to noise levels that exceed noise abatement and local noise standards.

1.3.3 Preferred Alternative

The preferred alternative is Alternative D2A, consisting of the five phases of interchange improvements described in Sections 1.1.3 and 1.3.1. The preferred alternative includes construction of slip ramps connecting Pacheco Boulevard to the proposed high-speed northbound I-680 to westbound SR-4 and eastbound SR-4 to southbound I-680 ramps.

The preferred alternative was developed as a result of conceptual engineering and environmental studies with input and oversight from local cities, Contra Costa County, the Pacheco Municipal Advisory Committee, and the regional Transportation Partnership and Coordination – Central County (TRANSPAC) committee.

Alternative D2A was identified as the preferred alternative because it meets the purpose and need for the project and best achieves the design objectives for capacity and safety improvements through a phased sequence of construction. The preferred alternative will provide additional capacity for the principal directional traffic movements by constructing freeway-to-freeway high-speed ramps between I-680 and SR-4 that will supplement and/or replace (depending on the quadrant of the interchange) the existing tight-radius, lower-capacity loop and diagonal ramps. The

preferred alternative will add new slip ramps that directly connect Pacheco Boulevard with the northbound I-680 to westbound SR-4 and eastbound SR-4 to southbound I-680 freeway connector ramps, providing important freeway access for the community of Pacheco and the nearby County Sheriff and California Highway Patrol offices. The alternative will improve safety by eliminating many of the existing interchange's congested merging and weaving sections. The preferred alternative is consistent with the long-range planning for this interchange and was ranked as one of the more economical alternatives studied. Environmental review of the project was integrated with the development of design options and selection of the preferred alternative, and is documented in this IS/EA.

The evaluation of alternatives considered improvements that could be made to the existing interchange, or to connecting or local roads, that would achieve the purpose and need of the project. The project does not involve relocation of either I-680 or SR-4, and therefore alternatives were limited to various design options, involving different ramp connections and configurations. Development of alternatives involved a sequence of evaluation steps during the Conceptual Engineering Studies phase (described in detail in Section 1.4) that first identified a range of possible modifications, resulting in 17 design options that were considered for short- and long-term improvements. Factors used for evaluation included the ability of each alternative to meet the project's purpose and need, geometric considerations, traffic operations, constructability, right-of-way required, and costs and benefits. The alternatives considered but not proceeding further involved variations or combinations of reconfiguring the existing loop ramps, closing (or partially closing) the existing Pacheco Boulevard interchange, constructing interchange ramps at Glacier Road, and constructing variations of levels of connector ramps between I-680 and SR-4. These design alternatives were rejected for various reasons, including failure to resolve the already poor weaving conditions at the interchange, elimination of local freeway access at Pacheco Boulevard, unacceptable right-of-way requirements or relatively high costs, introduction of out-of-direction travel for some movements, inadequate spacing between the interchange and local road intersections, and unacceptable impacts to local streets.

Following completion of the initial concept design phase, additional design options for the proposed slip ramps and project geometrics were developed and reviewed during preparation of the Project Report. Features that would further enhance capacity and safety were identified and incorporated into the preferred alternative. These features involved widening the northbound I-680 to eastbound SR-4 diagonal

ramp to two lanes and making improvements to enhance sight distance, and including the westbound SR-4 to southbound I-680 two-lane loop ramp. Several options for improving local intersections at nearby interchanges were also considered as possible alternatives to installing the proposed slip ramps at Pacheco Boulevard. Although some of these options could provide benefits to local traffic circulation and could be implemented by city or county jurisdictions independent of this project, they were ultimately rejected as inadequate substitutes for the access to and from the freeway system at Pacheco Boulevard that would be provided by the proposed slip ramps.

1.4 Alternatives Considered and Withdrawn

The I-680/SR-4 interchange has long been identified as needing operational and capacity improvements. Since the interchange was constructed in the early 1960s, traffic patterns have substantially changed in central and eastern Contra Costa County.

In 1983, the Contra Costa County Board of Supervisors requested planning for reconstruction of the existing cloverleaf interchange, following the upgrading of SR-4 from a conventional highway to freeway standards, but plans were not implemented. In 1993, Caltrans prepared a PSR/Project Report for the purpose of protecting right-of-way in the vicinity of the interchange from future encroachment and to encourage compatible land uses. The PSR/Project Report considered a single concept for an ultimate four-level freeway-to-freeway interchange.

In January 2000, engineering studies were started to investigate potential improvements to the interchange, including both near-term and long-term or “ultimate” improvements, and to examine what improvements should be incorporated into the I-680 HOV Lane Project design to ensure compatibility with future improvements.

A Project Development Team was assembled consisting primarily of participants from CCTA, Caltrans, the FHWA, and Contra Costa County. Coordination and presentations by PDT members were made periodically to local cities, the Pacheco Municipal Advisory Committee, and the Transportation Partnership and Coordination – Central County (TRANSPAC) (the regional transportation planning committee for central Contra Costa County). The role of the PDT was to provide direction in the development of alternative concepts, evaluation of the alternatives,

and recommendations for project implementation while gaining feedback and input from the interested cities and committees.

During the Conceptual Engineering Studies phase, a broad range of 17 alternative concepts were developed for both short-term operational improvements and long-term ultimate improvements. They were grouped into six categories: Near-Term Improvement Alternatives, Pacheco Interchange Improvement Alternatives, SR-4 CD Road Alternatives, 3-Level Interchange Alternatives, HOV Connection Alternatives, and 4-Level Interchange Alternatives. With the exception of three long-term alternative concepts and two short-term alternatives, all other concepts were dropped from consideration for not meeting the project purpose and need in terms of traffic operations or maintaining local access; not proving to be cost effective; or for not meeting an acceptable geometric standard for freeway-to-freeway interchange design.

The remaining five alternatives under consideration were subsequently evaluated according to 30 criteria grouped into seven categories. The categories were Purpose and Need, Geometric Considerations, Traffic Operations, Constructability, Environmental, Right-of-Way, and Costs and Benefits.

In June 2000, Caltrans representatives met with FHWA to discuss the five interchange alternatives under consideration, prior to presentation of the alternatives evaluation results to the PDT. Support was expressed for the Long-Term Conceptual Alternative D2A, the currently proposed Phases 1 through 5.

In July 2000, project representatives made presentations to senior staff of the Pacheco Municipal Advisory Committee to update them on the alternative concepts being considered. The committee expressed support for Conceptual Alternative D2A because it was the only alternative that would maintain all current traffic movements without out-of-direction travel.

At the completion of the conceptual studies and distribution of the Draft Conceptual Engineering Report, the PDT requested that senior staff members at TRANSPAC be contacted and the findings of the team be shared. In September 2000, a presentation was made to TRANSPAC of the findings. Following the presentation, TRANSPAC submitted a letter of concurrence expressing support for Alternative D2A.

In 2003 and 2004, during geometric review of the Draft Project Report for the interchange phases, several additional options were developed for some of the connector ramps (northbound I-680 to eastbound SR-4 and westbound SR-4 to

southbound I-680). Two identified options would provide improvements and were confirmed and included in the project phases. These improvements were reconstruction of the northbound I-680 to eastbound SR-4 diagonal ramp into a two-lane ramp with improved curvature and sight distance, and inclusion of the westbound SR-4 to southbound I-680 two-lane loop ramp. Other ramp variations were considered but dropped. These rejected options included the following:

- Adding a lane to the existing northbound I-680 to eastbound SR-4 diagonal ramp. This option was rejected in favor of rebuilding/realigning this ramp to improve the curvature and sight distance while still providing an additional lane.
- Combining the northbound I-680 exit ramps (as proposed, there will be a northbound I-680 exit ramp for the flyover to eastbound SR-4 in Phase 1, followed by a northbound I-680 to eastbound SR-4 at-grade two-lane ramp in Phase 5). The rejected option considered having both northbound I-680 to eastbound SR-4 and northbound I-680 to westbound SR-4 traffic on one ramp exiting I-680, and just north of the I-680 exit this ramp option would divide into westbound and eastbound SR-4 traffic directions. This option was rejected in favor of the proposed separate I-680 exits for each of the northbound I-680 to westbound and eastbound SR-4 movements to avoid combining different directional movements within a single exit ramp.
- An option to provide a westbound SR-4 to southbound I-680 two-lane connector ramp was evaluated and rejected as it would require a fourth-level flyover ramp structure at a relatively high cost. This option would partially duplicate the regional traffic movement already served by westbound SR-4 to SR-242. The proposed five-phase I-680/SR-4 interchange design would not preclude adding such an option in the future, as a separate project, if required due to high traffic volume growth in the region.

To address the FHWA requirement to support the proposed use of slip ramps to provide access to I-680 (see Section 1.3.1), a review was performed of possible options to improve the next-nearest existing interchange access points on I-680 and SR-4. This review focused on the existing interchanges at I-680 and Concord Avenue and at SR-4 and Morello Avenue. Twenty-two potential improvements were identified and evaluated for their relative performance, right-of-way requirements, bicycle and pedestrian facility conflicts or requirements, and estimated cost. These options are summarized in Table 1-1 and shown in Figure 1-7.

Table 1-1 Summary of Local Roadway and Intersection Improvement Options Considered

Option	Location	Description	Advantages	Disadvantages	Right-of-Way Impacts	Bike / Pedestrian	Cost
Pacheco Boulevard/Contra Costa Boulevard/Chilpancingo Parkway/Concord Avenue Intersection							
Option 1	Westbound Concord Ave.	Add a right-turn lane and columns (existing could become a thru lane or remain as right-turn lane)	Adds capacity to intersection, funnels traffic to southbound I-680 from Concord Ave.	Right-turn geometry is constrained by right-of-way (most likely nonstandard design); turning radius may limit truck traffic	None	No existing sidewalk/bike path, no proposed sidewalk or bike path.	\$1.0 Million
Option 2	Westbound Concord Ave.	Add a through and left-turn lane on westbound approach at intersection	Adds additional capacity to intersection	Limited width under the structure requires realignment of lanes	Requires acquisition of right-of-way from gas station and others	Bike lane on Chilpancingo Pkwy. is to remain. Contra Costa Blvd. could become less pedestrian friendly due to limited right-of-way.	\$2.1 Million
Option 3	Southbound Pacheco Blvd.	Add exclusive right-turn lane	Frees vehicles from queue backup at intersection, could shorten green-time for southbound Pacheco Blvd.	Require right-of-way acquisition from shopping center, loss of parking or landscaping; construction would likely affect business	Requires acquisition of right-of-way from Pleasant Hill Shopping Center, will result in loss of parking and landscaping for shopping center.	Potential to lose sidewalk due to limited right-of-way and the need to preserve parking.	\$2.7 Million
Option 4	Southbound Pacheco Blvd.	Add third left-turn lane	Allows for additional capacity for the left-turn, free southbound lanes from the backup of the left-turn queue	Limited right-of-way and lane configuration constraints limit the feasibility of this option without acquiring right-of-way from Shopping Center	Right-of-way is needed from Shopping Center	Potential to lose sidewalk due to limited right-of-way and the need to preserve parking.	\$2.7 Million
Option 5	Northbound Contra Costa Blvd.	Add a northbound lane both north and south of the intersection	Adds capacity to northbound and intersection	Limited right-of-way on east side of Contra Costa Blvd.	Requires acquisition of right-of-way on east side of Contra Costa Blvd.	Existing sidewalk on Contra Costa Blvd. would need to be replaced.	\$1.2 Million
Option 6	Eastbound Chilpancingo Pkwy.	Add exclusive right-turn lane	Vehicles turning right will avoid backup at intersection, and queuing is reduced	Limited right-of-way; acquisition of right-of-way would be required from adjacent businesses. Contra Costa Canal culvert would need to be widened.	Requires acquisition of right-of-way from gas station and others	Existing sidewalk on Chilpancingo Pkwy. would need to be replaced.	\$0.6 Million

Table 1-1 Summary of Local Roadway and Intersection Improvement Options Considered

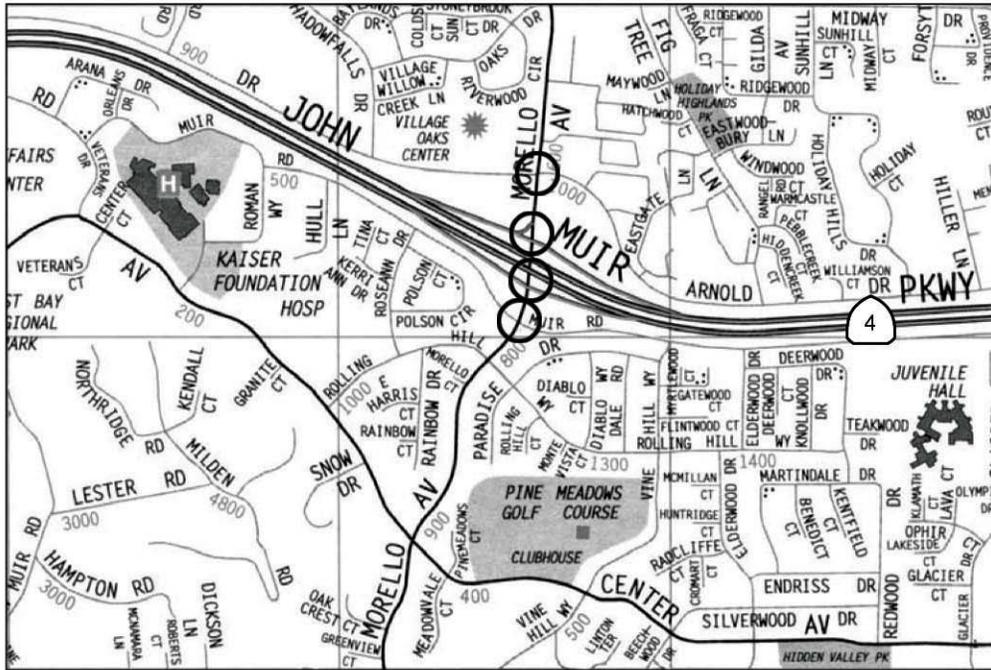
Option	Location	Description	Advantages	Disadvantages	Right-of-Way Impacts	Bike / Pedestrian	Cost
Pacheco Boulevard/SB I-680 Off-Ramp/Pleasant Hill Shopping Center							
Option 7	Southbound Pacheco Blvd.	Add exclusive right-turn lane into shopping center	Allows greater flow of traffic southbound, easier access to shopping center	Requires right-of-way acquisition from shopping center, loss of parking and landscaping and disruption to shopping center during construction.	Requires acquisition of right-of-way from Pleasant Hill Shopping Center, will result in loss of parking and landscaping for shopping center.	Potential to lose sidewalk due to limited right-of-way and the need to preserve parking.	\$1.3 Million
Option 8	Southbound Pacheco Blvd.	Add second left-turn pocket lane	Increases capacity of left turn; will improve the flow of traffic to southbound I-680 and southbound Pacheco Blvd.	Limited right-of-way makes alternative difficult. Requires right-of-way acquisition from shopping center.	Requires acquisition of right-of-way from Pleasant Hill Shopping Center, will result in loss of parking and landscaping for shopping center.	Potential to lose sidewalk due to limited right-of-way and the need to preserve parking.	\$1.3 Million
Option 9	Northbound Pacheco Blvd.	Extend left-turn lane into shopping center	Added queuing will help northbound traffic flow, and avoid backup of queue into northbound Pacheco Blvd. Provides better access to shopping center.	Right-of-way is severely limited; would require acquisition of right-of-way of shopping center.	Requires acquisition of right-of-way from Pleasant Hill Shopping Center, will result in loss of parking and landscaping for shopping center.	Potential to lose sidewalk due to limited right-of-way and the need to preserve parking.	\$1.1 Million
Option 10	Northbound Pacheco Blvd.	Eliminate left-turn lane.	Allows for higher northbound flow of traffic. Other access into shopping center exists from all directions.	Loss of access to shopping center, could affect businesses.	None	No loss of existing sidewalk.	\$0.4 Million
Option 11	Westbound approach from I-680	Add third left-turn lane	Allows for greater capacity at intersection	Requires additional right-of-way to the south; shopping center would be affected; may require modifications to the off-ramp; tight right-turn radius.	Requires Acquisition of right-of-way south of Pleasant Hill Shopping Center	No loss of existing sidewalk.	\$0.7 Million
Option 12	Eastbound approach (exit from shopping center)	Add exclusive right-turn lane	Reduces queue and green-time for shopping center, increased green-time for Pacheco Blvd.	Loss of parking and landscaping at shopping center	Shopping center exit would be widened, affecting the shopping center.	Potential loss of sidewalk and landscaping in shopping center parking lot.	\$0.9 Million

Table 1-1 Summary of Local Roadway and Intersection Improvement Options Considered

Option	Location	Description	Advantages	Disadvantages	Right-of-Way Impacts	Bike / Pedestrian	Cost
Morello Avenue/SR-4 Interchange							
Option 13	Westbound SR-4 off-ramp to Morello Ave.	Add exclusive left-turn lane, in addition to the combined left and through-lane	Adds capacity to intersection	Affects landscaped area, retaining wall; utility relocation needed.	None	No existing bike lanes; sidewalks on Morello Ave will remain	\$1.4 Million
Option 14	Morello Ave. to eastbound SR-4 (southbound approach)	Add third left-turn lane to eastbound SR-4	Adds capacity to intersection	Requires widening on ramp to accommodate 3 lanes, additional right-of-way may be needed. Retaining wall needed on Morello Ave under structure.	Additional right-of-way may be need for third lane on Morello Ave. to eastbound SR-4 on-ramp.	Existing bike lane and sidewalk on Morello Ave will need to be replaced.	\$1.1 Million
Option 15	Morello Ave. to eastbound SR-4 (northbound approach)	Add exclusive right-turn lane	Adds capacity to intersection	Requires additional right-of-way	Additional right-of-way is needed on Morello Ave.; this could affect the Chevron gas station on Morello Ave.	Potential to loose sidewalk due to limited right-of-way and the need to preserve parking.	\$1.3 Million
Morello Avenue/Muir Road							
Option 16	Southbound Morello Ave. approach	Add exclusive right-turn lane	Adds capacity to intersection	Requires additional right-of-way, retaining wall and utility relocation	Additional right-of-way is needed on Morello Ave. and Muir Road	Bike lane and sidewalk on Morello Ave. could be affected due to limited right-of-way on Morello Ave. and Muir Road.	\$1.3 Million
Option 17	Southbound Morello Ave. approach	Add second left-turn lane	Adds capacity to intersection	Requires additional right-of-way	Additional right-of-way is needed on Muir Road for lane drop.	Sidewalk on Muir Road could be affected due to limited right-of-way.	\$1.3 Million
Option 18	Northbound Morello Ave. approach	Add exclusive right-turn lane	Adds capacity to intersection	Requires additional right-of-way	Additional right-of-way is needed on Morello Ave. and Muir Road	Sidewalk on Muir Road could be affected due to limited right-of-way.	\$0.8 Million
Option 19	Northbound Morello Ave. approach	Add second left-turn lane	Adds capacity to intersection	Requires additional right-of-way	Additional right-of-way is needed on Morello Ave. and Muir Road	Bike lane and sidewalk on Morello Ave. could be affected due to limited right-of-way on Morello Ave. and Muir Road.	\$1.4 Million
Morello Avenue/Arnold Drive							
Option 20	Southbound Morello Ave. approach	Add exclusive right-turn lane	Adds capacity to intersection	Requires additional right-of-way, retaining wall and utility/signal relocation	Additional right-of-way is needed on Morello Ave. and Arnold Dr.	Bike lane and sidewalk on Morello Ave. could be affected due to limited right-of-way	\$1.5 Million

Table 1-1 Summary of Local Roadway and Intersection Improvement Options Considered

Option	Location	Description	Advantages	Disadvantages	Right-of-Way Impacts	Bike / Pedestrian	Cost
Option 21	Southbound Morello Ave. approach	Add second left-turn lane	Adds capacity to intersection	Requires additional right-of-way, retaining wall and utility/signal relocation	Additional right-of-way is needed on Morello Ave. and Arnold Dr.	Bike lane and sidewalk on Morello Ave. could be affected due to limited right-of-way	\$2.2 Million
Option 22	Northbound Morello Ave. approach	Add exclusive right-turn lane	Adds capacity to intersection	Requires additional right-of-way	Additional right-of-way is needed on Morello Ave. and Arnold Dr.	Bike lane and sidewalk on Morello Ave. could be affected due to limited right-of-way	\$1.4 Million



SR4/Morello Avenue Interchange



I-680/Concord Avenue Interchange

○ Local intersection/interchange access evaluated for potential improvement



Source: Thomas Guide, Metropolitan Bay Area, 2001

Project No. 26812933	INTERCHANGE IMPROVEMENTS EVALUATED AT CONCORD AVENUE/I-680 AND MORELLO AVENUE/SR-4	Figure 1-7
I-680/SR-4		

Individually, the options provide a range of potential benefits but are not sufficient to address the purpose and need discussed in Section 1.2. Logical combinations of some of the options can provide promising local benefits. However, several conclusions were reached that ultimately eliminated these options from further consideration as alternatives to this project. At a local level (in the vicinity of the potential improvement options), the benefits would be incremental; however, even considered cumulatively, these options would not solve the long-term need to better accommodate traffic at Concord Avenue and Pacheco Boulevard. The existing split-interchange configuration, the cost to construct the improvements, and the potential adverse affects from acquisition of businesses and land make these options disruptive, difficult to build, and costly. In addition, the options would not substantially improve access to SR-4 at Pacheco Boulevard or Muir Road. Travelers would have to use the Concord Avenue interchange to access I-680 and the Morello Avenue interchange to access SR-4, which requires a longer travel distance for trips originating or ending at Pacheco Boulevard or Blum Road in the vicinity of the I-680/SR-4 interchange. For these reasons, the options listed in Table 1-1 were not advanced for further consideration because even cumulatively they would not sufficiently fulfill the project purpose identified in Section 1.2.1.

Additional review was also performed to examine any other alternatives to the proposed slip ramps connecting to Pacheco Boulevard (see Section 1.3.1). The review resulted in the development of six options that were considered by the PDT, but these options were also not recommended for further development or study. The options identified included the construction of a tunnel under the I-680/SR-4 interchange and design variations of connections to Pacheco Boulevard or Muir Road. It was concluded that none of the designs analyzed sufficiently improved upon the proposed slip ramps. Two options that would combine the I-680 northbound to eastbound and westbound SR-4 exit ramps could degrade traffic operations on I-680 to LOS F at the ramp, which could cause backups onto I-680 and potentially negate the traffic flow improvements provided by the proposed Phase 1 high-speed direct connector. Almost all of the options required additional project costs and right-of-way, with associated impacts to adjacent local land uses (e.g., access changes and acquisition of shopping center parking) and to bike lanes and pedestrian facilities.

1.5 Related Transportation Projects

Other major transportation projects in the vicinity of the I-680/SR-4 interchange are described below.

I-680 HOV Lanes. The I-680 HOV Lane Project was completed in 2005, adding a new HOV lane in the northbound direction of I-680 between SR-242 and the Marina Vista interchange in Martinez and in the southbound direction between North Main Street overcrossing in Walnut Creek and Marina Vista. The new lanes are designated for HOV vehicle use. These lanes also link to the new HOV lanes on the new Benicia-Martinez Bridge, described below.

Second Benicia-Martinez Bridge. A second Benicia-Martinez Bridge has been constructed that is parallel to the existing railroad and highway bridges. The new structure increases the total number of lanes to nine (five lanes eastbound on the new bridge and four lanes westbound on the existing bridge). HOV bypass lanes are provided at the toll plaza.

Burlington Northern–Santa Fe Railroad Crossing. The Burlington Northern–Santa Fe (BNSF) railroad crosses I-680 south of the Pacheco Boulevard connection ramps with I-680. The initial plans and environmental clearance for the I-680 HOV lanes included reconstruction of the BNSF structure over I-680. However, it was determined during final design of the HOV lanes that reconstruction of the structure was not necessary to construct as part of that freeway widening improvement, and it was separated out as an individual project to be built at a later time. Phase 5 of the interchange project would be completed after the BNSF crossing is constructed, as that phase extends the northbound widening on I-680 to just north of (and through) the BNSF crossing structure.

Local Road Improvements. The CCTA 2004 Countywide Transportation Plan Update includes two nearby projects: widening of Pacheco Boulevard to four lanes from Blum Road to Arthur Road, and extension of Arnold Drive from its existing easterly terminus at Pacheco Boulevard beneath I-680 to join Imhoff Drive at Blum Road.

SR-4/I-680 HOV Connection and Ramps. TRANSPAC is the sponsor of a potential future HOV connection between the existing SR-4 HOV lanes (which extend to the east on SR-4 beginning at the SR-242/SR-4 interchange area) and the HOV lanes on I-680. This would add an HOV lane connection between westbound SR-4 and southbound I-680 and between northbound I-680 and eastbound SR-4. The five phases of construction described for the I-680/SR-4 interchange project would not preclude the possible future addition of this HOV connector.

SR-4 Improvements. SR-4 has been a priority for highway improvements for many years. Recent construction has widened the existing four lanes to eight lanes between Railroad Avenue and Loveridge Road, and planned improvements will continue the roadway widening east to Somersville Road (anticipated completion in 2010). Ultimately, the SR-4 segment from Somersville Road to SR-160 and the county line is planned to be widened from six to eight lanes.

