Final
Environmental Impact Statement
and 4(f)/6(f) Evaluation
BART Warm Springs Extension

VOLUME 1

U.S. Department of Transportation
Federal Transit Administration

BART

June 2006

BART WARM SPRINGS EXTENSION
Fremont, California

FINAL ENVIRONMENTAL IMPACT STATEMENT
and
SECTION 4(F)/SECTION 6(F) EVALUATION

PREPARED PURSUANT TO:

National Environmental Policy Act of 1969, §102 (42 U.S.C. §4332); and Federal Transit Law (49 U.S.C. §5301(e), §5323(b) and §5324 (b)); 49 U.S.C. §303 (formerly Department of Transportation Act of 1966, §4(f)); Land and Water Conservation Fund Act of 1965, §6(f) (16 U.S.C. § 4601-8(f)); National Historic Preservation Act of 1966, § 106 (16 U.S.C. §470f); 40 CFR Parts 1500 – 1508; 23 CFR Part 771; Executive Order 11990 (Protection of Wetlands); Executive Order 11988 (Floodplain Management); and Executive Order 12898 (Environmental Justice).

by the

FEDERAL TRANSIT ADMINISTRATION
U.S. DEPARTMENT OF TRANSPORTATION

and the

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Cooperating Agency:

National Park Service
U.S. Department of the Interior

Leslie T. Rogers
Regional Administrator, Region IX
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MAY 16 2006
Date of Approval

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4/5/06
Date of Approval

BART Warm Springs Extension, Fremont, California

Final Environmental Impact Statement and Section 4(f)/Section 6(f) Evaluation

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Prepared by:

Federal Transit Administration
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ABSTRACT

The San Francisco Bay Area Rapid Transit District (BART) is proposing a 5.4-mile extension of the BART system in the City of Fremont in southern Alameda County, California. BART previously prepared an Environmental Impact Report (EIR) and Supplemental Environmental Impact Report (SEIR) for this project in accordance with the California Environmental Quality Act (CEQA). At the conclusion of CEQA review, the BART Board of Directors adopted the project on June 26, 2003. Recent changes in state transportation funding priorities have resulted in BART's seeking $58 million (in 2004 dollars) in federalized state funds (State Transportation Improvement Program) and other federalized funding that may be available in the future. This Environmental Impact Statement (EIS) is intended to satisfy the requirements of the National Environmental Policy Act of 1969 (NEPA) and other environmental requirements that apply to federal actions, such as Section 4(f) of the Department of Transportation Act (49 U.S.C. Section 303), Section 6(f) of the Land and Water Conservation Fund (LWCF), and Section 106 of the National Historic Preservation Act (NHPA).

The alternatives evaluated are the No-Build Alternative and the Proposed Action, the Warm Springs Extension (WSX) Alternative. The WSX Alternative would extend south from the existing Fremont BART Station to a proposed new station in the Warm Springs district of the City of Fremont. An optional station at Irvington is also being considered if additional funding for the station is secured by the City of Fremont. The WSX Alternative alignment would generally parallel portions of the Union Pacific railroad corridor, which contains the former Western Pacific (WP) and Southern Pacific (SP) railroad tracks, and Interstates 680 and 880 in southern Alameda County. The initial segment would begin on an embankment at the southern end of the existing elevated Fremont BART Station. The alignment would pass over Walnut Avenue on an aerial structure and descend into a cut-and-cover subway north of Stevenson Boulevard. The alignment would continue southward in the subway structure under Fremont Central Park and the eastern arm of Lake Elizabeth, and surface to run at grade between the former WP and SP alignments north of Paseo Padre Parkway. Paseo Padre Parkway will be reconfigured to a vehicle underpass as part of the Paseo Padre-Washington Boulevard grade separations project being carried out by the City of Fremont. The alignment would pass over Paseo Padre Parkway on a bridge structure, and then continue southward at grade, passing under a grade-separated Washington Boulevard. Washington Boulevard will be reconfigured as a vehicular overpass as part of the city's grade separations project. From Washington Boulevard, the WSX Alternative alignment would continue at grade along the former WP alignment south to a terminus station at Warm Springs and South Grimmer Boulevards in the Warm Springs district.

The WSX Alternative is composed of 5.4 miles of new trackway, a station at Warm Springs, and ancillary facilities that include traction power, train control, communications, subway ventilation and emergency access structures, and vehicle maintenance facilities. The Warm Springs Station would be a 34-acre multi-modal facility with 2,040 parking spaces and 7 bus bays. The station site plan is designed around an internal circulation system similar to city blocks, so that in the future, the parking area could be redeveloped with transit-oriented development while maintaining the internal street system. (On-site transit-oriented development is not a part of the WSX Alternative and is not analyzed in this EIS.) Tail tracks would extend approximately 3,000 feet south of the Warm Springs Station to provide train turn back facilities and temporary train storage. Located just south of the Warm Springs Station adjacent to the tail tracks, the maintenance facility would have rail car lifts and associated shop facilities to accommodate 1 or 2 BART cars and 30 employee parking spaces within a 3-acre, fenced maintenance yard. Twenty-eight additional BART vehicles are proposed as part of the project, but the new vehicles would not be required until full ridership is reached.

Traction power facilities (substations and gap breaker stations) are proposed at six locations adjacent to the alignment: Fremont Station, midway between the south subway portal and Paseo Padre Parkway, Blacow Road, midway between Auto Mall Parkway and South Grimmer Boulevard, Warm Springs

Station, and the maintenance facility. A structure for ventilation, pumping, and emergency access would be provided at either one or two locations along the 1-mile-long subway segment of the alignment in Fremont's Central Park. While most of the ventilation structure(s) would be primarily subterranean, some of the structure would be located on the surface. Communications facilities would include communications antennas (less than 30 feet high) at the two subway tunnel portals and possibly at Irvington Station. Smaller antennas (16 feet high) would be placed approximately every 2,000 feet for Advanced Automated Train Control. Data processing would be enclosed in train control bungalows at three locations: midway between the south subway portal and Paseo Padre Parkway, the optional Irvington Station site, and Warm Springs Station. A radio communications antenna up to 150 feet high will also be necessary at Warm Springs Station.

An optional station at Irvington is also proposed pending independent funding by the City of Fremont. The 18-acre optional Irvington Station would be a multi-modal facility with 925 parking spaces and 5 bus bays.

Adverse environmental effects include increased traffic congestion at certain intersections, effects on special-status species, effects on cultural resources, and noise and groundborne vibration from BART trains. Mitigation measures to reduce or avoid adverse effects are identified in the document and include intersection improvements, habitat restoration, cultural resources documentation, noise mitigation, and vibration-reducing trackway treatments.

A 45-day review period was established for comments on this document, beginning on March 11, 2005 and ending on April 25, 2005. Comments were submitted in writing, by email, or were made orally at the public hearing. The public hearing was held at 6:30 p.m. on Tuesday, April 12, 2005, at the Washington Township Veterans Memorial, which is located at 37154 Second Street, Fremont, California 94536. Information on the public hearing could be obtained from http://www.bart.gov/wsx. Email comments were accepted at bartwarmspringsextension@bart.gov. Written comments were accepted at one of the addresses below. All comments were received by 5 p.m. on April 25, 2005.

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Following the close of the public comment period, BART and FTA considered the substantive written and oral comments received on the Draft EIS. Volume 2 of the Final EIS includes all of the substantive comments and responses to those comments.

FOR ADDITIONAL INFORMATION CONCERNING THE WSX PROJECT OR THIS DOCUMENT, PLEASE CONTACT:

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Acronyms and Abbreviations

1998 Amended Plans	amended and restated redevelopment plans for Fremont's four redevelopment project areas
3D	three-dimensional
AATC	Advanced Automatic Train Control
AB 1X	California Assembly Bill 1X
ABAG	Association of Bay Area Governments
AC Transit	Alameda–Contra Costa Transit
ACFCD	Alameda County Flood Control and Water Conservation District
ACHP	Advisory Council on Historic Preservation
ACM	asbestos-containing materials
ACTIA	The Alameda County Transportation Improvement Authority
ACWD	Alameda County Water District
AHERA	Asbestos Hazard Emergency Response Act
ARB	California Air Resources Board
ARARs	applicable or relevant and appropriate requirements
BA	biological assessment
BAAQMD	Bay Area Air Quality Management District
BAPL	Bay Area Products Line
BART	San Francisco Bay Area Rapid Transit District
Basin Plan	water quality control plan
BMP	best management practice
BO	biological opinion
BPA	Bonneville Power Administration
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Average Fuel Economy
Caltrans	California Department of Transportation
CBD	Central Business District
CBSC	California Building Standards Code
CCAA	California Clean Air Act
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980

CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CESA	California Endangered Species Act
cfs	cubic feet per second
CFZ	Calaveras Fault Zone
CGS	California Geological Survey
CIDH	cast-in-drilled-hole
Clean Water Program	Alameda Countywide Clean Water Program
CMA	Alameda County Congestion Management Agency
CMA	Congestion Management Agency
CNDDB	California Natural Diversity Database
CNEL	community noise equivalent level
CNPPA	California Native Plant Protection Act
CNPS	California Native Plant Society
Corps	U.S. Army Corps of Engineers
CORRACTS	Corrective Actions
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CT	Census Tracts
CUPA	certified unified public health agency
CWA	Clean Water Act
CWR	continuous welded rail
dB	decibel
dBA	A-weighted decibel
DOT	U.S. Department of Transportation
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EBMUD	East Bay Municipal Utilities District
EIR	environmental impact report
EIS	environmental impact statement
EMF	electromagnetic fields
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ERNS	Emergency Response Notification System of Spills
ESA	federal Endangered Species Act
ESU	Evolutionarily Significant Unit
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRMs	Flood Insurance Rate Maps
FIS	Flood Insurance Study
Fremont	City of Fremont
FTA	Federal Transit Administration
General Construction Permit	general permit for discharges of stormwater runoff associated with construction activity
GFZ	Greenville Fault Zone
GIS	geographic information systems
GO 95	State Industrial Safety Division General Order 95

gpm	gallons per minute
GPS	global positioning system
HABS	Historic American Building Survey
HFZ	Hayward Fault Zone
HHS	U.S. Department of Health and Human Services
HI	hazard index
HOV	high-occupancy vehicle
HSAS	Homeland Security Advisory System
I-880	Interstate 880
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
kV	kilovolt
Ldn	day-night sound level
LEDPA	least environmentally damaging practicable alternative
Leq	equivalent sound level
Lmax	maximum sound level
Lmin	minimum sound level
LOS	level of service
LT	long-term
LUST	leaking underground storage tank
LWCF	Land and Water Conservation Fund
Lxx	percentile-exceeded sound levels
MBTA	Migratory Bird Treaty Act
MCE	maximum credible earthquake
MCL	maximum contaminant level
mm	millimeter
MMI	Modified Mercalli Intensities
MOA	memorandum of agreement
mpg	miles per gallon
MPOs	Metropolitan Planning Organizations
MTC	Metropolitan Transportation Commission
MTS	Metropolitan Transportation System
MVE/MVW	Monte Vista East/West
MW	megawatt
MWh	megawatt hours
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Center
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NO2	nitrogen dioxide
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service
NOI	Notice of Intent
NOP	Notice of Preparation
Nox	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System

NPL	National Priority List
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NUMMI	New United Motor Manufacturing, Inc.
NWP	Nationwide Permit
OCC	Operations Control Center
OHS	Office of Homeland Security
PCB	polychlorinated biphenyls
PG&E	Pacific Gas and Electric Company
PGA	Peak Ground Acceleration
Plan	Storm Water Quality Management Plan
PM2.5	particulate matter <2.5 microns in diameter
PPV	peak particle velocity
PUC	San Francisco Public Utilities Commission
RAGS	Risk Assessment Guidance for Superfund
RCB	reinforced concrete box
RCRA	Resource Conservation and Recovery Act
RME	reasonable maximum exposure
rms	root mean square
ROD	Record of Decision
ROG	reactive organic gases
RTEP	Regional Transit Expansion Program
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SAFS	San Andreas Fault System
SAFZ	San Andreas Fault Zone
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SBC	Southwestern Bell Company
SC-SG-HFZ	Seal Cove-San Gregorio-Hosgri Fault Zone
SFBAAB	San Francisco Bay Area Air Basin
SFO	San Francisco International Airport
SFPP	Santa Fe Pacific Pipelines
SFPUC	San Francisco Public Utilities Commission
SHPO	State Historic Preservation Officer
SLIC	spills, leaks, investigation and cleanup sites
SO2	sulfur dioxide
SP	Southern Pacific
ST	short-term
State Parks	California Department of Parks and Recreation
Strategic Plan	BART Strategic Plan: A New Era of Ownership
SVRTC	Silicon Valley Rapid Transit Corridor
SWF	solid waste facility
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Quality Control Board

TACs	toxic air contaminants
TAZ	traffic analysis zones
TEA-21	Transportation Equity Act for the 21st Century
the Act	Alquist-Priolo Special Studies Zones Act of 1972
TIP	Transportation Improvement Program
TMDL	total daily maximum load
TOD	transit-oriented development
TRI	Toxic Release Inventory Database
TSD	treatment, storage and disposal
UP	Union Pacific Railroad
USDOT	U.S. Department of Transportation
U.S. EPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
V/C	volume of traffic compared to the capacity
VdB	velocity level in decibels
VMT	vehicle miles traveled
VTA	Santa Clara Valley Transportation Authority
WDS	Waste Discharge System Data
WMUDS/SWAT	Waste Management Unit Database System Solid Waste Assessment Test data
WSX	Warm Springs Extension

Executive Summary

Overview

The San Francisco Bay Area Rapid Transit District (BART) has been in operation since 1972 and currently operates in four Bay Area counties: San Francisco, Alameda, Contra Costa, and San Mateo. The most recent extensions to the BART system are the extensions to Dublin/Pleasanton in eastern Alameda County, to Pittsburg/Bay Point in eastern Contra Costa County, and to the San Francisco International Airport in San Mateo County, with a terminus in Millbrae, California.

In 1991, BART prepared an environmental impact report (EIR) for the Warm Springs Extension (WSX) to fulfill the requirements of the California Environmental Quality Act (CEQA). The EIR analyzed a series of alternatives for extending BART to the Warm Springs area. In 1992, the BART Board of Directors certified the Final EIR and adopted a project consisting of a 5.4-mile, two-station extension of the existing BART system, with stations at Irvington and Warm Springs and an aerial BART alignment over Lake Elizabeth in Fremont Central Park. (See Figure ES-1.) The BART Board also approved a subway alignment under Lake Elizabeth as a design option contingent on local funding.

When the Final EIR was certified in 1992, Fremont did not support the recommended project alternative, which included the aerial alignment in Fremont Central Park. Fremont did support the alternative that included a subway alignment under Lake Elizabeth. Sufficient funds were not available to construct either alternative. However, because of public support for the extension of rail transit service from Fremont, BART continued to consider the possibility of an extension and other transit agencies continued to study the regional corridor.

In 2002, BART initiated the preparation of a Supplemental EIR (SEIR) pursuant to CEQA to address the modifications to the project studied in the 1992 EIR. The principal modification from the 1992 project was the change from an aerial structure to a subway alignment under Fremont Central Park and Lake Elizabeth, reducing environmental impacts to the park. Additionally, the project included only one new station at Warm Springs, with an optional station at Irvington. On June 26, 2003, the BART Board of Directors certified the Final SEIR (San Francisco Bay Area Rapid Transit District 2003) and adopted the modified project as analyzed in the SEIR. The 1992 EIR and 2003 SEIR are available for review upon request at BART headquarters, 300 Lakeshore Drive, 21st Floor, Oakland, CA 94612.

Recent changes in state transportation funding priorities have resulted in BART's seeking federal funding for the project. BART and the Federal Transit Administration (FTA) are preparing this environmental impact statement (EIS) to satisfy the requirements of the National Environmental Policy Act (NEPA) and other environmental requirements that apply to federal actions, in order to enable BART to apply for federal funding.

For purposes of this EIS, BART is considering two alternatives for the Warm Springs Extension: the BART Warm Springs Extension Alternative (WSX Alternative) and the No-Build Alternative. These alternatives are described in detail in Chapter 3, *Preferred Alternative and Other Alternatives Considered*. The WSX Alternative evaluated in this EIS is identical to the Proposed Project analyzed in the 2003 SEIR. No changes to the project design concept or scope have been made since the adoption of the proposed project by the BART Board of Directors in 2003. This EIS incorporates by reference material from the CEQA EIR and SEIR, and does not consider in detail alternatives that were evaluated during the CEQA process and found not to satisfactorily meet the project's purpose and need. The reasons that those alternatives were dismissed from further evaluation in this EIS are discussed in detail in Chapter 3.

Purpose and Need

The purpose and need for the project are briefly summarized below and discussed in detail in Chapter 2, *Purpose and Need.*

The proposed 5.4-mile BART extension to the Warm Springs district of Fremont, would improve the regional transit network by enhancing the link between the southern Alameda County-northern Santa Clara County area and the rest of the East Bay, and San Francisco. By shortening travel times and improving reliability, the BART extension is expected to generate additional transit ridership and reduce overall traffic congestion. The Warm Springs Extension would help accommodate projected future growth in employment and population, reduce pressure to expand roads, and support the region's efforts to meet state and federal air quality standards.

Transportation has become a critical issue for people living and working in the southern Alameda County and northern Santa Clara County. The surge in population, including nearly a 20 percent population increase over the past decade in the City of Fremont, has increased traffic on regional roadways. Highway improvements have not kept up with the demand for more highway capacity. Congestion on Interstate 680 and Interstate 880, the two major regional roadways linking Santa Clara, Alameda, and Contra Costa Counties, has worsened considerably over the last decade, and escalating traffic volumes have reached levels considered unacceptable by the California Department of Transportation and other regional monitoring agencies. Improved transit service could better meet existing local and regional transportation demand and increase transportation capacity to accommodate future growth in areawide employment and population.

The increased traffic volume and congestion in the region resulting from growth in employment and population has contributed to increased pollutant emissions in the study area. The WSX Alternative corridor is located within the San Francisco Bay Area Air Basin (SFBAAB), which is designated by the State of California as a serious non-attainment area for ozone and a non-attainment area for inhalable particulate matter (PM10). The U.S. Environmental Protection Agency (EPA) has designated the SFBAAB as an unclassified nonattainment area for 1-hour ozone (2006 attainment deadline), and a marginal non-attainment area for 8-hour ozone. The Metropolitan Transportation Commission (MTC) identifies transit as an alternative to the private automobile that can reduce annual average daily traffic (AADT), which would reduce vehicular emissions in the air basin (Metropolitan Transportation Commission 2001). The Warm Springs Extension was named a

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Source: Bay Area Rapid Transit 2003.

Figure ES-1
BART System Map

Transportation Control Measure in MTC Resolution 2131-the Transportation Contingency Plan of the 1982 Air Quality Plan.

Increased traffic volumes and longer commuting distances for employees have combined to increase the number of vehicle miles traveled annually in the Bay Area. Traffic congestion also has meant that automobiles frequently travel at slower and less efficient speeds, which contributes not just to air pollution, but to less efficient use of energy that could be used for other regional needs.

Transportation improvements should be consistent with smart growth principles by promoting infill development rather than sprawl. Improved access to high-volume transit systems, such as BART, supports smart growth goals by enabling more clustered, compact growth. Transit stations become an important part of the community and can serve as a catalyst for transit-oriented development (TOD). TOD promotes a mixture of land uses, such as restaurants, convenience and other retail stores, and high-density residential use.

The purpose of the WSX project is to address transportation and air quality problems in the project corridor with a transit project that will:

- increase transit access and ridership,
- improve environmental quality,
- provide development catalyst for transit-oriented development,
- ensure compatibility with adjacent land uses and planned development,
- provide transportation services equitably to all segments of the population,
- support community goals and institutional objectives,

Alternatives Analyzed in the Environmental Impact Statement

The alternatives analyzed in this EIS are the No-Build Alternative and the WSX Alternative.

No-Build Alternative

As described in Chapter 3, *Alternatives Considered*, the purpose of evaluating the No-Build Alternative is to allow decision-makers to compare the impacts of the WSX Alternative with the impacts of not approving the action. For the purpose of this EIS, the No-Build Alternative represents the consequences of deciding not to construct a project (i.e., the No-Action Alternative required by NEPA). In this case, the BART Board adopted the WSX Alternative in June 2003 as a state- and locally funded project without federal involvement. If the No-Build Alternative were selected as the outcome of the EIS evaluation, BART could continue with construction of the 2003 Adopted Project provided that sufficient state and local funding were found. However, at this time, it does not appear that such funding is reasonably likely to be available, which is why BART is seeking to satisfy requirements for federal funding eligibility through the NEPA review process. Selection of the No-

Action Alternative at the conclusion of NEPA review would likely result in the WSX Alternative not being constructed until a substantially later date.

Accordingly, for the purposes of this analysis, the No-Build Alternative does not include a BART extension to Warm Springs, and assumes that transit services offered by BART will continue at current levels, except for limited improvements in service frequency. In addition, the No-Build Alternative assumes that commitments to transportation improvements planned by other agencies will be carried out. The No-Build Alternative represents the conditions that would be reasonably expected to occur in the foreseeable future if the WSX Alternative were not approved. These conditions are based on current plans and are consistent with available infrastructure and community services, which, for the purposes of this analysis, include current rail services provided by BART, and bus service provided by Alameda Contra Costa Transit District (AC Transit) , and Santa Clara Valley Transportation Authority (VTA). Programmed highway improvements included in MTC's 2001 Regional Transportation Plan, such as the addition of an HOV lane to I-680 over the Sunol Grade, are also included in this alternative. Fremont's grade separations project has also been assumed in this alternative. These transportation improvements would occur even if the WSX Alternative is not implemented. The No-Build Alternative does not include the proposed VTA BART extension to Santa Clara County and San Jose.

The No-Build Alternative would not have certain impacts that would occur with implementation of the WSX Alternative, such as potential disturbances to hazardous materials, increased stormwater flows, temporary loss of flood storage, potential soil erosion and sedimentation, disturbance to sensitive species or habitat, residential and business displacements, visual impacts, disturbances of sensitive archaeological and historic resources, local intersection impacts, noise, and vibration effects. However, unlike the WSX Alternative, the No-Build Alternative would fail to address continuing long-term traffic congestion, and traffic-related air quality and energy benefits would not be realized. Projected growth in the area also would not be accommodated in a manner consistent with "smart growth" principles.

WSX Alternative

The WSX Alternative alignment would generally parallel portions of the UP railroad corridor, which contains the former Western Pacific (WP) and former Southern Pacific (SP) railroad tracks,[1] and Interstates 680 and 880 in southern Alameda County (see Figure ES-2). The initial segment would begin on an embankment at the southern end of the existing elevated Fremont BART Station. The alignment would pass over Walnut Avenue on an aerial structure and descend into a cut-and-cover subway north of Stevenson Boulevard. The alignment would continue southward in the subway structure under Fremont Central Park and the eastern arm of Lake Elizabeth, and surface to grade between the former WP and SP alignments north of Paseo Padre Parkway. The alignment would pass over grade-separated Paseo Padre Parkway, and then continue southward at grade, passing under a grade-separated Washington Boulevard.[2] From Washington Boulevard, the WSX Alternative

[1] Until December 2002, WP and SP were both owned by UP. For clarity in this EIS, the tracks on the eastern side of the UP right-of-way will be referred to as the former WP tracks, and the tracks on the western side of the UP right-of-way will be referred to as the former SP tracks.

[2] *Grade separated* describes an intersection where two modes of transportation (e.g., rail tracks and a highway) cross each other at different levels to permit unconstrained operation. Paseo Padre Parkway will be reconfigured as a vehicular underpass and Washington Boulevard as a vehicular overpass in a grade separations project being undertaken by the City of Fremont.

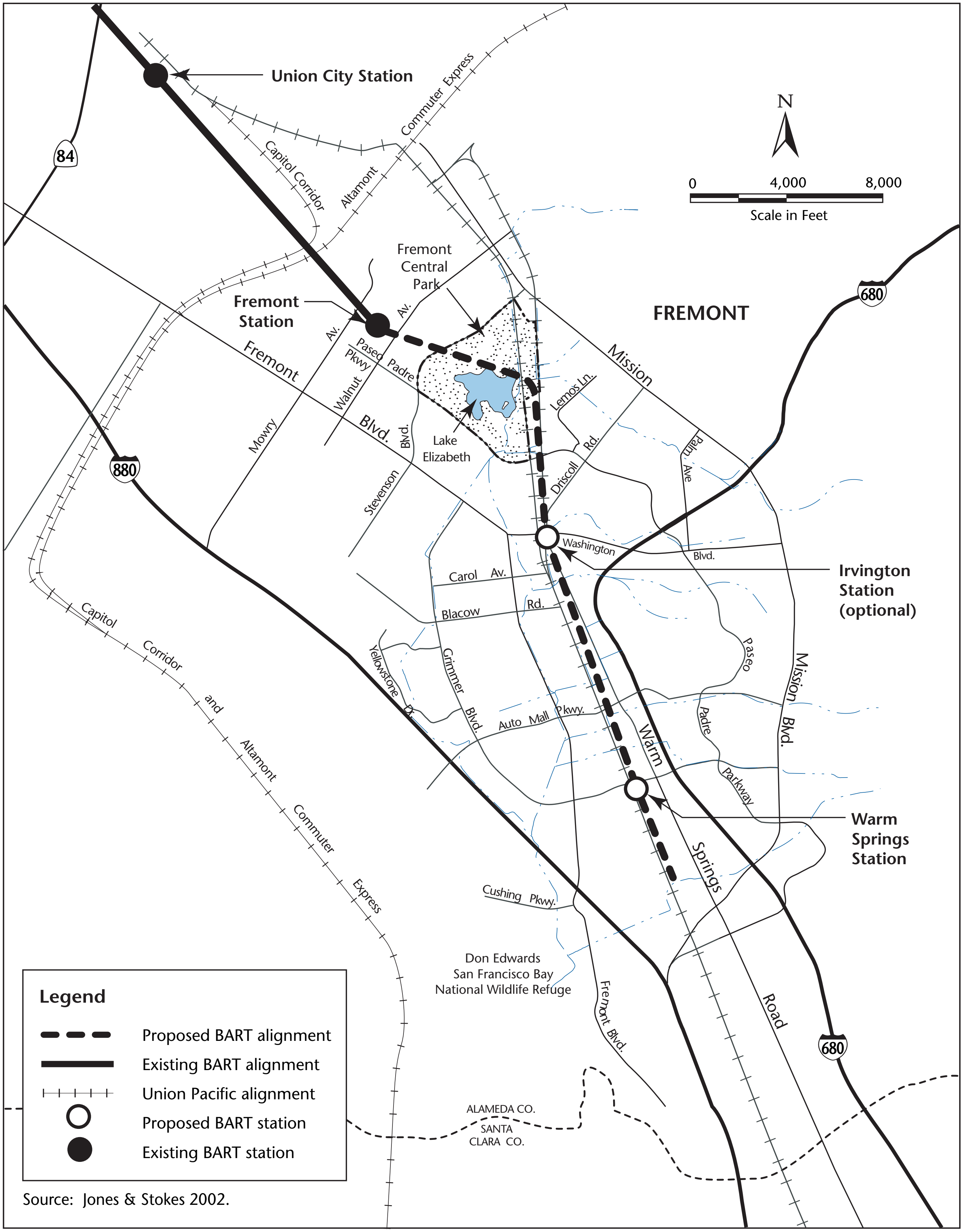

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Figure ES-2
WSX Alternative

alignment would continue at grade along the former WP alignment south to a terminus station at Warm Springs and South Grimmer Boulevards in the Warm Springs district. A summary of the WSX Alternative is presented in Table ES-1.

Table ES-1. 2004 WSX Alternative Summary

Item	Description
WSX Alternative	
Estimated Construction Start	2006[a]
Begin Revenue Service	2010
Length of Alignment	5.4 miles
–Embankment	0.2 mile
–Overpass	0.1 mile
–Subway	1.0 mile
–At grade	3.3 miles
–Retained cut/fill	0.8 mile
Warm Springs Station Intermodal Facilities	34 acres
	2,040 parking spaces
	7 bus bays
Ancillary Facilities	
–Traction Power (electrical substations, gap breaker stations) –Train Control and Communications –Subway Ventilation Structure(s) –Pumping/Emergency Access –Vehicle Maintenance	
Estimated Ridership in 2025	
Total New Transit Trips	7,200
New BART Trips Systemwide	8,200
Cost –Capital –Operating (annual average)	 $678 million $8.16 million
WSX Alternative with Optional Irvington Station	
Irvington Intermodal Facilities	18 acres
	925 parking spaces
	5 bus bays
Estimated Ridership in 2025 with Irvington Station	
Total New Transit Trips	9,100
New BART Trips Systemwide	10,800
Cost –Capital –Operating (annual average)	 $757 million $9.49 million

[a] Construction is unlikely to begin in 2006. A new project schedule has yet to be determined.

Source: San Francisco Bay Area Rapid Transit District

Purpose of the Environmental Impact Statement

The EIS was prepared in compliance with NEPA, the Council on Environmental Quality (CEQ) NEPA Regulations, 40 C.F.R. Parts 1500–1508, and joint Federal Highway Administration/Federal Transit Administration regulations governing the application of NEPA to transportation projects, 23 C.F.R. Part 771. NEPA requires all federal agencies to consider the environmental consequences of major federal actions over which they have discretionary authority. This EIS is an informational document intended to inform public agencies and the public about the potential environmental effects that may result from implementation of the proposed action, the construction and operation of the proposed extension of the BART system to Warm Springs. This analysis will support the development of an effective mitigation program for site-specific mitigation of possible environmental impacts. This EIS is also intended to satisfy the requirements of Section 4(f) of the Department of Transportation of 1966 (now codified at 49 U.S.C. 1653 [f]) relating to use of park lands for transportation projects, Section 6(f) of the Land and Water Conservation Fund Act of 1965 relating to replacement of federally-funded park land converted to other uses, and Section 106 of the National Historic Preservation Act of 1966 relating to preservation of historic resources.

As the federal lead agency, FTA is responsible for considering this EIS. Once the Final EIS is published, FTA will consider the Final EIS in reaching its decision and will prepare a Record of Decision (ROD) completing the NEPA process. The National Park Service, as a cooperating agency, considered the EIS in approving the conversion to non-park use of park land acquired or improved with federal funds pursuant to the Land and Water Conservation Fund Act, Section 6(f). Other agencies may also use this EIS as part of the process of issuing approvals or permits prior to construction.

Scope of the Environmental Impact Statement

On April 6, 2004, FTA published a Notice of Intent (NOI) for the Warm Springs Extension Draft EIS in the *Federal Register*, consistent with 40 C.F.R. section 1501.7. A copy of the NOI is included as Appendix A of this document. As a result of a review of the subjects analyzed in the 1992 EIR and 2003 SEIR and based on agency and public comments received in response to the NOI, BART has determined that the environmental resource areas listed below would be analyzed in the EIS. The environmental analysis incorporated herein identifies the environmental impacts of the WSX Alternative on those resource areas, as well as the mitigation measures proposed to avoid or substantially reduce environmental consequences. Operational and construction-related impacts are considered for each resource area.

- Transportation
- Geology, Soils, and Seismicity
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Wetlands
- Biological Resources

- Land Use and Planning
- Parks and Recreation
- Population, Employment, and Housing
- Aesthetics
- Cultural Resources
- Noise and Vibration
- Air Quality
- Energy
- Utilities and Public Services
- Safety and Security
- Environmental Justice

Cumulative and indirect impacts, the relationship between short-term uses of the environment and long-term productivity, and irreversible commitments of resources are discussed in Chapter 5 (Other NEPA Considerations).

Environmental Consequences

The environmental analysis incorporated in the EIS identifies the adverse and beneficial environmental effects of the WSX Alternative and the proposed mitigation measures for adverse effects. Table ES-2 at the end of this chapter describes the adverse impacts and mitigation measures identified to avoid or reduce those impacts where feasible.

In most cases, impacts to the affected resources would be reduced after implementation of mitigation measures. Some impacts, however, cannot be feasibly mitigated and would remain *adverse environmental effects that cannot be avoided.* Those impacts are listed below.

- **Impacts BIO-Cume-2 and BIO-Cume-5—**Potential for loss of ruderal forb-grassland habitat (WSX Alternative, and with optional Irvington Station).
- **Impact BIO-Cume-3—**Potential to contribute to cumulative regional impacts on the Western Burrowing Owl.
- **Impact A-5—**Potential visual impacts due to sound walls.
- **Impact A-6—**Temporary visual disturbances caused by construction.

- **Impacts TRN-4, TRN-8, and TRN-11—**Change in volume-to-capacity ratio (V/C) and level of service (LOS) at the intersection of Osgood Road/Durham Road/Auto Mall Parkway (WSX Alternative, and with optional Irvington Station).

- **Impacts TRN-7, TRN-14, TRN-19, and TRN-Cume-6—**Change in V/C and LOS at the intersection of Mission Boulevard/Warm Springs Boulevard (WSX Alternative, and with optional Irvington Station).

- **Impacts TRN-20 and TRN-21—**Change in LOS on northbound I-880 just south of Mission Boulevard (WSX Alternative, and with optional Irvington Station).

- **Impact N-2—**Exposure of vibration-sensitive land uses to groundborne vibration from BART trains.

- **Impacts E-3, E-7, and E-Cume-2—**Effects of WSX Alternative on peak- and base-period electricity demand (WSX Alternative, and with optional Irvington Station).

- **Impact G-1—**Potential impacts resulting from earthquake-induced ground shaking and ground rupture.

Beneficial Effects

Based on the analysis and conclusions set forth in this EIS, the WSX Alternative would have beneficial effects in the areas of land use, transportation, air quality, and energy. Following is a summary of project-related benefits.

Transportation

As discussed in Section 4.2 (*Transportation*), the WSX Alternative would have beneficial impacts on transportation by enhancing transit opportunities within the action area; overall traffic congestion would be relieved to some degree. The WSX Alternative would result in an increase in new transit trips, particularly for trips destined for, originating in, or passing through southern Alameda County. Transit person trips would increase with the WSX Alternative in comparison to the No Action Alternative in both 2010 and 2025. The WSX Alternative would increase new transit ridership by 4,700 daily trips in 2010 and 7,200 daily trips in 2025. The optional Irvington Station would increase new transit ridership to a total of 5,700 and 9,100 daily trips in 2010 and 2025 respectively. This increase in transit trips indicates a shift in use from automobile to transit.

Land Use

As discussed in Section 4.8 (Land Use), through its Strategic Plan and System Expansion Criteria, BART encourages intensification of land uses surrounding BART facilities to enhance increased transit opportunities and ridership. To the extent that the WSX Alternative encourages transit-oriented development, a beneficial effect would result, maximizing opportunities to foster “smart growth” in the vicinity of the proposed future station sites.

Air Quality

As discussed in Section 4.14 (*Air Quality*), a reduction in the emission of reactive organic gases, oxides of nitrogen, and particulate matter $\leq$10 microns in diameter from mobile sources during operation of the WSX Alternative would result in regional air quality benefits. Such benefits would result from decreases in automobile and bus vehicle miles traveled (VMT) as compared to No-Build conditions. Implementation of the WSX Alternative also would reduce greenhouse gas emissions. In addition, the WSX Alternative would reduce toxic air contaminants because such emissions are directly correlated with VMT.

Energy

As discussed in Section 4.15 (*Energy)*, the WSX Alternative would result in an overall decrease in Bay Area transportation energy consumption in 2010 and in 2025 as compared to No-Build conditions. The decrease in energy consumption would result from an action-related decrease in annual automobile and bus VMT. This decrease in VMT would translate into gains in energy efficiency, which would be a net benefit.

Public Review Process

Notice of Intent

The NOI for the BART Warm Springs Extension Project DEIS was published in the Federal Register on April 6, 2004. Copies of the NOI were also sent to state and local agencies.

Public Scoping Meeting

A public scoping meeting for the WSX Alternative was held on April 28, 2004, at the Fremont Main Library. The purpose of the meeting was to solicit comments to help determine the scope of the WSX EIS. Notices were published beforehand in local newspapers announcing the time, date, location, and purpose of the meeting. In addition, invitations to the meeting and copies of the NOI were distributed to an extensive mailing list of stakeholders throughout Fremont, southern Alameda County, and northern Santa Clara County. More than 50 people attended the public scoping meeting. Comments received in response to the NOI and at the public scoping meeting have been considered, where applicable.

Areas of Known Controversy and Issues to Be Resolved

The CEQ NEPA Regulations direct federal agencies to consider areas of controversy known to the lead agency, including issues raised by other agencies and the public. The following areas of concern were raised in comments made on the NOI.

Areas of Controversy

- Whether alternatives previously eliminated under CEQA may be considered reasonable under NEPA.

- Relationship of WSX Alternative to future transit-oriented development.
- Impacts of construction and maintenance dewatering on groundwater and hydrological functions
- Effects on conservation and restoration efforts in the project area.
- Noise and vibration impacts and location of potential sound walls.
- Effects of subway construction on Fremont Central Park.
- Effects on low-income or minority populations.
- Relationship between the WSX Alternative and the Santa Clara Valley Transit Authority's Silicon Valley Rapid Transit Corridor (SVRTC) project.
- Cost effectiveness and funding.
- Need for the optional Irvington Station.

Issues to be Resolved

- Adoption and funding of the optional Irvington Station.
- Scheduling and coordination with Fremont's grade separations project.
- Location of replacement habitat for biological impacts.
- Land use planning efforts in the vicinity of proposed Warm Springs and optional Irvington Stations.
- Site-specific implementation of noise control measures.
- Site-specific implementation of vibration control measures.
- Impacts of construction and maintenance dewatering on groundwater and hydrological functions.

Comments on the Draft Environmental Impact Statement

A 45-day public review period was held to receive comments on the DEIS, which extended from March 11, 2005 to April 25, 2005. BART held a public hearing at 6:30 p.m. on Tuesday, April 12, 2005, to receive public comments on the DEIS. The public hearing was held at the Washington Township Veterans Memorial, which is located at 37154 Second Street, Fremont, CA 94536. In addition to comments received at the Public Hearing, BART accepted written comments on the DEIS that were sent to one of the addresses listed below and received before the end of the comment period. BART also accepted email comments sent to the following address: bartwarmspringsextension@bart.gov. The public comment period ended at by 5:00 p.m. on April 25, 2005.

During the public review period, written comments were submitted to one of the following addresses:

Lorraine Lerman
Office of Planning and Program Development
U.S. Department of Transportation
Federal Transit Administration, Region IX
201 Mission Street, Suite 2210
San Francisco, CA. 94105

San Francisco Bay Area Rapid Transit District
Attention: Shari Adams
Warm Springs Extension Group Manager
MS-LKS-21
P.O. Box 12688
Oakland, California 94604-2688

The DEIS was available for review at the following locations:

San Francisco Bay Area Rapid Transit District
300 Lakeside Drive
21st Floor
Oakland, CA 94612

Fremont Main Library
2400 Stevenson Boulevard
Fremont, CA 94538

Metropolitan Transportation Commission (MTC) – Association of
Bay Area Governments (ABAG) Library
101 8th Street
Oakland, CA 94607-4700

The Executive Summary of the DEIS was also available online at BART's website, located at www.bart.gov/wsx. Supporting documentation for the DEIS was also available for public review at the 300 Lakeside Drive address listed above. Additional information was available by calling 510/476-3900.

Final Environmental Impact Statement

Following the close of the public comment period on April 25, 2005, BART and FTA considered the comments and prepared responses to substantive written and oral comments on the DEIS. Volume 2 of the Final EIS includes all of the substantive comments and responses to the comments.

Upon completion of the Final EIS, FTA published a notice of its availability. The Final EIS was available for public review at the same locations in which the Draft EIS was available, and copies were distributed to persons who commented on the Draft EIS, interested parties, and agencies that have authority over aspects of the project. FTA will consider the Final EIS in reaching its decision to approve or disapprove of the proposed project. FTA will issue a Record of Decision (ROD) no earlier than 30 days following the notice of availability of the Final EIS.

The Executive Summary of the Final EIS is available online at BART's website: www.bart.gov/wsx. Supporting documentation for the FEIS is also available for public review at the following address and telephone number:

San Francisco Bay Area Rapid Transit District
300 Lakeside Drive
21st Floor
Oakland, CA 94612
Phone: 510/476-3900

Adverse Effect	Mitigation Measure
TRANSPORTATION—WSX Alternative	
Impact TRN-4—2010 change in V/C and LOS at the intersection of Osgood Road/Durham Road/Auto Mall Parkway.	No mitigation is available.
Impact TRN-5—2010 change in V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.	Mitigation Measure TRN-5—Improve V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.
Impact TRN-6—2010 change in V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.	Mitigation Measure TRN-6—Improve V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.
Impact TRN-7—2010 change in V/C and LOS at the intersection of Mission Boulevard/Warm Springs Boulevard.	No mitigation is available.
Impact TRN-8—2025 change in V/C and LOS at the intersection of Osgood Road/Durham Road/Auto Mall Parkway.	No mitigation is available.
Impact TRN-9—2025 change in V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.	Mitigation Measure TRN-5—Improve V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.
Impact TRN-10—2025 change in V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.	Mitigation Measure TRN-6—Improve V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.
Impact TRN-20—2025 change in V/C and LOS on northbound I-880 just south of Mission Boulevard.	No mitigation is available.
Impact TRN-23—Reduced parking supply at Fremont and Warm Springs Station resulting in spillover into residential or commercial areas.	Mitigation Measure TRN-23—Provide additional parking and implement parking monitoring program.
Impact TRN-25—Construction-period traffic impacts.	Mitigation Measure TRN-25—Develop and implement a construction phasing and traffic management plan. Mitigation Measure POP-7—Maintain access, traffic control, and parking supply during construction.
Impact TRN-Cume2 – Contribution to cumulative change in 2025 in V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.	Mitigation Measure TRN5 – Improve V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.
Impact TRN-Cume3 – Contribution to cumulative change in 2025 V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.	Mitigation Measure TRN6 – Improve V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.
Impact TRN-Cume8 – Reduced parking supply at Fremont Station resulting in spillover into residential or commercial areas.	Mitigation Measure TRN-Cume8 – Provide additional parking and implement parking monitoring program.
Impact TRN-Cume10 – Cumulative contribution to construction-related impacts.	Mitigation Measure TRN-Cume10 – Adjust the construction traffic management plan described in Mitigation Measure TRN25.

Adverse Effect	Mitigation Measure
TRANSPORTATION—Optional Irvington Station	
Impact TRN-11—2010 change in V/C and LOS at the intersection of Osgood Road/Durham Road/Auto Mall Parkway	No mitigation is available.
Impact TRN-12—2010 change in V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.	Mitigation Measure TRN-5— Improve V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.
Impact TRN-13—2010 change in V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.	Mitigation Measure TRN-6—Improve V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.
Impact TRN-14—2010 change in V/C and LOS at the intersection of Mission Boulevard/Warm Springs Boulevard.	No mitigation is available.
Impact TRN-15—2010 change in V/C and LOS at the intersection of Osgood Road/Driscoll Road/Washington Boulevard.	Mitigation Measure TRN-15—Improve V/C and LOS at the intersection of Osgood Road/Driscoll Road/Washington Boulevard.
Impact TRN-17—2025 change in V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.	Mitigation Measure TRN-5—Improve V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.
Impact TRN-18—2025 change in V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.	Mitigation Measure TRN-6—Improve V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.
Impact TRN-19—2025 change in V/C and LOS at the intersection of Mission Boulevard/Warm Springs Boulevard.	No mitigation is available.
Impact TRN-21—2025 change in V/C and LOS on northbound I-880 just south of Mission Boulevard.	No mitigation is available.
Impact TRN-24—Reduced parking supply at Fremont and Irvington Stations resulting in spillover into residential or commercial areas.	Mitigation Measure TRN-24—Implement parking monitoring program.
Impact TRN-26—Construction-period traffic impacts in the vicinity of the optional Irvington Station.	Mitigation Measure TRN-25—Develop and implement a construction phasing and traffic management plan. Mitigation Measure POP-7—Maintain access, traffic control, and parking supply during construction.
Impact TRN-Cume4 – Contribution to cumulative change in 2025 V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.	Mitigation Measure TRN5 –Improve V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.
Impact TRN-Cume5 – Contribution to cumulative change in 2025 V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.	Mitigation Measure TRN6 – Improve V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.
Impact TRN-Cume6 – 2025 change in V/C and LOS at the intersection of Mission Boulevard/Warm Springs Boulevard.	No feasible mitigation is available.
Impact TRN-Cume7 – Contribution to cumulative change in 2025 V/C and LOS at the intersection of Osgood Road/Driscoll Road/Washington Boulevard.	Mitigation Measure TRN-Cume7 – Improve V/C and LOS at the intersection of Osgood Road/Driscoll Road/Washington Boulevard.

Adverse Effect	Mitigation Measure
Impact TRN-Cume9 – Cumulative contribution to reduced parking supply at Fremont and Irvington Stations resulting in spillover into residential or commercial areas.	Mitigation Measure TRN-Cume9 – Implement parking monitoring program.
GEOLOGY AND SOILS—WSX Alternative	
Impact G-1—Potential impacts resulting from earthquake-induced ground shaking and ground rupture	Mitigation Measure G-1—Conduct geotechnical surveys to accurately locate the primary and secondary traces of the HFZ. Mitigation Measure G-2—Design and construct BART tracks on engineered embankments. Mitigation Measure G-3—Design and construct proposed alignment excavations to accommodate future track repair and realignment. Mitigation Measure G-4—Implement redundant emergency response measures from the BART Emergency Plan. These mitigation measures will minimize but cannot eliminate this potential impact; therefore, this impact is considered to be unavoidable.
Impact G-2—Potential impacts resulting from fault creep within the Hayward fault zone.	Mitigation Measure G-5—Perform periodic track and structure inspection, track alignment surveys, and reports of adverse track conditions by train operators. Mitigation Measure G-6—Design proposed structures to accommodate fault creep.
Impact G-3 – Potential impacts resulting from expansive soils.	Mitigation Measure G-7—Design proposed structures to account for potential soil expansion.
Impact G-4—Potential impacts resulting from soil compression.	Mitigation Measure G-8—Implement appropriate design criteria to minimize the potential for detrimental soil compression and ground settlement. Mitigation Measure G-9—Monitor ground settlement during operation of the WSX Alternative.
Impact G-5—Potential impacts on paleontological resources as a result of WSX construction.	Mitigation Measure G-10—Identify Pleistocene units before construction. Mitigation Measure G-11— Provide paleontological monitoring for construction activities with potential to disturb Pleistocene units. Mitigation Measure G-12—Stop work if vertebrate fossils are encountered during site preparation or construction.

Adverse Effect	Mitigation Measure
GEOLOGY AND SOILS—Optional Irvington Station	
Impact G-6—Potential impacts of optional Irvington Station resulting from earthquake-induced ground shaking and ground rupture.	Mitigation Measure G-1—Conduct geotechnical surveys to accurately locate the primary and secondary traces of the HFZ. Mitigation Measure G-4—Implement redundant emergency response measures from the BART Emergency Plan. Mitigation Measure G-7—Design proposed structures to account for potential soil expansion Mitigation Measure G-13—Locate Irvington Station structures outside the zone of potential fault rupture. Impact G-14—Design and construct all Irvington Station structures in accordance with applicable building standards.
Impact G-7—Potential impacts on paleontological resources as a result of WSX construction.	Mitigation Measure G-10—Identify Pleistocene units before construction. Mitigation Measure G-11— Provide paleontological monitoring for construction activities with potential to disturb Pleistocene units. Mitigation Measure G-12—Stop work if vertebrate fossils are encountered during site preparation or construction.
Impact G-8—Potential slope instability in excavations and during construction.	Mitigation Measure G-15—Design and construct deep excavations according to applicable building codes.
HAZARDS AND HAZARDOUS MATERIALS—WSX Alternative	
Impact HazMat-1—Creation of a hazard to the public or to the environment from reasonably foreseeable accidents involving the release of hazardous materials.	Mitigation Measure HazMat-1—Implementation of BART Emergency Plan.
Impact HazMat-3—Exposure of workers or the public to hazardous materials in the soil or groundwater resulting in adverse health effects.	Mitigation Measure HazMat-3—Conduct additional site characterization; prepare and implement site-specific health and safety plan; develop and implement a soil/groundwater management plan
Impact HazMat-4—Potential handling of hazardous materials within 0.25 mile of an existing school.	Mitigation Measure HazMat-3—Conduct additional site characterization; prepare and implement site-specific health and safety plan; develop and implement a soil/groundwater management plan
Impact HazMat-5—Potential for demolition or renovation of existing structures to expose workers to lead-based paint and asbestos-containing materials.	Mitigation Measure HazMat-5—Survey and properly handle materials from structures that may contain asbestos and lead-based paint.
Impact HazMat-6—Potential for interruption or delay of ongoing site investigation/remediation activities.	Mitigation Measure HazMat-6—Cooperation and coordination with responsible site investigation/remediation parties and agencies.
HAZARDS AND HAZARDOUS MATERIALS—Optional Irvington Station	
Impact HazMat-1—Creation of a hazard to the public or to the environment from reasonably foreseeable accidents involving the release of hazardous materials.	Mitigation Measure HazMat-1—Implementation of BART Emergency Plan.

Adverse Effect	**Mitigation Measure**
Impact HazMat-3—Exposure of workers or the public to hazardous materials in the soil or groundwater resulting in adverse health effects.	Mitigation Measure HazMat-3—Conduct additional site characterization; prepare and implement site-specific health and safety plan; develop and implement a soil/groundwater management plan
Impact HazMat-5—Potential for demolition or renovation of existing structures to expose workers to lead-based paint and asbestos-containing materials.	Mitigation Measure HazMat-5—Survey and properly handle materials from structures that may contain asbestos and lead-based paint.
Impact HazMat-6—Potential for interruption or delay of ongoing site investigation/remediation activities.	Mitigation Measure HazMat-6—Cooperation and coordination with responsible site investigation/remediation parties and agencies.
HYDROLOGY—WSX Alternative	
Impact H-1—Alteration of flooding conditions due to changes in infiltration rates, drainage patterns, or the rate and amount of surface runoff.	Mitigation Measure H-1—Design and implement a stormwater management system to safely convey stormwater.
Impact H-3—Loss of flood storage capacity at Tule Pond South.	Mitigation Measure H-3–Mitigate the loss of flood storage capacity by providing an equal or greater amount of storage capacity at the same location.
Impact H-4—Delivery of increased pollutant loads to urban drainages from expanded impervious areas.	Mitigation Measure H-4—Incorporate design features and implement best management practices (BMPs) for post-construction water quality protection.
Impact H-8—Water quality degradation from operational dewatering.	Mitigation Measure H-8—Obtain NPDES permit and implement permit conditions for all operational dewatering activities that discharge to surface waters.
Impact H-9—Potential for accelerated erosion and discharge of sediment into water bodies as a result of ground-disturbing activities.	Mitigation Measure H-9—Ensure implementation of stormwater general NPDES permit conditions.
Impact H-10—Water quality degradation at Lake Elizabeth, Mission Creek, Tule Pond, and Cañada de Aliso during construction.	Mitigation Measure H-10(a)—Implement water quality control measures to prevent release of sediment. Mitigation Measure H-10(b)— Obtain NPDES permit and implement permit conditions for all construction dewatering activities that discharge to surface waters.
Impact H-11—Release of hazardous substances that violate water quality standards.	Mitigation Measure H-11—Implement hazardous materials spills prevention and control plan.
Impact H-12—Potential depletion of local groundwater supplies during construction.	Mitigation Measure H-12—Develop and implement a construction dewatering plan.
Impact H-13—Temporary reduction in flood storage capacity at Lake Elizabeth.	Mitigation Measure H-13(a)—Limit construction of cut-and-cover subway to the dry season. Mitigation Measure H-13(b)—Create additional flood storage capacity equal to or greater than the temporary reduction in flood storage during construction.
Impact H-Cume1 – Potential for increased hardscape area to reduce groundwater infiltration and increase peak flows in area drainages.	Mitigation Measure H-1—Design and implement a stormwater management system to safely convey stormwater. Mitigation Measure H-4—Incorporate design features and implement best management practices (BMPs) for post-construction water quality protection.

Adverse Effect	Mitigation Measure
HYDROLOGY—Optional Irvington Station	
Impact H-14—Alteration of flooding conditions due to changes in infiltration rates, drainage patterns, or the rate and amount of surface runoff as a result of the presence of optional Irvington Station.	Mitigation Measure H-1—Design and implement a stormwater management system to safely convey stormwater.
Impact H-Cume3 – Potential for optional Irvington Station to increase the Action-related contribution to any cumulative regional impacts on groundwater recharge and peak flood flows.	Mitigation Measure H-1—Design and implement a stormwater management system to safely convey stormwater.
WETLANDS—WSX Alternative	
Impact WL-1—Permanent loss of wetlands habitat.	Mitigation Measure WL-1—Restore, create, and protect wetland habitat to mitigate loss of wetland habitat.
Impact WL-2—Loss of riparian forest habitat.	Mitigation Measure WL-2—Enhance, recreate, or restore riparian forest to compensate for the loss of riparian forest habitat.
Impact WL-4—Temporary disturbance of open water habitat.	Mitigation Measure WL-4—Install erosion barriers.
Impact WL-5—Temporary disturbance of wetlands and creek habitat.	Mitigation Measure WL-5(a)—Avoid or minimize disturbance of wetlands and creeks. Mitigation Measure WL-5(b)—Restore disturbed wetlands and creek habitat. Mitigation Measure WL-5(c)—Compensate for temporary loss of wetlands and creek habitat.
Impact WL-6—Temporary disturbance of riparian forest habitat.	Mitigation Measure WL-6(a)—Minimize disturbance of riparian habitats. Mitigation Measure WL-6(b)—If it is not possible to avoid work in riparian areas, restore disturbed riparian forest areas.
Impact WL-Cume1 – Potential for loss of wetlands and riparian habitat.	Mitigation Measure WL-1—Restore, create, and protect wetland habitat to mitigate loss of wetland habitat. Mitigation Measure WL-2—Enhance, recreate, or restore riparian forest to compensate for the loss of riparian forest habitat.
BIOLOGICAL RESOURCES—WSX Alternative	
Impact BIO-1—Effects of increased noise and groundborne vibration on wildlife.	Mitigation Measure N-1—Implement noise-reducing measures at noise-sensitive land uses in the WSX Alternative corridor. Mitigation Measure N-2—Implement vibration-reducing measures at vibration-sensitive land uses in the WSX Alternative corridor.
Impact BIO-3—Loss of occupied Western Burrowing Owl habitat and direct impacts on Western Burrowing Owls.	Mitigation Measure BIO-3—Implement on- and offsite replacement of Western Burrowing Owl habitat.

Adverse Effect	**Mitigation Measure**
Impact BIO-4—Removal of trees.	Mitigation Measure BIO-4(a)—Conduct a tree survey to assess tree resources affected by the WSX Alternative. Mitigation Measure BIO-4(b)—Provide replacement trees for the removal of protected trees.
Impact BIO-6—Temporary disturbance of ruderal forb-grassland.	Mitigation Measure BIO-6(a)— Minimize and avoid forb-grassland habitat. Mitigation Measure BIO-6(b)—Minimize erosion of stockpiled soil. Mitigation Measure H-9—Ensure implementation of NPDES permit conditions. Mitigation Measure H-10(a)—Implement water quality control measures to prevent release of sediment.
Impact BIO-8—Temporary disturbance of habitat for Western Burrowing Owl.	Mitigation Measure BIO-8—Conduct preconstruction surveys for nesting and wintering Burrowing Owls, and implement measures to avoid or minimize impacts if owls are present.
Impact BIO-9—Temporary noise disturbance of nesting common and special-status raptors.	Mitigation Measure BIO-9—Conduct a preconstruction survey for nesting raptors, and implement measures to avoid or minimize impacts if nesting special-status raptors are present.
Impact BIO-11—Temporary disturbance of nesting swallows.	Mitigation Measure BIO-11—Avoid construction during swallow nesting season or remove empty nests and prevent new nesting. Mitigation Measure WL-6(a)—Minimize disturbance of riparian habitats.
Impact BIO-12—Disturbance or loss of wetlands and upland habitat identified as potential habitat for California red-legged frog.	Mitigation Measure BIO-12(a)—Implement measures to avoid and minimize disturbance of California red-legged frog and California tiger salamander habitat at South Tule Pond (New Marsh). Mitigation Measure BIO-12(b)—Compensate for permanent and temporary impacts to California red-legged frog and California tiger salamander habitat at South Tule Pond (New Marsh). Mitigation Measure BIO-12(c)—Biological Monitoring.
Impact BIO-13—Permanent and temporary disturbance of potential California tiger salamander upland estivation habitat.	Mitigation Measure Bio-12(a)—Implement measures to avoid and minimize disturbance of California red-legged frog and California tiger salamander habitat at South Tule Pond (New Marsh). Mitigation Measure BIO-12(b)—Compensate for permanent and temporary impacts to California red-legged frog and California tiger salamander habitat at South Tule Pond (New Marsh). Mitigation Measure BIO-12(c)—Biological Monitoring.

Adverse Effect	Mitigation Measure
Impact BIO-14—Water quality degradation effects on fish in Mission Creek and Lake Elizabeth during construction.	Mitigation Measure H-9—Ensure implementation of NPDES permit conditions. Mitigation Measure H-10(a)—Implement water quality control measures to prevent release of sediment. Mitigation Measure H-10(b)—Obtain NPDES permit for all construction dewatering activities that discharge to surface waters.
Impact BIO-16—Potential for fish stranding leading to mortality during dewatering activities.	Mitigation Measure BIO-16—Capture and relocate any stranded fish during dewatering activities.
Impact BIO-Cume2 – Potential for loss of ruderal forb-grassland habitat.	Mitigation Measure BIO-3—Implement on- and offsite replacement of Western Burrowing Owl habitat. This cumulative impact is considered to be unavoidable.
Impact BIO-Cume3 – Potential to contribute to cumulative regional impacts on the Western Burrowing Owl.	Mitigation Measure BIO-3—Implement on- and offsite replacement of Western Burrowing Owl habitat. Mitigation Measure BIO-8—Conduct preconstruction surveys for nesting and wintering Burrowing Owls, and implement measures to avoid or minimize impacts if owls are present. However, cumulative loss of suitable habitat for the Western Burrowing Owl in the region is considered unavoidable.
Impact BIO-Cume4 – Potential for construction-related cumulative impacts.	Mitigation Measure WL-5(a)—Avoid or minimize disturbance of wetlands and creeks. Mitigation Measure WL-5(b)—Restore disturbed wetlands and creek habitat. Mitigation Measure WL-5(c)—Compensate for temporary loss of wetlands and creek habitat. Mitigation Measure WL-6(a)—Minimize disturbance of riparian habitats. Mitigation Measure WL-6(b)—If it is not possible to avoid work in riparian areas, restore disturbed riparian forest areas. Mitigation Measure BIO-8—Conduct preconstruction surveys for nesting and wintering Burrowing Owls, and implement measures to avoid or minimize impacts if owls are present. Mitigation Measure BIO-9—Conduct a preconstruction survey for nesting raptors, and implement measures to avoid or minimize impacts if nesting special-status raptors are present. Mitigation Measure BIO-11—Avoid construction during swallow nesting season or remove empty nests and prevent new nesting.
Impact BIO-Cume5 – Potential for loss of ruderal forb-grassland habitat.	No mitigation is available.

Adverse Effect	**Mitigation Measure**
BIOLOGICAL RESOURCES—Optional Irvington Station	
Impact BIO-18—Removal of protected trees from Irvington Station site.	Mitigation Measure BIO-4(a)— Conduct a tree survey to assess tree resources affected by the WSX Alternative. Mitigation Measure BIO-4(b)—Provide replacement trees for the removal of protected trees.
Impact BIO-19—Temporary noise disturbance of common and special-status nesting raptors at optional Irvington Station site.	Mitigation Measure BIO-9—Conduct a preconstruction survey for nesting raptors, and implement measures to avoid or minimize impacts if nesting special-status raptors are present.
LAND USE—WSX Alternative	
Impact LU-3—Creation of construction impacts, such as traffic and circulation obstructions, noise, dust, and other pollutants, and safety issues.	Mitigation Measure LU-3—Limit construction-related effects on land uses adjacent to the project alignment in Fremont Central Park.
PARKS AND RECREATION—WSX Alternative	
Impact PR-1—Occurrence or acceleration of substantial deterioration of park and recreational facilities or programs.	Mitigation Measure A-3—Implement measures to conceal the ventilation structures. Mitigation Measure N-1—Implement noise-reducing measures at noise-sensitive land uses in the WSX Alternative corridor. Mitigation Measure N-3—Design and construct electrical substations, vent shafts, and other ancillary facilities to reduce noise.
Impact PR-3—Construction-related disruptions to park and recreation facilities or programs.	Mitigation Measure PR-3—Limit construction-related disruptions to Fremont Central Park.
POPULATION, ECONOMICS, AND HOUSING—WSX Alternative	
Impact POP-3—Displacement of existing businesses or housing, especially affordable housing.	Mitigation Measure POP-3—Acquire property and relocate residences and businesses.
Impact POP-7—Substantial diminishment in access to and parking at businesses and residences.	Mitigation Measure POP-7—Maintain access, traffic control, and parking supply during construction.
Impact POP-Cume2 – Potential to restrict access and egress to existing businesses, residences, and community facilities or to reduce parking supply.	Mitigation Measure POP-Cume2 – Coordinate access and traffic control during construction of cumulative projects.
POPULATION, ECONOMICS, AND HOUSING—Optional Irvington Station	
Impact POP-10—Displacement of existing businesses or housing as a result of the optional Irvington Station, especially affordable housing.	Mitigation Measure POP-3—Acquire property and relocate residences and businesses.
Impact POP-12—Disruption or division of the physical arrangement of an existing community in the vicinity of the Irvington Station site such that social interaction within the community is severely hampered.	Mitigation Measure POP-7—Maintain access, traffic control, and parking supply during construction.
Impact POP-14—Substantial diminishment in access to and parking at businesses and residences near Irvington Station site.	Mitigation Measure POP-7—Maintain access, traffic control, and parking supply during construction.

Adverse Effect	**Mitigation Measure**
Impact POP-Cume4 – Potential for construction of the Irvington Station to restrict access and egress to existing businesses, residences, and community facilities or to reduce parking supply.	Mitigation Measure POP-Cume2 – Coordinate access and traffic control during construction of cumulative projects.
AESTHETICS—WSX Alternative	
Impact A-1—Reconfiguration of Tule Pond, resulting in change of a well-defined landscape feature.	Mitigation Measure A-1—Protect and replace vegetation near Tule Pond.
Impact A-3—Potential Adverse effects on visual quality and character of Fremont Central Park from proposed ventilation structures.	Mitigation Measure A-3—Implement measures to conceal the ventilation structures.
Impact A-4—Introduction of new elements associated with the proposed Warm Springs Station.	Mitigation Measure A-4—Ensure design of proposed Warm Springs Station is consistent with existing environment.
Impact A-5—Potential visual impacts due to sound walls.	Preferred Mitigation Measure A-5(i)—Screen views of sound walls with landscaping. Alternative Mitigation Measure A-5(ii)—Provide surface treatments. Because exact heights of sound walls cannot be determined at this time, this impact may be unavoidable.
Impact A-6—Temporary visual impacts caused by construction.	Mitigation Measure A-6—Take measures to conceal temporary construction activities. Even with this mitigation measure in place, impacts may be unavoidable.
AESTHETICS—Optional Irvington Station	
Impact A-7—Introduction of new elements or demolition of existing structures in area of optional Irvington Station.	Mitigation Measure A-7(a)—Ensure design of an optional Irvington Station is consistent with existing environment. Mitigation Measure A-7(b)—Incorporate Gallegos Winery site into design of optional Irvington Station.
CULTURAL RESOURCES—WSX Alternative	
Impact CR-1b—Potential for vibration damage to William Y. Horner House.	Mitigation Measure N-2—Implement vibration-reducing measures at vibration-sensitive land uses in the WSX Alternative corridor. Mitigation Measure N-5—Employ vibration-reducing construction practices.
Impact CR-2—Potential for ground-disturbing activities to result in substantial change in the significance of archaeological resources: site CA-ALA-343 and previously unknown or buried cultural deposits or human remains.	Mitigation Measure CR-2(a)—Prepare and implement MOA and historical properties treatment plan for APE. Mitigation Measure CR-2(b)—Conduct geomorphological research and subsurface investigations, including backhoe trenching. Mitigation Measure CR-2(c)—Conduct subsurface testing, data recovery, and reporting for CA-ALA-343. Mitigation Measure CR-2(d)—Stop work if buried cultural deposits are encountered during construction activities.

Adverse Effect	**Mitigation Measure**
Impact CR-Cume-1—Potential for damage to archaeological resources.	Mitigation Measure CR-2(a)—Prepare and implement MOA and treatment plan for APE. Mitigation Measure CR-2(b)—Conduct geomorphological research and subsurface investigations, including backhoe trenching. Mitigation Measure CR-2(c)—Conduct subsurface testing, data recovery, and reporting for CA-ALA-343. Mitigation Measure CR-2(d)—Stop work if buried cultural deposits are encountered during construction activities. Mitigation Measure CR-5—Preserve and interpret structural remains of Gallegos Winery and associated features.
Impact CR-Cume-2—Potential for damage to William Y. Horner House.	Mitigation Measure N-2—Implement vibration-reducing measures at vibration-sensitive land uses in the WSX Alternative corridor.
CULTURAL RESOURCES—Optional Irvington Station	
Impact CR-5—Potential impact on structural remains of Gallegos Winery and associated features.	Mitigation Measure CR-5—Preserve and interpret structural remains of Gallegos Winery and associated features.
Impact CR-6—Potential impact on a significant architectural resource: Ford House.	Mitigation Measure CR-6(a)—Document the Ford House. Mitigation Measure CR-6(b)—Adapt Ford House for reuse.
NOISE AND VIBRATION—WSX Alternative	
Impact N-1—Exposure of noise-sensitive land uses to noise from BART trains in the WSX Alternative corridor.	Mitigation Measure N-1—Implement noise-reducing measures at noise-sensitive land uses in the WSX Alternative corridor.
Impact N-2—Exposure of vibration-sensitive land uses to groundborne vibration from BART trains.	Mitigation Measure N-2—Implement vibration-reducing measures at vibration-sensitive land uses in the WSX Alternative corridor. There may be some situations where implementation of all feasible, available mitigation measures may not avoid or minimize impacts.
Impact N-3—Exposure of noise-sensitive land uses to noise from ancillary equipment.	Mitigation Measure N-3—Design and construct electrical substations, vent shafts, and other ancillary facilities to minimize noise.
Impact N-4—Exposure of noise-sensitive land uses to construction noise.	Mitigation Measure N-4(a)—Employ noise-reducing construction practices. Mitigation Measure N-4(b)—Disseminate essential information to residences and implement a complaint response/tracking program.
Impact N-5—Exposure of vibration-sensitive land uses to construction vibration.	Mitigation Measure N-5—Employ vibration-reducing construction practices.

Adverse Effect	**Mitigation Measure**
Impact N-Cume-2—Cumulative contribution to cumulative construction-related noise and vibration impacts.	Mitigation Measure N-4(a)—Employ noise-reducing construction practices. Mitigation Measure N-4(b)—Disseminate essential information to residences and implement a complaint response/tracking program. Mitigation Measure N-5—Employ vibration-reducing construction practices.
NOISE AND VIBRATION—Optional Irvington Station	
Impact N-1—Exposure of noise-sensitive land uses to noise from BART trains in the WSX Alternative corridor.	Mitigation Measure N-1—Implement noise-reducing measures at noise-sensitive land uses in the WSX Alternative corridor.
Impact N-2—Exposure of vibration-sensitive land uses to groundborne vibration from BART trains.	Mitigation Measure N-2—Implement vibration-reducing measures at vibration-sensitive land uses in the WSX Alternative corridor.
Impact N-3—Exposure of noise-sensitive land uses to noise from ancillary equipment.	Mitigation Measure N-3—Design and construct electrical substations, vent shafts, and other ancillary facilities to reduce noise.
Impact N-4—Exposure of noise-sensitive land uses to construction noise.	Mitigation Measure N-4(a)—Employ noise-reducing construction practices. Mitigation Measure N-4(b)—Disseminate essential information to residences and implement a complaint response/tracking program.
Impact N-5—Exposure of vibration-sensitive land uses to construction vibration.	Mitigation Measure N-5—Employ vibration-reducing construction practices.
Impact N-Cume-2—Cumulative contribution to cumulative construction-related noise and vibration impacts.	Impact N-Cume-2—Cumulative contribution to cumulative construction-related noise and vibration impacts.
Air Quality—WSX Alternative	
Impact AQ-6—Generation of emissions during project construction.	Mitigation Measure AQ-1—Comply with BAAQMD feasible control measures for construction emissions of PM10. Mitigation Measure AQ-2—Provide a construction emissions plan for diesel particulate matter.
ENERGY—WSX Alternative	
Impact E-3—Effects on peak- and base-period electricity demand.	No mitigation is available.
Impact E-4—Effects of construction on the consumption of nonrenewable energy resources.	Mitigation Measure E-4—Develop and implement a construction energy conservation plan.
Impact E-Cume-2—Contributions of the WSX Alternative (without and with the optional Irvington Station) to peak- and base-period electricity demand.	No mitigation is available.
Impact E-Cume3 – Effects of Proposed Project construction on the consumption of nonrenewable energy resources.	Mitigation Measure E-4—Develop and implement a construction energy conservation plan.

Adverse Effect	**Mitigation Measure**
ENERGY—Optional Irvington Station	
Impact E-7—Effects of the optional Irvington Station on peak- and base-period electricity demand.	No mitigation is available.
Impact E-8—Effects of construction of optional Irvington Station on the consumption of nonrenewable energy resources.	Mitigation Measure E-4—Develop and implement a construction energy conservation plan.
UTILITIES AND PUBLIC SERVICE—WSX Alternative	
Impact UPS-1—Potential conflicts with Hetch Hetchy water pipelines and electrical transmission lines and ACWD water lines.	Mitigation Measure UPS-1—Coordinate with the San Francisco Public Utilities Commission and ACWD staff. Mitigation Measure UPS-2—Provide protection from stray electrical currents. Mitigation Measure UPS-3—Proper clearance from Hetch Hetchy electrical transmission lines will be maintained.
Impact UPS-2—Potential disruptions of utilities, electrical transmission lines, pipelines, and fiber optic cables related to the operation of the WSX Alternative.	Mitigation Measure UPS-1—Coordinate with the San Francisco Public Utilities Commission and ACWD staff. Mitigation Measure UPS-2—Provide protection from stray electrical currents. Mitigation Measure UPS-4—Maintain clearance beneath electrical transmission lines.
Impact UPS-4—Construction-related service interruptions	Mitigation Measure UPS-1—Coordinate with the San Francisco Public Utilities Commission and ACWD staff. Mitigation Measure UPS-5—Coordinate with affected utilities, companies, and agencies that own pipelines and underground conduits to arrange necessary relocation and protection of existing lines.
SAFETY AND SECURITY—WSX Alternative	
Impact SS-1—Impacts on local community safety services.	Mitigation Measure SS-1—Coordination with the Fremont Fire Department.
Impact SS-2—Inadequate lighting or visual obstructions at park-and-ride lots.	Mitigation Measure SS-2(a)—Implement safety and security criteria to deter crime. Mitigation Measure SS-2(b)—Use cameras and security patrols to enhance safety.
Impact SS-3—Safety of workers and work sites during construction.	Mitigation Measure SS-3—Implement safety rules, procedures and policies to protect workers and work sites during construction.
SAFETY AND SECURITY—Optional Irvington Station	
Impact SS-1—Impacts on local community safety services.	Mitigation Measure SS-1—Coordination with the Fremont Fire Department.
Impact SS-2—Inadequate lighting or visual obstructions at park-and-ride lots.	Mitigation Measure SS-2(a)—Implement safety and security criteria to deter crime. Mitigation Measure SS-2(b)—Use cameras and security patrols to enhance safety.

Adverse Effect	**Mitigation Measure**
Impact SS-3—Safety of workers and work sites during construction.	Mitigation Measure SS-3—Implement safety rules, procedures and policies to protect workers and work sites during construction.

Chapter 1
Introduction

1.1 Introduction

The Federal Transit Administration (FTA), as lead agency, and the San Francisco Bay Area Rapid Transit District (BART) have prepared this environmental impact statement (EIS) for the proposed Warm Springs Extension (WSX), an extension of the BART system in the City of Fremont (Fremont), from its current terminus in central Fremont to the Warm Springs district in southern Fremont. This introductory chapter provides an overview and brief history of the proposed action and an outline of the organization of this document and the public review process.

1.2 Overview of Proposed Action

BART has been in operation since 1972 and currently operates in four Bay Area counties: San Francisco, Alameda, Contra Costa, and San Mateo. The most recent extensions to the BART system are the extensions to Dublin/Pleasanton in eastern Alameda County, to Pittsburg/Bay Point in eastern Contra Costa County, and to the San Francisco International Airport in San Mateo County, with a terminus in Millbrae, California.

In southern Alameda County, BART operates service to downtown Fremont. The Fremont service currently terminates at the Fremont BART Station, which is near the Fremont Civic Center. The entire existing BART system is shown in Figure 1-1.

In response to public policies and support for the extension of BART in southern Alameda County, BART proposed a 5.4-mile extension of the BART system south from the existing Fremont Station to a new station at Warm Springs. This extension is the Proposed Action analyzed in this EIS. The Proposed Action also includes an optional station at Irvington.

BART previously prepared an environmental impact report (EIR) in 1992 and a supplemental EIR in 2003 for this project in accordance with the California Environmental Quality Act (CEQA). At the conclusion of CEQA review, the BART Board of Directors adopted the project on June 26, 2003. Recent changes in state transportation funding priorities have caused BART to seek federal funding for the project. This EIS is intended to satisfy the requirements of the National Environmental Policy Act of 1969 (NEPA) and other environmental requirements that apply to federal actions, such as Section 4(f) of the Department of Transportation Act (49 U.S.C. Section 303) and Section 106 of the National Historic Preservation Act.

For purposes of this EIS, BART is considering two alternatives for the Warm Springs Extension: the BART Warm Springs Extension Alternative (WSX Alternative) and the No-Build Alternative. These alternatives are described in detail in Chapter 3, *Alternatives Considered*. This EIS incorporates by reference material from the CEQA EIR and supplemental EIR; it does not consider in detail alternatives that were evaluated during the CEQA process and found not to satisfactorily meet the project's purpose and need. Chapter 3 also briefly describes alternatives that were considered in previous studies and eliminated from detailed analysis in the EIS.

1.3 Background of Proposed Action

In the early 1990s, BART developed a project and conducted an environmental review pursuant to CEQA to extend BART service from the current terminus at the Fremont BART Station through Fremont to the Warm Springs district. The BART WSX project was originally developed in response to growth projections for the study area that indicated a need for consideration of alternative travel modes to better meet current and anticipated travel demand in combination with regional freeway network limitations. The project was also intended to respond to several specific policy mandates for improved transit service.

- 1980 BART Board of Directors' adoption of its first extension staging policy, identifying four extensions, including the WSX.
- Metropolitan Transportation Commission's (MTC's) inclusion of BART to Warm Springs as a programmed project in its New Rail Transit Starts and Extension Program (MTC Resolution 1876 as amended).
- Voter-approved and sanctioned Measure B sales tax in Alameda County, which provides partial funding for a one-station extension to Warm Springs.
- Naming of Warm Springs Extension as a Transportation Control Measure in MTC Resolution 2131 – Transportation Contingency Plan of the 1982 Air Quality Plan.
- Boatwright Law (Senate Bill 1715/Chapter 1259 of 1988), which set extension priorities and authorized construction of the West Pittsburg [Pittsburg/Bay Point], Dublin, and Warm Springs Extensions, pending funding and environmental approvals. Both the Pittsburg/Bay Point and Dublin extensions have subsequently been constructed.

1.3.1 1992 Adopted Project

In 1991, BART prepared an EIR for the WSX project (San Francisco Bay Area Rapid Transit District 1992a, 1992b). On September 15, 1992, the BART Board of Directors certified the *BART Warm Springs Extension Final Environmental Impact Report* and adopted a project consisting of a 5.4-mile, two-station extension of the BART system, with stations at Irvington and Warm Springs. This project is referred to as the 1992 Adopted Project and is briefly described in the following paragraphs. The 1992 Adopted Project was not constructed because sufficient funds were not available at that time.

As proposed, the alignment of the 1992 Adopted Project (identified as Alternative 5, Design Option 2A, in the 1992 EIR) would have begun at the existing elevated Fremont BART Station and extended southeasterly. The same vehicles that provide service to the Fremont Station would be used for the WSX project. The alignment would have followed an aerial alignment through Fremont Central Park that skirted the eastern edge of Lake Elizabeth. The alignment would have continued on an aerial structure over the former Southern Pacific (SP) railroad track, curved south between the former SP

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Source: Bay Area Rapid Transit 2003.

Figure 1-1
BART System Map

railroad track and the former Western Pacific (WP) railroad track,[1] and crossed over Paseo Padre Parkway. The alignment would have then transitioned to a below-grade[2] crossing under Washington Boulevard to arrive at the Irvington Station.

From the Irvington Station, the alignment would have risen to grade[3] and remained at grade over the Blacow Road underpass and under the Auto Mall Parkway overpass. From Auto Mall Parkway, the alignment would have risen to an embankment and an aerial structure to cross the former WP railroad track at Grimmer Boulevard and continued above grade to the elevated Warm Springs Station. The alignment would have then transitioned to grade, and would have had approximately 3,000 feet of tail track[4] south of the Warm Springs Station.

The 1992 Adopted Project also included a subway design option (identified as Design Option 2S in the 1992 EIR) that, contingent on local funding, would have substituted a subway alignment under Fremont Central Park for the aerial alignment proposed as Design Option 2A. The 1992 Adopted Project alignment is shown in Figure 1-2.

1.3.2 Fremont Grade Separation Project

Since BART adopted the original WSX Project in 1992, the City of Fremont has independently undertaken the Washington Boulevard and Paseo Padre Parkway Railroad Grade Separation Project (referred to herein as the "grade separation project"). The project involves constructing two grade-separated railroad crossings: An automobile underpass is planned for Paseo Padre Parkway between Gomes Road and Hancock Drive, and an automobile overpass is planned for Washington Boulevard between Bruce Drive and Roberts Avenue.

The city's grade separation project will include relocation of the former SP railroad tracks. Currently, the former WP and SP railroad tracks, both of which are currently owned by UP, are separated by approximately 500 feet at Paseo Padre Parkway and approximately 300 feet at Washington Boulevard. The former SP track will be relocated to the east, parallel to the WP alignment. Relocating the former SP track will provide the opportunity to construct a Paseo Padre Parkway underpass and a Washington Boulevard overpass that are not unduly long or prohibitively expensive.

The grade separation project has been approved by the City of Fremont, and funding has been obtained. The purpose of the two grade separations is to decrease traffic delays and reduce risks resulting from the existing at-grade rail crossings. The grade separations will help facilitate the extension of BART through the area, but the grade separation project is needed to improve traffic

[1] Currently, Union Pacific Railroad (UP) owns and operates the western set of tracks in the railroad corridor. The eastern set of railroad tracks has two owners: The Santa Clara Valley Transportation Authority (VTA) owns the eastern track alignment south of Paseo Padre Parkway, and UP owns the eastern alignment north of Paseo Padre Parkway. UP also temporarily conducts limited train operations on the eastern alignment south of Paseo Padre Parkway. For clarity in this EIS, the railroad tracks on the eastern side of the UP right-of-way will be referred to as the former WP tracks, and the railroad tracks on the western side of the UP right-of-way will be referred to as the former SP tracks.
[2] *Below grade* refers to the location of a structure or transit guideway below the level of the ground surface.
[3] *Grade* and *at grade* refer to the location of a structure or transit guideway at the same level as the ground surface or on a moderate surface embankment.
[4] *Tail track* refers to track(s) behind the last station used for reversing trains and train storage.

flow and safety independent of BART and will proceed regardless of whether the WSX Alternative is adopted. The grade separations will occur before the WSX Alternative is constructed and, therefore, must be taken into account in project design and alternatives. Conditions without the grade separation project are also described in this document. Figure 1-3 illustrates the geographical extent of the city's grade separation project.

1.3.3 2003 Modified Project

When the WSX CEQA EIR was certified in 1992, Fremont did not support the recommended project alternative (Alternative 5, Design Option 2A, in the 1992 EIR), which included an aerial alignment over Lake Elizabeth in Fremont Central Park. Fremont did support the alternative that included a subway alignment under Lake Elizabeth (Design Option 2S in the 1992 EIR). Sufficient funds were not available to construct either alternative. However, because of public support for the extension of rail transit service from Fremont, BART continued to consider the possibility of an extension from Fremont to Warm Springs and other transit agencies continued to study the regional corridor.

Due to changed conditions in the project area, including Fremont's grade separation project, in 2002, BART initiated the preparation of a CEQA supplemental EIR (San Francisco Bay Area Rapid Transit District 2003) to address modifications to the Adopted Project studied in the 1992 EIR. The principal modification from the 1992 Adopted Project is the change from an aerial structure to a subway alignment under Fremont Central Park and Lake Elizabeth, which would reduce environmental impacts on the park. Other important changes include an at-grade alignment from Paseo Padre Parkway to the end of the extension, where the 1992 alignment included both aerial and below-grade segments (see Figure 1-4). Also, the Irvington Station, which was a part of the 1992 Adopted Project, was made an optional station due to perceived funding constraints.

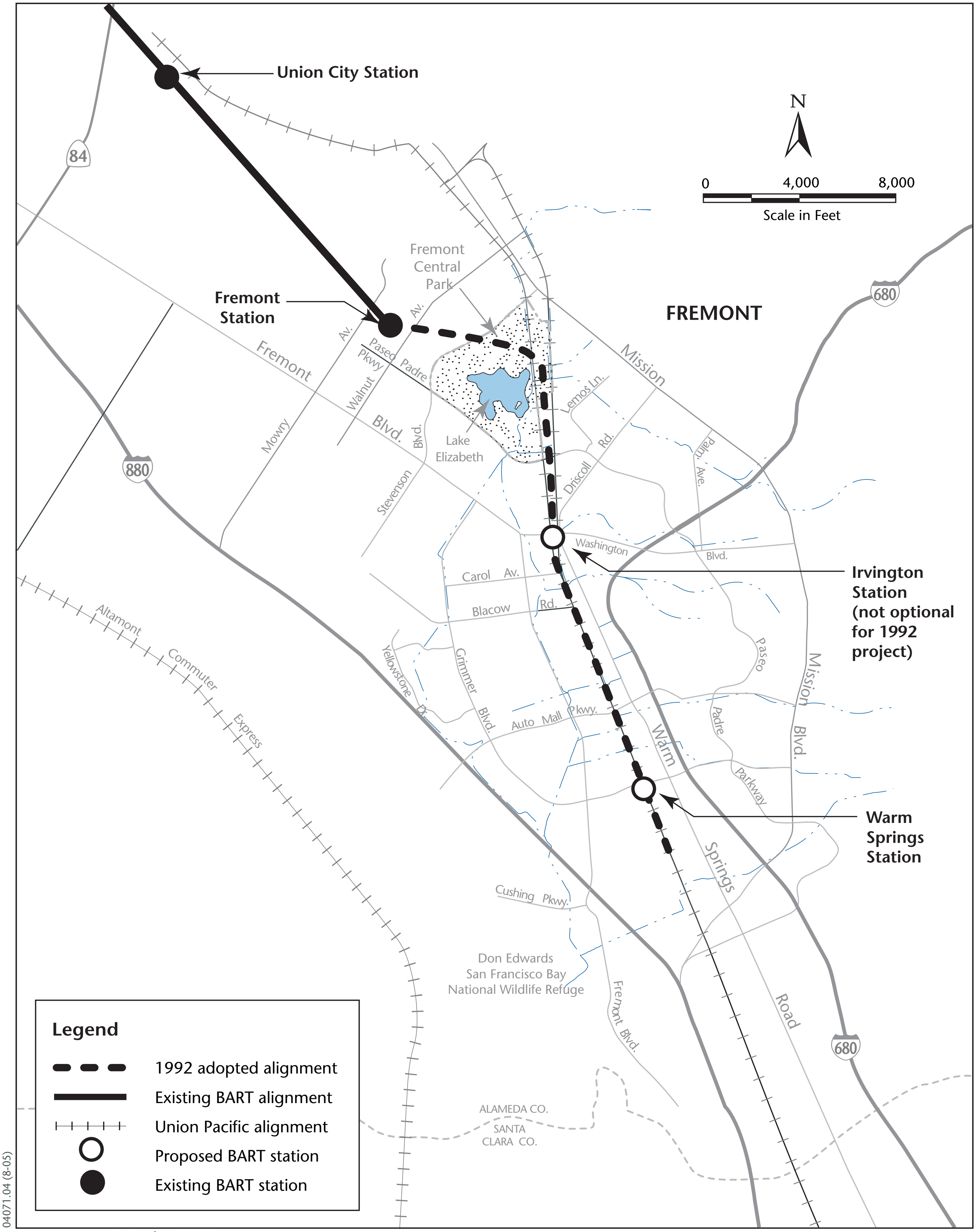
A Notice of Preparation (NOP) and CEQA Initial Study were submitted to the State Clearinghouse on March 5, 2002. A CEQA scoping meeting was conducted on March 25, 2002, which approximately 100 citizens and agency representatives attended. Comments received in response to the NOP and at the public scoping meeting were considered in the preparation of the supplemental EIR.

A draft supplemental EIR was published in March 2003, and a public comment period continued from March 25 to May 9, 2003. A public hearing was held on April 14, 2003. Following the close of the public comment period, the BART Board of Directors certified the final supplemental EIR on June 26, 2003. At the June 26, 2003 meeting, the BART Board of Directors adopted the Proposed Project analyzed in the supplemental EIR.

The 2003 supplemental EIR is available for review upon request at BART headquarters, 300 Lakeshore Drive, 21st Floor, Oakland, CA 94612, Oakland, CA.

1.4 Description of the WSX Alternative

The Proposed Project analyzed in the 2003 Supplemental EIR is identical to the WSX Alternative evaluated in this EIS. No changes to the project design, concept, or scope have been made since the BART Board of Directors adopted the 2003 Proposed Project.



Source: Jones & Stokes 2002.

Figure 1-2
1992 Adopted Project

Figure 1-3
Fremont Grade Separations Project

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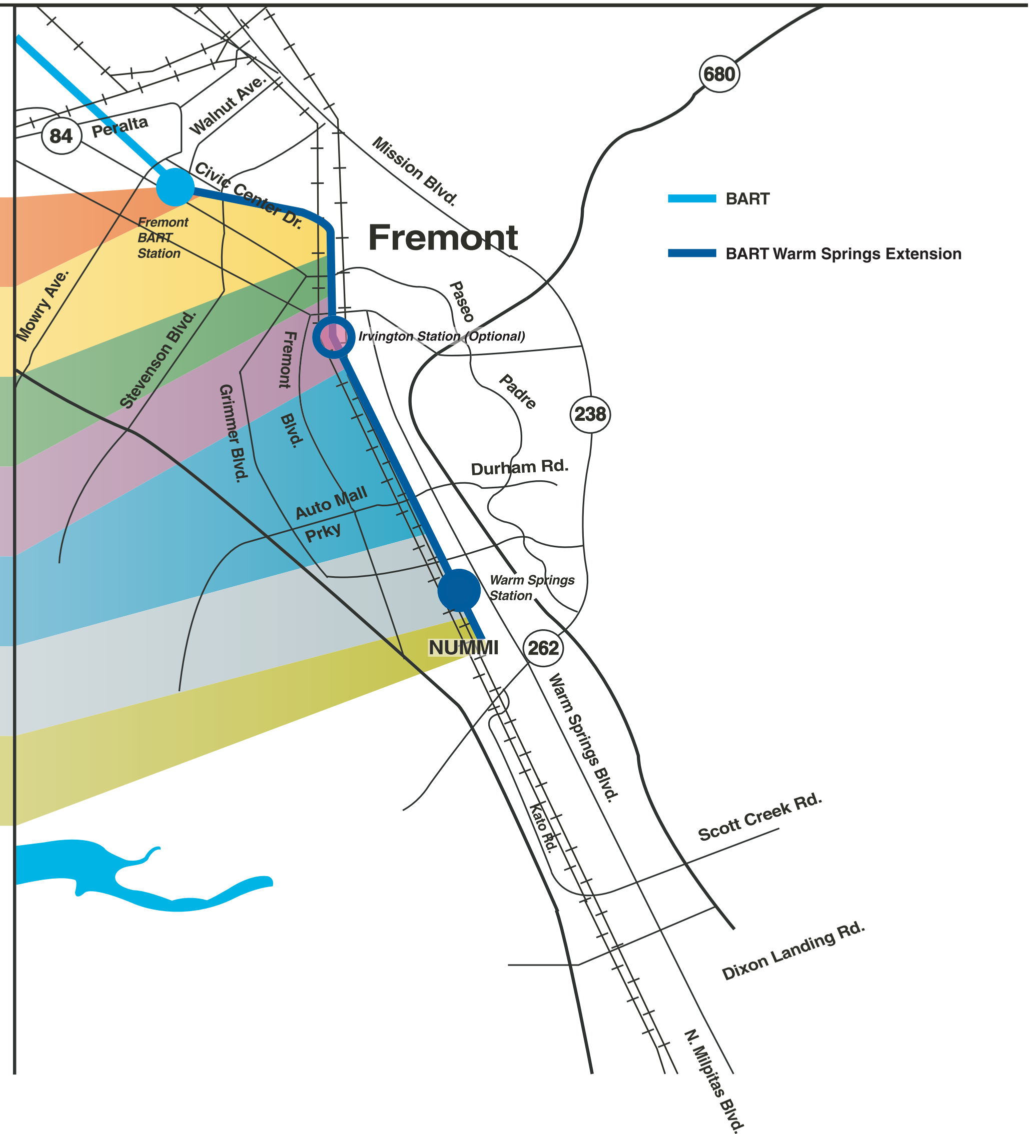
Source: BART 2004.

Adopted Project (1992)	Proposed Action (2003)
Aerial	Aerial
Aerial (over Fremont Central Park)	Subway (under Fremont Central Park)
Aerial	At Grade
Below Grade	At Grade
At Grade	At Grade
Aerial	At Grade
At Grade	At Grade



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Source: Parsons Brinkerhoff 2002.

Figure 1-4
Alignment Comparison

The alignment of the WSX Alternative (shown in Figure 1-5) generally parallels portions of the UP tracks and Interstates 680 and 880 (I-680 and I-880) in southern Alameda County. The initial segment of the WSX Alternative alignment would begin on an embankment at the southern end of the existing Fremont BART Station. The alignment would pass over Walnut Avenue on an aerial structure and descend into a cut-and-cover subway[5] north of Stevenson Boulevard. The alignment would continue southward in the subway structure under Fremont Central Park and the eastern arm of Lake Elizabeth, and surface to grade between the former WP and SP railroad alignments north of Paseo Padre Parkway. The new alignment would pass over grade-separated Paseo Padre Parkway on a bridge structure, and then continue southward at grade, passing under a grade-separated Washington Boulevard. From Washington Boulevard south to South Grimmer Boulevard, the WSX Alternative alignment would continue at grade along the former WP alignment. Near South Grimmer Boulevard, the alignment would bear to the east and continue south, crossing over South Grimmer Boulevard, to the end of the WSX Alternative (just south of the Warm Springs Station). The WSX Alternative also includes an optional station at Irvington.

The WSX Alternative is at grade for a large portion of the alignment. With the exception of the initial segment over Walnut Avenue, which is aerial, and the Fremont Central Park portion of the alignment, which is underground, the WSX Alternative would be constructed at grade (refer to Figure 1-4).

A detailed project description is provided in Chapter 3, *Alternatives Considered*.

1.4.1 Area Studied for the WSX Alternative

For the purposes of this EIS, the area studied is the area surrounding the WSX Alternative corridor that potentially could be affected by project operation and construction activities. The area studied for the WSX Alternative is bounded by the existing Fremont BART Station to the north, the Alameda County line to the south, the East Bay hills to the east, and the San Francisco Bay to the west. The area studied is shown in Figure 1-6. The area shown in Figure 1-6 was considered in the process of making the determinations of appropriate study areas for each environmental resource. As described in Section 4.1, *Introduction to Environmental Analysis*, those determinations were based on the relevant characteristics of the individual resources.

1.4.2 WSX Alternative Corridor

The WSX Alternative corridor includes the WSX Alternative alignment and station areas, as well as the proposed contractor laydown areas, all of which are described in detail in Chapter 3, *Alternatives Considered*. The corridor is approximately 5.4 miles long and is approximately 100 feet wide. The WSX Alternative corridor is shown in Figure 1-5.

[5] *Cut-and-cover* refers to a method of building subways in which a trench is excavated, a concrete box structure through which trains will pass is constructed in the trench, and the box structure is covered with soil to return the ground level to its preexisting condition.

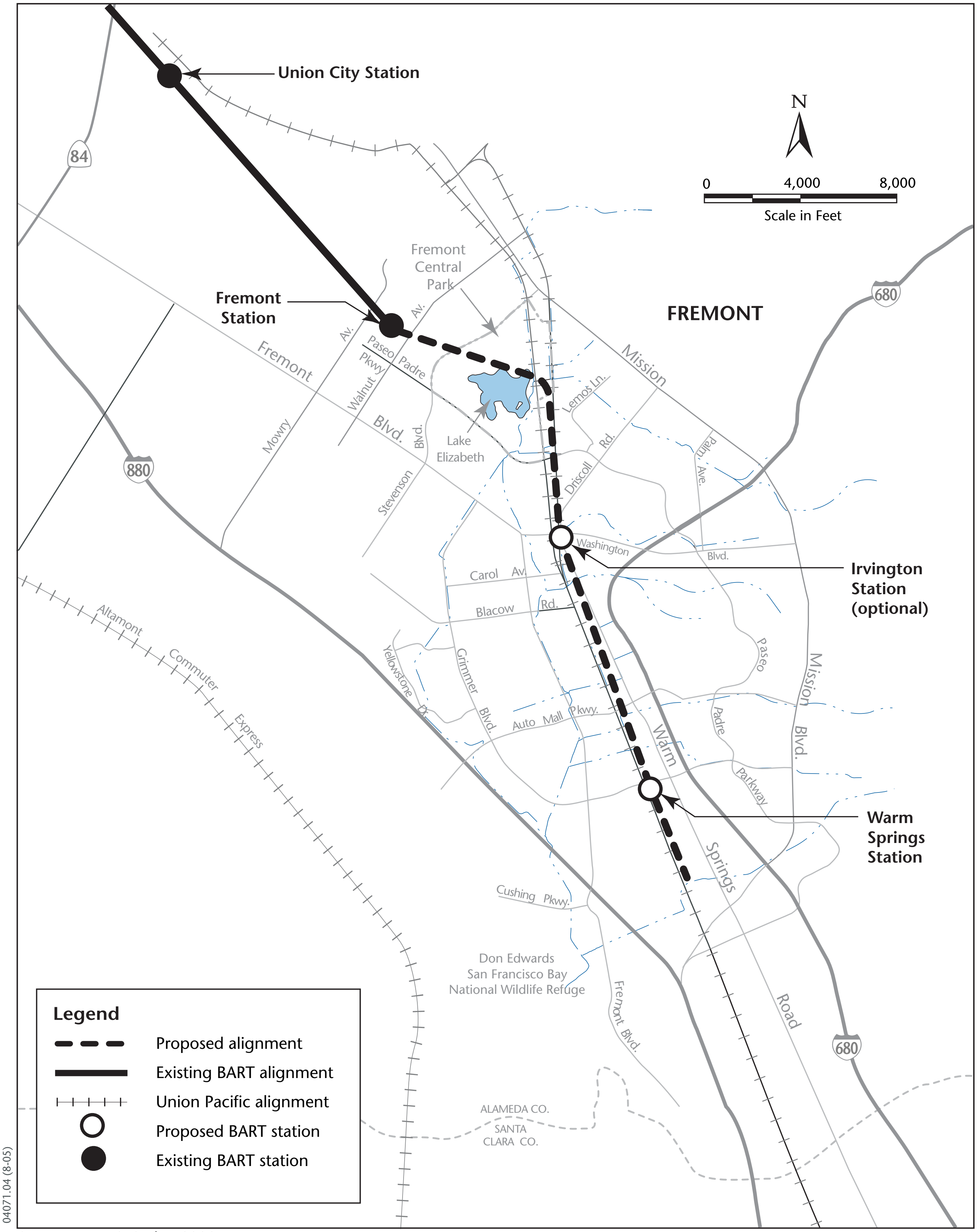
1.5 Environmental Impact Statement Purpose and Intended Use

BART prepared the EIS in compliance with NEPA and the Council on Environmental Quality (CEQ) NEPA Regulations, 40 C.F.R. Parts 1500–1508. This EIS is intended to inform public agencies and the public about the potential environmental effects that may result from implementation of the Proposed Action.

Under NEPA, a *lead agency* is the federal government agency that has the principal responsibility for carrying out or approving a project and, therefore, has the principal responsibility for preparing NEPA documents. As the lead agency for the Proposed Action, FTA is responsible for considering this EIS. FTA will consider the Final EIS in reaching its decision and will prepare a Record of Decision (ROD), completing the NEPA process. The National Park Service (NPS), as a cooperating agency, has considered the EIS in approving the conversion to non-park use of parkland acquired or improved with federal funds pursuant to the Land and Water Conservation Fund Act, Section 6(f).

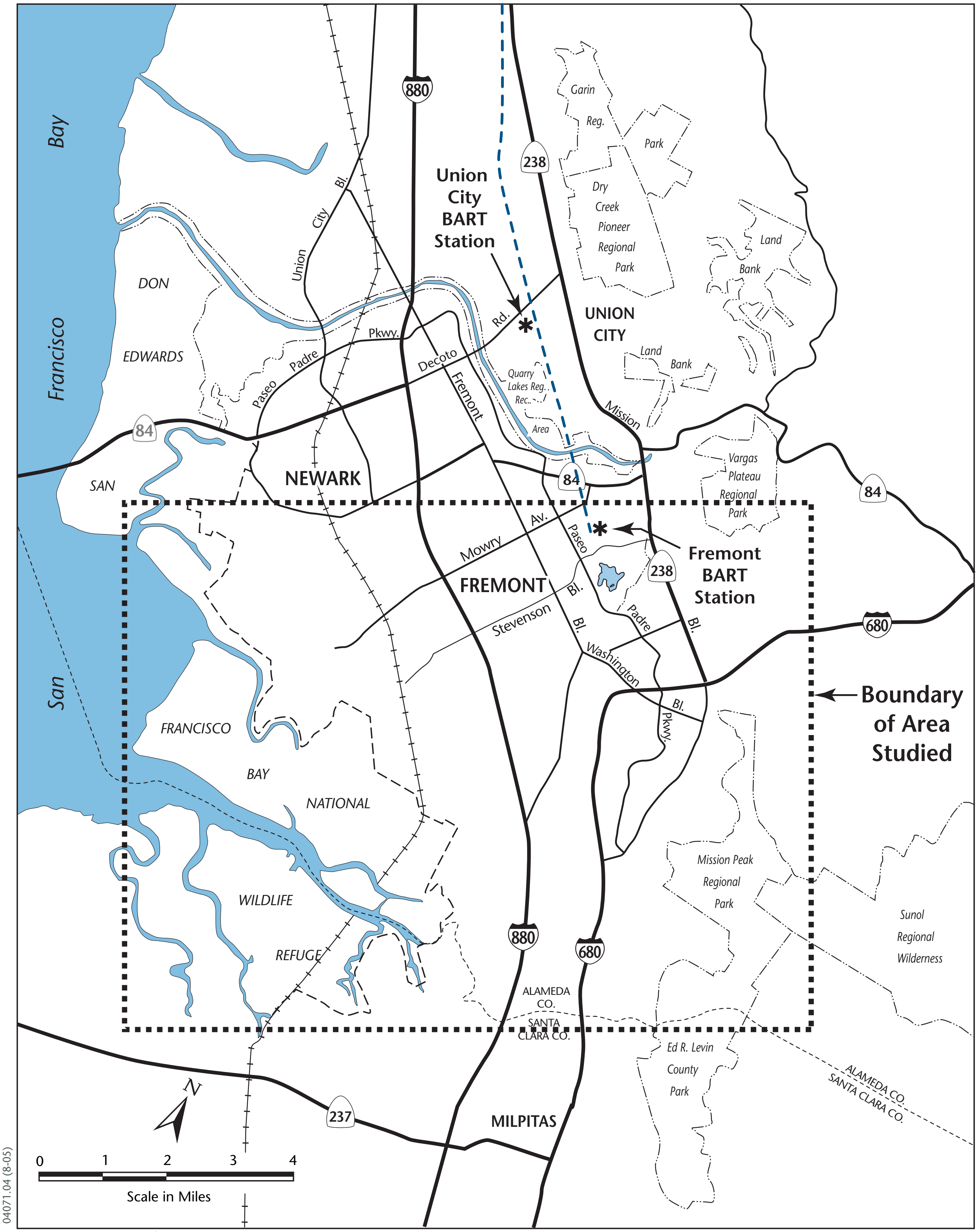
This document is also intended to satisfy the requirements of Section 4(f) of the Department of Transportation of 1966 (now codified at 49 USC 1653[f]), Section 6(f) of the Land and Water Conservation Fund Act of 1965, Section 106 of the National Historic Preservation Act of 1966, and executive orders on environmental stewardship, transportation infrastructure, environmental justice, floodplain management, and protection of wetlands.

The analysis presented in the EIS was used to support the development of an effective program for implementing site-specific mitigation measures to offset possible environmental impacts and to provide information to interested members of the public and public agencies about potential impacts resulting from the Proposed Action. Through the formal public review process associated with the Draft EIS, the public and various organizations and agencies have been afforded an opportunity to comment on the Draft EIS. Other agencies may also use this EIS as part of the process of issuing approvals or permits prior to construction. Table 1-1 provides a list of agencies that may use this document and areas over which these agencies have authority. Chapter 8 identifies the agency coordination and consultation undertaken during the EIS process and in compliance with NEPA and other federal environmental requirements.



Source: Jones & Stokes 2002.

Figure 1-5
WSX Alternative



Source: Jones & Stokes 2002.

Figure 1-6
Area Studied for WSX Alternative

Table 1-1. Agencies with Review, Permit, and/or Approval Authority

Agency	Statutory Authority	Permit or Approval Jurisdiction, Actions Covered	Documentation or Prior Actions Required
FEDERAL			
Federal Transit Administration	NEPA; Clean Air Act of 1970 as amended	Lead federal agency for EIS; granting of funding; conformity evaluation of project with State Implementation Plan under Clean Air Act (CAA)	Approval of this EIS, Record of Decision, and CAA Conformity Analysis
U.S. Environmental Protection Agency	Section 404 permit (Clean Water Act Amendment of 1977); Clean Air Act of 1970 as amended	Section 404 oversight; CAA Conformity determination	Review of EIS
U.S. Department of Interior	Section 4(f) (Department of Transportation Act of 1966)	Approval of a transportation project for use of publicly owned land such as a park, recreation area, wildlife refuge, or land from a historic site of national, state, or local significance	Section 4(f) evaluation
U.S. National Park Service	Section 6(f)(3) (Land and Water Conservation Fund)	Approval of conversion to non-park use of publicly owned park property, or park facilities whose acquisition or construction were financed by the Fund.	Section 6(f) evaluation
U.S. Fish and Wildlife Service	Section 7 (Federal Endangered Species Act of 1972); Migratory Bird Treaty Act of 1918	Section 7 – Taking (kill, harm, capture, harass, etc.) of endangered and other special-status plant or animal species	Biological Assessment; Review of EIS
U.S. Army Corps of Engineers	Section 404 permit (Clean Water Act)	Permits for discharge of dredged or fill materials into waters of the United States, including jurisdictional wetlands according to Section 404 (b) (1) guidelines	Review of EIS
Advisory Council on Historic Preservation	Section 106 review (National Historic Preservation Act of 1966)	Review of project for potential disturbance to significant historic and archaeological resources	Finding of Effect
STATE			
Public Utilities Commission	Operation/Safety Approval	Operating/safety approvals within railroad rights-of-way	Proposed project plans
Department of Parks and Recreation		Concurrence with National Park Service approval of conversion of federally funded park land to non-park uses.	

Agency	Statutory Authority	Permit or Approval Jurisdiction, Actions Covered	Documentation or Prior Actions Required
Department of Fish and Game	Fish and Game Code, Sections 1601–1603 review	Sections 1601–1603 – Streambed Alteration Agreement, review of project for potential to alter streamflows or the bed and bank of a stream, lake, or pond.	Notification of streambed alteration and environmental documentation
State Historic Preservation Office	Section 106 of National Historic Preservation Act of 1966	Review and final approval of Historic Property Survey and Effects Reports (statement indicating whether it has any concerns about projects that will disrupt soil or alter buildings); party to Memorandum of Agreement for any adverse effects on historic properties	Finding of Effect
Native American Heritage Commission	Public Resource Code Section 5097	Review of project for potential disturbance to native American heritage/burial sites	Consultation letter; review of EIS
REGIONAL			
Regional Water Quality Control Board	Section 401 and 402 of Clean Water Act; Porter-Cologne Act	Section 401 and Porter Cologne Act – Water quality certification, or waiver thereof, for potential construction in wetlands areas determined to be under U.S. Army Corps of Engineers' jurisdiction	
Bay Area Air Quality Management District	Section 176 (c) of Clean Air Act of 1970, as amended	Air quality conformity	Review of EIS
Metropolitan Transportation Commission	Section 176 (c) of Clean Air Act of 1970, as amended	Review all applications for state or federal funding; Air quality conformity	Proposed Action plans and EIS
LOCAL			
City of Fremont	Encroachment permit	Encroachment of city property requiring the use of an encroachment permit	Encroachment permit application and three copies of proposed plans
Alameda County Water District	Drilling permit	Fremont, Newark, and Union City Well Ordinances regulate all work on wells and boreholes associated with water wells, geotechnical investigations, and chemical investigations	Drilling permit application and site plans

Agency	Statutory Authority	Permit or Approval Jurisdiction, Actions Covered	Documentation or Prior Actions Required
Alameda County Flood Control and Water Conservation District	Encroachment permit	Encroachment of district property requiring the use of an encroachment permit	Encroachment permit application and copies of proposed plans

1.6 Organization and Content of the Final Environmental Impact Statement

The content and format of the EIS have been designed to meet the requirements of NEPA. Pursuant to NEPA, BART and FTA have published both and Draft and Final EIS documents:

- BART and FTA published a Draft EIS on March 11, 2005, which was available for public review during the period from March 11, 2005 to April 25, 2005. (For more information on the public review process, please refer to Section 1.7, "Public Review Process.")
- The Final EIS is composed of two volumes. Volume 1 is a complete version of the revised Draft EIS text. The revisions include those suggested or requested during the public comment period and revisions initiated by staff, such as clarifications or corrections of minor typographical errors. Volume 2 of the Final EIS presents each comment received on the Draft EIS and the response to each comment. The material contained in each Final EIS volume is summarized in the following paragraphs.

1.6.1 Volume 1

Volume 1 of the Final EIS is organized into the following chapters:

- The Executive Summary provides a brief summary of the EIS; a brief background and history of the Proposed Action; a brief description of the WSX Alternative; an explanation of the purpose and use of the EIS, the scope of the EIS, and the public review process conducted during the development of the EIS; and presentation of the major conclusions, areas of known controversy, and issues to be resolved.
- Chapter 1, Introduction, provides an overview and background of the Proposed Action; a brief description of the WSX Alternative; discussion of the use and scope of the EIS, including identification of the lead federal agency; introduction of document organization; and a summary of the public review process.
- Chapter 2, Purpose and Need, discusses in detail the purpose and need of the Proposed Action.
- Chapter 3, Alternatives Considered, discusses the proposed alternatives and alternatives that were previously considered and eliminated from detailed analysis in the EIS.
- Chapter 4, Environmental Analysis, provides information on the affected environment and environmental consequences of the Proposed Action, including existing conditions related to

various resource areas, potential effects of the proposed alternatives on those resources, and mitigation measures for potential impacts.

- Chapter 5, Other NEPA Considerations, identifies irreversible and irretrievable commitments of resources, analyzes cumulative impacts of the alternatives together with other projects, and examines the relationship between the short-term uses of the environment and long-term productivity.
- Chapter 6, Section 4(f)/Section 6(f) Evaluation, analyzes the adverse effects of the Proposed Action on parks, recreation areas, and historic sites.
- Chapter 7, Financial Considerations, discusses the funding for the Proposed Action and the proposed financial plan for implementation.
- Chapter 8, Agency and Community Participation, summarizes the scoping process for the Proposed Action, coordination with public agencies that has occurred, and the public outreach efforts conducted during the preparation of the EIS.
- Chapter 9, Agencies, Organizations, and Individuals Receiving Copies of the Final EIS, provides a list of the entities to which the Final EIS has been distributed.
- Chapter 10, References, provides the references used in the preparation of the EIS.
- Chapter 11, List of Preparers, provides the names of the key individuals involved in the preparation of this document.
- An acronyms fold out list includes a list of acronyms and abbreviations used in this EIS and their definitions, and the index provides a list of key terms in the document and their location.
- The following Appendices to the EIS are included in this volume.
  - Notice of Intent.
  - 2003 Mitigation Monitoring and Reporting Plan.
  - Biological Resources Information:
    - California Natural Diversity Database Search for the Niles, Milpitas, Mountain View, Newark, Hayward, Dublin, Livermore, La Costa Valley, and Calaveras Reservoir 7.5-Minute USGS Topographic Quadrangles.
    - U.S. Fish and Wildlife Service Species Lists for the Proposed Project Area.
    - Results of Surveys Conducted for Special-Status Birds and Nesting Raptors.
    - Results of Special-Status Plant Surveys.
    - Results of California Red-Legged Frog Surveys.
    - Results of Burrowing Owl Survey.
    - Tables Listing Special-Status Species with Potential to Occur in the WSX Alternative Corridor.
  - Floodplain Finding Report

- Cultural Resources Information:
  - Consultation and coordination with California Department of Parks and Recreation and the State Office of Historic Preservation.
  - Draft Memorandum of Agreement with State Office of Historic Preservation.
- U.S. Department of Transportation Section 4(f)/6(f) Consultation.

In addition to the appendices listed above, environmental technical reports containing the analyses summarized in the EIS were prepared for some resources areas.

1.6.2 Technical Data

All supporting documentation for the DEIS, including the following technical reports is available for review at the BART offices at 300 Lakeside Drive, 21st Floor, Oakland, CA 94612.

- Draft Inventory and Evaluation Report and Finding of Effect (FOE) for BART Warm Springs Extension.
- Transportation Technical Report.
- Wetlands Delineation Report.
- Biological Assessment for the California Tiger Salamander.

In addition to the appendices listed above, environmental technical reports containing the analyses summarized in the EIS were prepared for some resources areas.

1.6.3 Volume 2

Volume 2 of the Final EIS presents all substantive comments received by BART and FTA during the public review process. Volume 2 includes two chapters:

- Chapter 1 presents an Introduction to the FEIS process; and
- Chapter 2 presents a copy of each comment BART received during the public review period from federal, state, regional and local agencies, public and private organizations, and individuals, and BART's response to each comment.

1.7 Public Review Process

1.7.1 Notice of Intent

The lead agency must publish a Notice of Intent (NOI) in the Federal Register, consistent with the CEQ NEPA Regulations, 40 C.F.R. Section 1501.7. The NOI serves as the official legal notice that a federal agency is commencing preparation of an EIS. An NOI for the BART WSX Draft EIS was filed on April 6, 2004. Copies of the NOI for the EIS were provided to the California Department of Transportation (Caltrans) and to local agencies, including MTC, the Alameda County Congestion Management Agency (ACCMA), Alameda/Contra Costa Transit Authority (AC Transit), and the Santa Clara Valley Transportation Authority (VTA).

1.7.2 Public Scoping Meeting

A public scoping meeting for the Proposed Action was held on April 28, 2004, at the Fremont Main Library. The purpose of the meeting was to solicit comments to help determine the scope of the EIS. Notices were published beforehand in local newspapers announcing the time, date, location, and purpose of the meeting. In addition, invitations to the meeting and copies of the NOI were distributed to an extensive mailing list of agencies and stakeholders throughout Fremont, southern Alameda County, and northern Santa Clara County. The scoping comment period extended from the publication of the NOI on April 6, 2004 until 5 p.m. on May 17, 2004. More than 50 people attended the public scoping meeting. Comments received in response to the NOI and at the public scoping meeting have been considered, where applicable. A scoping report summarizing all comments received during the scoping period was prepared and is available at the BART office at 300 Lakeside Drive, 21st floor, Oakland, CA 94612.

1.7.3 Review of Environmental Impact Statement

Draft EIS

BART provided the public with an opportunity to review the Draft EIS during a 45-day public review period from March 11, 2005 to April 25, 2005. BART held a public hearing to receive public testimony on the Draft EIS on April 12, 2005 at the Washington Township Veterans Memorial, which is located at 37154 Second Street, Fremont, CA 94536. The public hearing began at 6:30 p.m. BART accepted comments made during the public hearing as well as those submitted by email or in writing. The comment period closed at 5:00 p.m. on April 25, 2005. Supporting documentation for the DEIS was also made available for public review at the 300 Lakeside address listed below. BART accepted written comments received at either one of the addresses listed below:

Lorraine Lerman
Office of Planning and Program Development
U.S. Department of Transportation
Federal Transit Administration, Region IX
201 Mission Street, Suite 2210
San Francisco, CA. 94105

San Francisco Bay Area Rapid Transit District
Attention: Shari Adams
Warm Springs Extension Group Manager
MS-LKS-21
P.O. Box 12688
Oakland, CA 94604-2688

The Draft was available for review at the following locations:

San Francisco Bay Area Rapid Transit District
300 Lakeside Drive
21st Floor
Oakland, CA 94612

Fremont Main Library
2400 Stevenson Boulevard
Fremont, CA 94538

Metropolitan Transportation Commission (MTC)/Association of Bay Area Governments (ABAG) Library
101 8th Street
Oakland, CA 94607-4700

The executive summary for the Draft EIS was also available online at BART's web site during the public comment period (www.bart.gov/wsx). Additional information was available by calling (510) 476-3900.

Final EIS

Following the close of the public comment period on April 25, 2005, BART and FTA considered the substantive written and oral comments received on the Draft EIS. Volume 2 of the Final EIS includes all of the substantive comments and responses to those comments.

Upon completion of the Final EIS, FTA published a notice of availability of the Final EIS. BART made the Final EIS available for public review at the same locations in which the Draft EIS was available, and it distributed copies to persons who commented on the Draft EIS, interested parties, and agencies that have authority over aspects of the project. FTA will consider the Final EIS in reaching a decision to approve of the proposed project, and it will prepare a Record of Decision no earlier than 30 days following publication and distribution of the Final EIS.

Chapter 2
Purpose and Need

2.1 Introduction

Transportation has become a critical issue for people living and working in southern Alameda County and northern Santa Clara County. A surge in population, including a nearly 20% population increase over the past decade in the City of Fremont, has increased traffic on regional roadways. Highway improvements have not kept up with the demand for more highway capacity. Congestion on I-680 and I-880, the two major regional roadways linking Santa Clara, Alameda, and Contra Costa Counties, has worsened considerably over the last decade, and escalating traffic volumes have reached levels considered unacceptable by Caltrans and other regional monitoring agencies.

To address this need, the purpose of this project is to enhance transit ridership and reduce overall traffic congestion, shortening travel times and improving reliability. The project is also intended to help accommodate projected future growth in employment and population, reduce pressure to expand roads, and support the region's efforts to meet state and federal air quality standards. In addition, improvements to the regional transit network would enhance the link between the southern Alameda County-northern Santa Clara County area and the rest of the East Bay and San Francisco.

2.2 Need for Project

The need for a transportation improvement project in this corridor is based on the recognition of existing and future transportation constraints in the study area. The anticipated growth in employment and population in southern Alameda and northern Santa Clara Counties and related congestion along the regional freeway network establish a need to improve public transit service in the area. Improved transit service could better meet existing local and regional transportation demands and increase transportation capacity to accommodate future growth in areawide employment and population.

2.2.1 Growth in Alameda and Santa Clara Counties

During the past decade, job opportunities have increased throughout the Silicon Valley area, including downtown San Jose and the Cities of Fremont, Milpitas, and Santa Clara. Employment growth in the Silicon Valley during the late 1990s fostered more competition in the housing market, which caused workers to move farther from their places of employment to find affordable housing. To meet the demands of the expanding job market in the regional corridor, residential development has extended to the communities of southern Alameda County, surrounding counties, and the Central Valley.

The City of Fremont and Alameda County have undergone substantial changes in population, demographics, and housing conditions over the past decade, as well as changes in income, real estate, employment, business activity, retail sales, and municipal revenues and expenditures. These changes have outpaced many locations in the Silicon Valley, and the city's growth rate continues to outpace that of Alameda County: residential construction is strong, median and average home prices have increased, and employment and business activity since 1990 have significantly outpaced projections. This growth suggests that Fremont will soon import workers from other Bay area locations and communities farther away. (For more information regarding demographics and income, housing, and employment, refer to Section 4.10, *Population, Economics, and Housing*.)

The population and commuter surge, including a nearly 20% population increase over the past decade in the City of Fremont alone, has overwhelmed regional roadways with thousands of additional cars. In 2000, it was estimated that there were approximately 400,000 weekday automobile trips between the East Bay and Santa Clara County. By 2015, Fremont is projected to have 127,300 employed residents and 130,190 total jobs, indicating an increasing number of workers commuting to work in Fremont (Association of Bay Area Governments 2002).

Since the early 2000s, economic growth has slowed in Fremont and the Silicon Valley. However, even under slower economic growth scenarios, the number of vehicle trips is projected to increase in the Warm Springs corridor. By 2015, Fremont is projected to have 127,300 employed residents and 130,190 total jobs compared to 108,597 employed residents and 108,410 total jobs in 2000, indicating an increasing number of workers commuting to work in Fremont (Association of Bay Area Governments 2002). By 2025, the number of weekday automobile trips between the East Bay and Santa Clara County is expected to exceed 500,000 vehicle trips. (Metropolitan Transportation Commission 2001.)

In its recent report, *Mobility for the Next Generation, Transportation 2030 Plan for the San Francisco Bay Area,* the Metropolitan Transportation Commission (MTC) projects that the Bay Area population will grow to 8.8 million by 2030. Approximately 62% of the region's population will be found in Santa Clara, Alameda, and Contra Costa Counties, which will collectively house over 5 million residents. Jobs will remain concentrated in Santa Clara, Alameda, and San Francisco Counties, with 3.3 million jobs in these three counties. Average household income in the Bay Area will rise in real terms to $118,000 in 2030, and the level of auto ownership is likely to rise along with income, as most families will be able to purchase additional vehicles (Metropolitan Transportation Commission 2004).

2.2.2 Traffic Congestion

Highway improvements have not able to keep up with the demand for more capacity. I-880 is congested beyond the peak travel period, despite a major widening project in central Fremont. In 2001, over 160,000 cars per day traveled this roadway in this area in each direction. I-680, parallel to I-880 on the east side of Fremont, has also emerged as one of the Bay Area's most congested traffic corridors, with over 140,000 cars per day on the Sunol Grade (Metropolitan Transportation Commission 2001). In 2000, morning peak-hour traffic at the Alameda-Santa Clara County line was over 15,000 vehicles per hour (vph) in the southbound direction and about 11,000 vph in the northbound directions for I-680 and I-880 combined. By 2025, these morning peak-hour volumes are expected to increase by 28 percent to about 19,500 vph in the southbound direction and by 45 percent to almost 15,900 vph in the northbound direction (SVRTC 2003).

Based on 2004 peak hour data from the Alameda County Congestion Management Agency, a number of I-680 and I-880 freeway segments parallel to the WSX alignment currently operate at level of service (LOS) D or worse during AM and PM peak hours. On I-880, the two southbound segments from Stevenson Boulevard to Mission Boulevard and from Mission Boulevard to Dixon Landing Road both operate at LOS F in the AM Peak Hour. In the PM Peak Hour, the southbound Mission Boulevard to Dixon Landing Road segment operates at LOS E and the northbound segment operates at LOS D. On I-680, the two northbound freeway segments from Scott Creek Road to SR 238 and from SR 238 to SR 84 both operate at LOS E (Alameda County Congestion Management Agency 2004).

MTC's report, *Bay Area Transportation: State of the System 2004*, indicates that Bay Area residents' appetite for travel leveled off in 2003, reflecting the region's continued economic slump, marked by a three percent decrease in jobs and a sluggish one percent increase in population between 2002 and 2003. While the regional growth has slowed in the near term, long-term forecasts assume a rebound. By 2030, the region's population is expected to grow to 8.7 million people (compared to 6.9 in 2003) and employment to 5.2 million jobs (compared to 3.2 million in 2003) (Metropolitan Transportation Commission, Bay Area 2004).

According to MTC, the total number of daily trips made by Bay Area residents is projected to grow by 35% (to a total of 28.5 million trips) by the year 2030, and two of the three most significant changes in daily trips between Bay Area counties from 2000 to 2030 will occur over the Sunol Grade (116% increase in daily trips), and within the I-680 south corridor between Contra Costa and Alameda Counties (88% increase in daily trips) (Metropolitan Transportation Commission 2004). Highway and freeway expansion to respond to the need for improved regional access is possible, but limits exist. Caltrans estimates that I-880, the primary north-south freeway in the area, could be expanded from the existing 4 to 6 lanes to 8 to 10 lanes. However, as explained above, future demand is expected to exceed this capacity by as much as six additional lanes, and this scale of expansion is not feasible.

Arterial streets in the project vicinity are also expected to carry heavier traffic volumes in the future under No-Build conditions. Of 14 selected intersections located on Fremont area arterial roadways, all 14 currently operate at LOS D or better for both AM and PM peak hour conditions. For AM peak hour conditions in the project horizon year of 2025, 13 of the 14 arterial roadways are anticipated to have a worse LOS than current conditions and 6 would operate at LOS E or F. For the 2025 PM peak hour conditions, 13 of the 14 intersections would have a worse level of service and 4 would operate at LOS E or F.

2.2.3 Transit Accessibility

The BART system that links the southern Alameda County area with the rest of the East Bay, San Francisco, and northern San Mateo County, now terminates in central Fremont. For southbound travelers, reaching residential and employment centers in southern Alameda County and Santa Clara County is often inconvenient and time-consuming by transit, due to the lack of convenient street and freeway access from the Fremont BART Station. For northbound travelers attempting to reach the BART system, the need to travel long distances on congested freeways or surface streets by automobile or bus reduces the speed and reliability of access to the system. Improved access to the transit system is needed to attract riders and divert a significant number of people from automobiles. There is no direct automobile route between Fremont Station and Warm Springs, and a train on the

WSX alignment would clearly have a time advantage over an automobile following a much more indirect route and stopping at intersections.

2.2.4 Air Quality

The increased traffic volume and congestion in the region resulting from growth in employment and population has contributed to increased pollutant emissions in the study area. The study corridor is located within the San Francisco Bay Area Air Basin (SFBAAB), which includes all of San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, Marin, and Napa Counties, and parts of Sonoma and Solano Counties. The State of California has designated the SFBAAB as a serious non-attainment area for ozone and a non-attainment area for inhalable particulate matter less than 10 microns in diameter (PM10). The U.S. Environmental Protection Agency (U.S. EPA) has designated the SFBAAB as an unclassified nonattainment area for 1-hour ozone (2006 attainment deadline), and a marginal non-attainment area for 8-hour ozone.

MTC identifies transit as an alternative to the private automobile that can reduce annual average daily travel (AADT), which would reduce vehicular emissions in the air basin (Metropolitan Transportation Commission 2001). The WSX Alternative was named a Transportation Control Measure in MTC Resolution 2131, the Transportation Contingency Plan of the 1982 Air Quality Plan.

2.2.5 Energy Efficiency

Increased traffic volumes and longer commuting distances for employees have combined to increase the number of vehicle miles traveled annually in the Bay Area. Traffic congestion also has meant that automobiles frequently travel at slower and less efficient speeds, which contributes not just to air pollution, but also to less efficient use of energy that could be used for other regional needs. Transportation-related energy consumption involves energy used by the operation of vehicles (automobile, truck, bus, or train) within the region. Improved access to mass-transit systems can provide energy savings because they are able to transport people much more efficiently than private automobiles. According to a 1983 Caltrans report (Caltrans 1983) on energy and transportation systems, transit (including freight) consumed only 2% of the total energy utilized by California’s transportation sector.

2.2.6 Smart Growth

Smart Growth is a planning approach that promotes the development of livable neighborhoods, or neighborhoods that are safe, convenient, attractive, and affordable. Although smart growth has a variety of meanings, the common thread among the many different views of smart growth is that it is development that revitalizes central cities and older suburbs, supports and enhances public transit, promotes walking and bicycling, and preserves open spaces and agricultural lands (Association of Bay Area Governments 2004).

Smart Growth discourages sprawl, because sprawl leads to increased traffic and congestion by increasing the distance between jobs, homes, and other attractions (shopping centers, service areas), and encourages dependency on automobiles. To discourage sprawl, smart growth emphasizes mixed land use and multiple transportation choices to manage congestion, reduce pollution, and save energy. It also promotes development in already built-up areas, through either infill or redevelopment, which can take advantage of existing infrastructure (Smart Growth America 2004) .

Transit systems frequently support smart growth goals because they often lead to growth in infill areas and produce positive economic benefits for the community in which they are constructed. Improved access to high-volume transit systems, such as BART, support smart growth goals by enabling more clustered, compact growth, because the transit stations become an important part of the community and serve as catalyst for transit-oriented development (TOD). TOD promotes a mixture of land uses, such as restaurants, convenience and other retail stores, and high-density residential use.

2.3 Project Purpose

Employment throughout the South Bay and Silicon Valley area has contributed to high levels of traffic and congestion in the Fremont–South Bay Area. Although economic growth has slowed recently, the number of vehicle trips in the Warm Springs corridor is still expected to grow. In fact, traffic congestion and conditions during peak periods are expected to worsen in the region in the coming 15 to 20 years (Metropolitan Transportation Commission 2001). Increased traffic volume and congestion will lead to increased vehicular emissions and further degradation of air quality.

The purpose of this project is to address transportation and air quality problems in the project corridor with a transportation improvement project that will:

- increase transit access and ridership,
- improve environmental quality,
- provide development catalyst and transit-oriented development,
- ensure compatibility with adjacent land uses and planned development,
- provide transportation services equitably to all segments of the population,
- support community goals and institutional objectives.

2.3.1 Increase Transit Access and Ridership

The project purpose includes addressing regional transportation needs by improving overall access for transit patrons in southern Alameda County and northern Santa Clara County, and facilitating transfers between modes and between regional and local transit services. The transportation improvements should reduce travel times for commuters in the regional corridor, maximize transit ridership, and provide increased transportation choices, particularly during peak-commute periods. Enhanced transit access would improve the viability of existing transit systems and help relieve traffic congestion by attracting riders to transit who would otherwise use local or regional roadways. Increased transit ridership in the Warm Springs area, for example, would mean some relief on congested roadways in the project corridor such as Interstates 880 and 680, which are routes of regional significance.

The project should also be consistent with the goals, objectives and strategies that have been adopted in BART policy documents. The BART *Strategic Plan* charts a course to address transit travel demand, land use, and quality of life issues associated with the operation and expansion of BART (San Francisco Bay Area Rapid Transit District 1999). BART also has adopted System Expansion Criteria that are designed to contend with the pressures of growth in the Bay Area and to address the dispersal of jobs and housing while investing in BART and other transit systems to maximize service. "Increase transit ridership" is the Objective of Goal 1(Transit Travel Demand) of the *Strategic Plan*, which includes "Advocate those infrastructure improvements that best support transit ridership" as a strategy. Similarly, under the BART System Expansion Criteria, projects should enhance regional mobility and access to jobs and integrate well with other services and facilities in an intermodal network.

2.3.2 Improve Environmental Quality

Another purpose of the WSX project is to provide long-term environmental benefits and improved environmental quality. Expanding transit use should promote displacement of air-polluting auto trips and support regional plans to meet state and federal air quality standards by reducing the number of automobile trips and resulting vehicular emissions. As travelers shift from automobile to transit, automobile miles traveled would decrease, resulting in regional energy savings and conservation of non-renewable energy.

2.3.3 Provide Development Catalyst and Transit-Oriented Development

The project should also take advantage of opportunities for transportation improvements to serve as a catalyst for public and private development. Transit station sites can be designed to maximize ridership by supporting smart, efficient, and desirable growth patterns that can accommodate future transit-oriented development, both on-site and off-site. Development investment benefits include higher land values, increased rents, and greater tax income to cities. Development of the station sites should be consistent with local land use and urban development polices that maximize user and community benefits from transportation investments. In accordance with the BART *Strategic Plan*, projects should include working with local communities to promote transit-oriented development and enhanced destinations (Goal 3) and identify transit-oriented nodes and potential transit-oriented development (Goal 4).

2.3.4 Provide Transportation Services Equitably to All Segments of the Population

Consistent with BART policies, the project should extend transportation services to areas and communities currently underserved by transit. Stations can be designed to provide intermodal regional links to bus, shuttle, automobile, bicycle, and pedestrian networks. This increases mobility options for the transportation-disadvantaged, including the elderly and disabled. In accordance with the BART *Strategic Plan*, projects should "encourage and facilitate improved access to and from BART stations by all modes" (Goal 3).

2.3.5 Support Community Goals and Institutional Objectives

Another project purpose is to support regional, local, and institutional goals. The 25-year process for a Warm Springs Extension (which has been under consideration since 1979) continues to evolve. Transportation improvements would be planned in concert with the City of Fremont's land use planning efforts, reinforcing the social and economic fabric of Fremont's communities. The general plan for the City of Fremont specifically reserves a transit corridor for a BART extension and designates two potential station sites, one at Warm Springs and one at Irvington (City of Fremont 1991, as amended). Enhanced use of transit would provide growth opportunities in keeping with housing and economic development goals of the city, and respond directly to Alameda County development plans. The project would also be consistent with MTC's Regional Transportation Expansion Policy, which identifies and prioritizes transit projects. In accordance with the BART *Strategic Plan*, projects would "connect with planning efforts in local communities adjacent to BART" (Goal 2).

Chapter 3
Alternatives Considered

3.1 Introduction

Two alternatives are analyzed in this EIS: the No-Build Alternative and the Warm Springs Extension (WSX) Alternative. This chapter also discusses alternatives that were considered during the prior CEQA processes in 1992 and 2003 or raised in the scoping process for this EIS, but ultimately dismissed from further analysis in this EIS. The chapter begins with a discussion of the WSX Alternative setting, followed by a description of the alternatives.

3.2 WSX Project Location

The WSX Alternative would be located entirely within the City of Fremont, in the East Bay region of the San Francisco Bay Area. Fremont is the southernmost city in the southwestern portion of Alameda County. It is bounded by San Francisco Bay to the west, the foothills and mountains of the Diablo Range to the east, the Cities of Union City and Hayward to the north, and the City of Milpitas in Santa Clara County to the south. Figure 3-1 provides a map of the regional location. Figure 3-2 provides an illustration of the area studied for the WSX Alternative. Currently, the BART system extends into Fremont from the north and terminates at the Fremont BART Station, located in the north-central portion of the city.

Important regional transportation routes serving Fremont include I-880, I-680, and State Route (SR) 84. I-880, located west of the Fremont BART Station, is the principal north-south freeway that connects Fremont to Santa Clara County and the City of San Jose to the south, and to the City of Oakland and other communities of the East Bay to the north. I-880 lies 3 miles west of the WSX Alternative corridor and parallels the WSX Alternative corridor on the west. I-680, located east of the Fremont BART Station, connects Fremont to Santa Clara County and the City of San Jose to the south, and to the communities in eastern Alameda County and central Contra Costa County to the north. Within city boundaries, I-680 generally runs parallel to and is approximately 1 mile east of I-880, and serves the easternmost areas of Fremont. I-680 parallels the WSX Alternative alignment for approximately 3 miles, coming to within approximately 0.25 mile of the WSX Alternative corridor, and then veers slightly east. SR 84, which is the principal east-west route in the area studied, lies just to the north of the WSX Alternative corridor. It runs through the north-central portion of Fremont and connects the city to the Tri-Valley area to the east and to the San Francisco Peninsula to the west via the Dumbarton Bridge.

3.3 No-Build Alternative

As required by NEPA, an EIS must evaluate and analyze the impacts of a No-Action Alternative. For purposes of this EIS, "no action" would be represented by a decision not to approve construction of a BART extension to Warm Springs using federal or federalized state funds. Accordingly, throughout this EIS, the No-Action Alternative is referred to as the 'No-Build Alternative.'

The purpose of evaluating the No-Build Alternative is to allow decision-makers to compare the impacts of approving the project with the impacts of not approving the project. Strictly speaking, the No-Build Alternative would include continuing a present course of action until that action is changed (see "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 Fed. Reg. 18026, 18027 [March 23, 1981]). In this case, the BART Board adopted the WSX Alternative in June 2003 as a state- and locally-funded project without federal involvement. If the No-Build Alternative were selected as the outcome of this EIS evaluation, BART could continue with construction of the 2003 Adopted Project, provided that sufficient state and local funding were found. However, at this time, it does not appear that such funding is reasonably likely to be available, which is why BART is seeking to satisfy requirements for federal funding eligibility through the NEPA review process. Selection of the No-Build Alternative at the conclusion of NEPA review would likely result in the WSX Alternative not being constructed until a substantially later date.

Accordingly, for the purposes of this analysis, the No-Build Alternative does not include a BART extension to Warm Springs, and assumes that transit services offered by BART will continue at current levels, except for limited improvements in service frequency. In addition, the No-Build Alternative assumes that planned transportation improvements that other agencies have committed to constructing will be carried out.[1] The No-Build Alternative represents the conditions that would be reasonably expected to occur in the foreseeable future if the WSX Alternative were not approved. These conditions are based on current plans and are consistent with available infrastructure and community services, which, for the purposes of this analysis, include current rail services provided by BART, and bus service provided by AC Transit, and VTA. Programmed highway improvements included in MTC's 2001 Regional Transportation Plan, such as the addition of an HOV lane to I-680 over the Sunol Grade, are also included in this alternative. The city's grade separations project has also been assumed in this alternative because it will be a part of the existing conditions by the time the WSX Alternative would be constructed. These transportation improvements would occur even if the WSX Alternative is not implemented.

While the No-Build Alternative would have fewer environmental impacts than the WSX Alternative, as discussed in Chapter 4, it would fail to properly address the purpose and need of the WSX Alternative. The No-Build Alternative would not further BART's purpose and need related to improving public transportation services in the Bay Area and would not be consistent with the City of Fremont's land use and redevelopment goals (for example, Irvington redevelopment).

3.4 Warm Springs Extension Alternative

The WSX Alternative description includes a discussion of the alignment, proposed station and optional station, and ancillary facilities, as well as discussion of projected ridership, operating plan,

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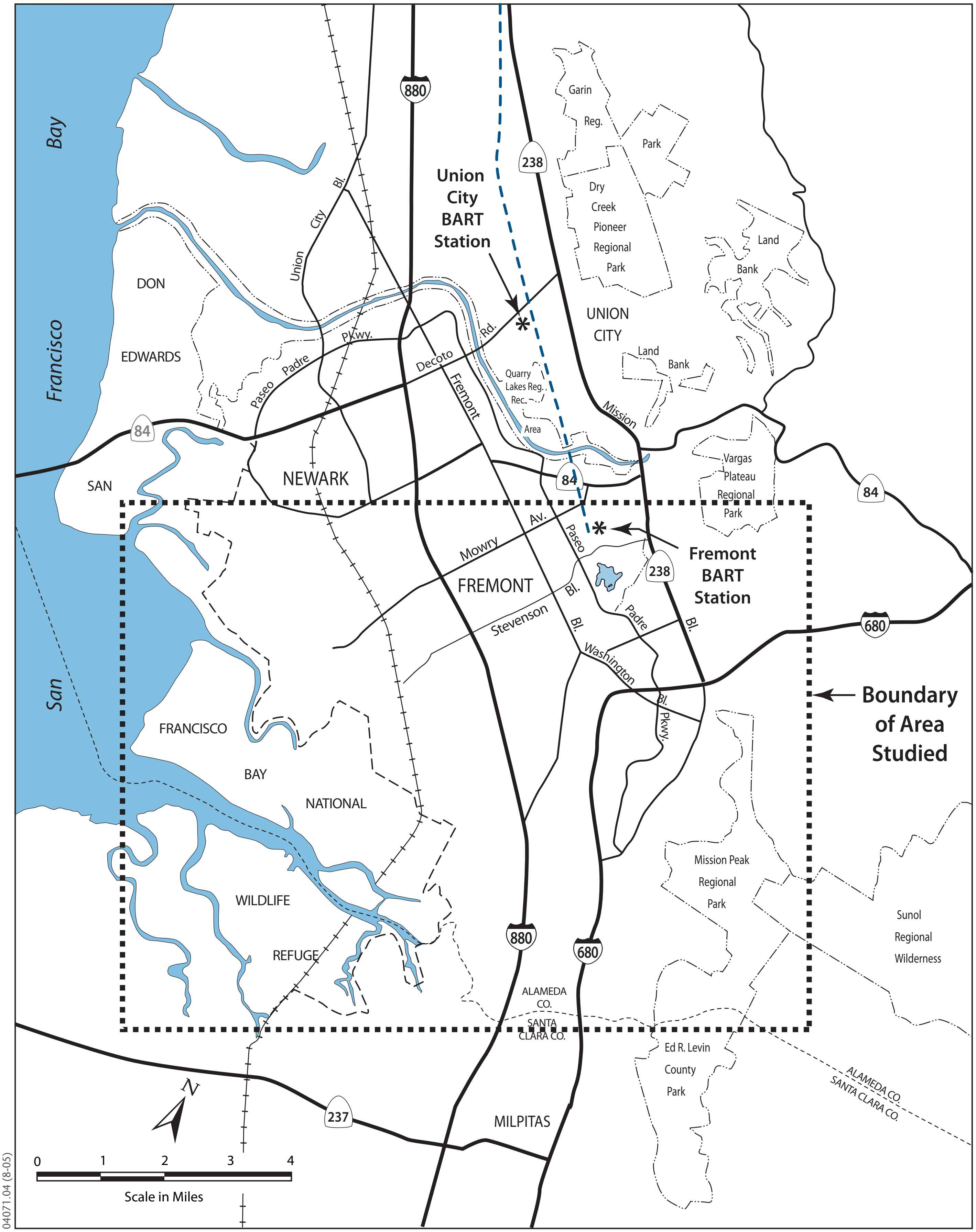
[1] The No-Build Alternative does not include the proposed VTA BART extension to Santa Clara County and San Jose.

Source: Basemap: San Francisco Estuary Institute EcoAtlas 2001.

Figure 3-1
Regional Location Map



Source: Jones & Stokes 2002.

Figure 3-2
Area Studied for WSX Alternative

and estimated cost. This section also provides a description of the anticipated construction scenario, including general construction activities, duration of activities, and location of potential contractor laydown (storage and activity) areas, and identifies utility and rail service providers that BART would need to coordinate with to facilitate construction of the WSX Alternative.

The WSX Alternative consists of a 5.4-mile extension of the BART system, with a new station in the Warm Springs district of Fremont. An optional second station in the Irvington district of the city is also being proposed. The proposed VTA BART extension to Santa Clara County and San Jose is not part of the WSX Alternative.

The WSX Alternative alignment would generally parallel portions of the UP railroad corridor, which contains the former WP and SP railroad tracks, and I-680 and I-880 in southern Alameda County (Figure 3-3). The initial segment of the WSX Alternative alignment would begin on an embankment at the south end of the existing Fremont BART Station. The WSX Alternative alignment would pass over Walnut Avenue on a bridge structure and descend into a cut-and-cover subway north of Stevenson Boulevard. It would continue southward in a subway under Fremont Central Park and the eastern arm of Lake Elizabeth. The alignment would surface to grade between the former WP and SP railroad alignments north of Paseo Padre Parkway. It would pass over a grade-separated Paseo Padre Parkway on a bridge structure, and then continue southward at grade, passing under a grade-separated Washington Boulevard. From Washington Boulevard, the WSX Alternative alignment would generally occupy the former WP right-of-way to just north of South Grimmer Boulevard, where it would veer slightly to the east, and run adjacent to the former WP right-of-way, before entering a new terminus at Warm Springs and Grimmer Boulevards in the Warm Springs District. The railroad corridor configuration would consist of BART on the eastern side (operating in the location of the former WP tracks) and UP on the western side (operating on the former SP tracks). The WSX Alternative alignment is described in greater detail below in Section 3.5.1.

Facilities along the WSX Alternative alignment would include the new station (discussed below in Sections 3.5.2 and 3.5.4, respectively) and ancillary facilities spaced out along the alignment, including electrical substations, gap breaker stations, train control facilities, ventilation structures, and a maintenance facility. The ancillary facilities are discussed below in Section 3.5.3. Table 3-1 provides a summary description of the WSX Alternative without the optional Irvington Station. The optional Irvington Station is presented in Section 3.4.4 below.

Table 3-1. WSX Alternative (without optional Irvington Station)

WSX Alternative Item	Description
Estimated Construction Start	2006[a]
Begin Revenue Service	2010
Length of Alignment	5.4 miles
–Embankment	0.2 mile
–Overpass	0.1 mile
–Subway	1.0 mile
–At grade	3.3 miles
–Retained cut/fill	0.8 mile
Warm Springs Station Intermodal Facilities	34 acres 2,040 parking spaces: –daily parking spaces –short-term parking spaces –7 bus bays –parking for the disabled
Ancillary Facilities	–Traction power (electrical substations, gap breaker stations) –Train control and communications –Subway ventilation structure(s) –Pumping/emergency access –Vehicle maintenance
Estimated Ridership	
–2010	4,700 new transit riders
–2025	7,200 new transit riders
Cost	
–Capital (2004$, see Chapter 7) –Operating (2004$, see Chapter 7)	$678 million $8.16 million

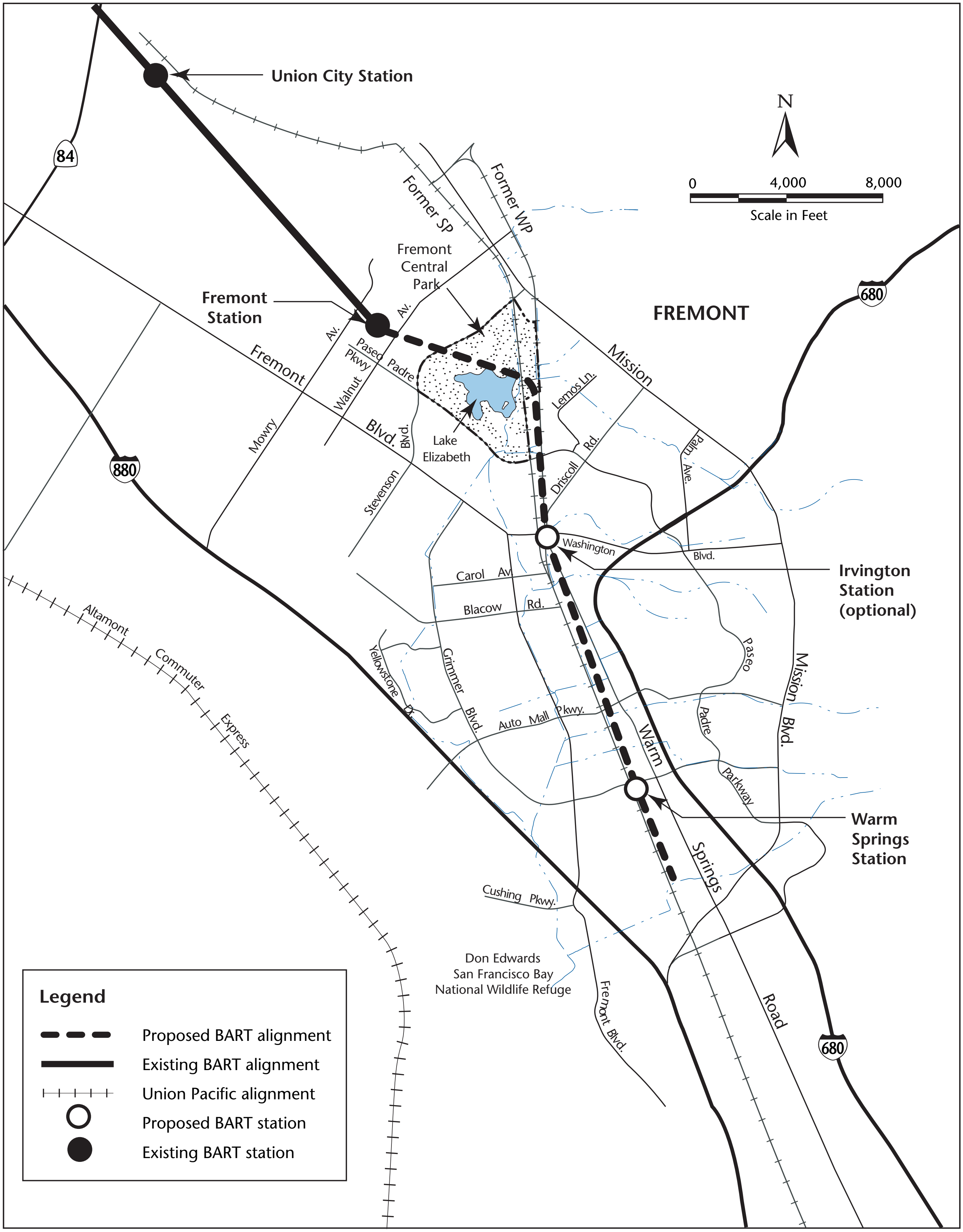
[a] Construction is unlikely to begin in 2006. A new project schedule is yet to be determined.

Source: San Francisco Bay Area Rapid Transit District

3.4.1 WSX Alternative Alignment

To provide a clear description of the WSX Alternative alignment, the discussion in this section refers to the alignment as divided into the following segments.

- Fremont BART Station to Stevenson Boulevard.
- Stevenson Boulevard to SP Railroad Right-of-Way. (This segment includes Fremont Central Park).



Source: Jones & Stokes 2002.

Figure 3-3
WSX Alternative

- Former SP Railroad Right-of-Way to Paseo Padre Parkway.
- Paseo Padre Parkway to Washington Boulevard.
- Washington Boulevard to end of WSX Alternative alignment.

The WSX Alternative drawings referenced in this discussion are organized as follows.

- Figures 3-4a through 3-4f show the WSX Alternative alignment.
- Figures 3-5a through 3-5f show typical cross sections of bridges and other features of the alignment.
- Figures 3-6a and 3-6b show the proposed Warm Springs Station conceptual station layouts and site plans.
- Figures 3-7a through 3-7f show typical layouts of the ancillary facilities for the WSX Alternative.
- Figures 3-8a and 3-8b show the proposed optional Irvington Station conceptual station layouts and site plans.

Fremont BART Station to Stevenson Boulevard

The existing Fremont BART Station is located on the block bounded by Walnut Avenue, Civic Center Drive, Mowry Avenue, and the Alameda County Flood Control detention basin. The station structure is elevated. BART trains currently approach the station on an aerial structure from the north. The station structure and platform are surrounded by a parking lot and a bus/taxi intermodal facility. Under the WSX Alternative, no changes would be made to the station structure itself. The WSX Alternative alignment would extend on an embankment southeasterly from the existing platform, across the station parking lot, to Walnut Avenue. The embankment would be approximately 20 feet high and 150 feet wide. The embankment would have an approximately 30-foot-wide opening to maintain vehicular circulation in the southern area of the station. The number of parking spaces in the southern end of the station parking lot would be reduced by approximately 150 spaces to accommodate the embankment, but the station would retain a total of 1,876 parking spaces.

The WSX Alternative alignment would cross Walnut Avenue on two 120-foot bridge structures (one for each direction of track). The structures would be supported by abutments on both sides of Walnut Avenue and center piers located in the median. Figure 3-5a shows a typical cross section of the bridge structures. To provide sufficient highway clearance under these bridges, the Walnut Avenue street grade will be permanently lowered approximately 1 foot in the vicinity of the bridges as part of the WSX Alternative.

Just south of Walnut Avenue is an existing wetland area commonly known as Tule Pond. Tule Pond is hydrologically connected to a larger wetland area north of Walnut Avenue and east of the Fremont Station parking lot. This entire wetland area, both north and south of Walnut Avenue, serves the Alameda County Flood Control and Water Conservation District (ACFCD) as a flood detention basin. The WSX Alternative alignment would cross the Hayward fault, which lies in an east-west direction, at Tule Pond. For seismic safety, the alignment would pass through Tule Pond on an embankment. The embankment would be approximately 175 feet wide and 30 feet high. The central portion of Tule Pond would be filled to construct the BART embankment. The remaining area of

Tule Pond on both sides of the embankment would be expanded to maintain existing storage capacity and remain as a detention basin. An existing ACFCD service road would be retained but relocated. Figure 3-5b shows a typical cross section of the embankment.

The undeveloped area extending from Walnut Avenue and Tule Pond south to Stevenson Boulevard is bordered on both the east and west by multi-family residential developments. The WSX Alternative alignment would extend through the undeveloped area on an embankment that would slowly descend to grade over approximately 1,000 feet. The alignment would then begin to move below grade into a retained-cut[2] section for approximately 1,000 feet and enter a subway portal approximately 75 feet north of Stevenson Boulevard. The portal structure would be approximately 40 feet wide. The portal area would include facilities for maintenance and emergency access/egress. Figure 3-5c shows a typical cross section of the portal area. This segment of the alignment is illustrated in Figure 3-4a.

Stevenson Boulevard to Former SP Railroad Right-of-Way (Fremont Central Park)

From the portal structure, the WSX Alternative alignment would proceed in a cut-and-cover subway under Stevenson Boulevard and Fremont Central Park. The WSX Alternative alignment under Fremont Central Park would pass between the area of the softball playing fields and through a portion of the parking lot. It would then pass under the northeastern arm of Lake Elizabeth and cross under the former SP alignment. After construction of the subway structure is complete, Stevenson Boulevard, Fremont Central Park, and Lake Elizabeth would be returned to their existing conditions, and all existing uses would be reinstated. This process is described below in greater detail in Section 3.5.7 of this chapter. Figure 3-5d shows a typical cross section of the cut-and-cover subway structure.

The proposed length of the subway is approximately 1 mile. At least one ventilation structure would be required in this segment to provide emergency access/egress from the subway to the surface. There are two options for ventilating the subway: a single ventilation structure or two smaller ventilation structures. If the single-structure option were implemented (Option 1), the structure would be placed in Fremont Central Park approximately 125 feet south of the existing parking lot. If the two-structure option were implemented (Option 2), the first structure would be placed in the Fremont Central Park parking lot, and the second structure would be placed east of Lake Elizabeth near Mission Creek. The proposed locations of the ventilation structures under these options are shown in Figures 3-4a and 3-4b. A more detailed description of ventilation structures is provided below in Section 3.5.3.

Former SP Railroad Right-of-Way to Paseo Padre Parkway

After passing under Lake Elizabeth, the WSX Alternative alignment would continue in the subway and cross under the former SP tracks and then emerge into the railroad corridor between the former WP and SP alignments, just south of Central Park Golf Course. The southern subway portal would be located in an undeveloped parcel approximately 100 feet east of the current location of the former SP alignment. Similar to the northern portal, the southern portal would include facilities for

[2] *Retained cut* refers to a "u"-shaped, belowground structure with concrete walls and an open top. It is used to transition an alignment from at grade to subway or vice versa.

BART

Figure 3-4a
WSX Alternative Alignment
Fremont BART Station to
Fremont Central Park

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

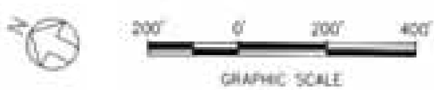


Figure 3-4b
WSX Alternative Alignment
Fremont Central Park to
Paseo Padre Parkway

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

Figure 3-4c
WSX Alternative Alignment
Former SP Railroad to Blacow Road

Source: Parsons Brinckerhoff 2003.

04071.04 (8-05)

Figure 3-4d
WSX Alternative Alignment
Blacow Road to Auto Mall Parkway

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

Figure 3-4e
WSX Alternative Alignment
Auto Mall Parkway to
Warm Springs Court

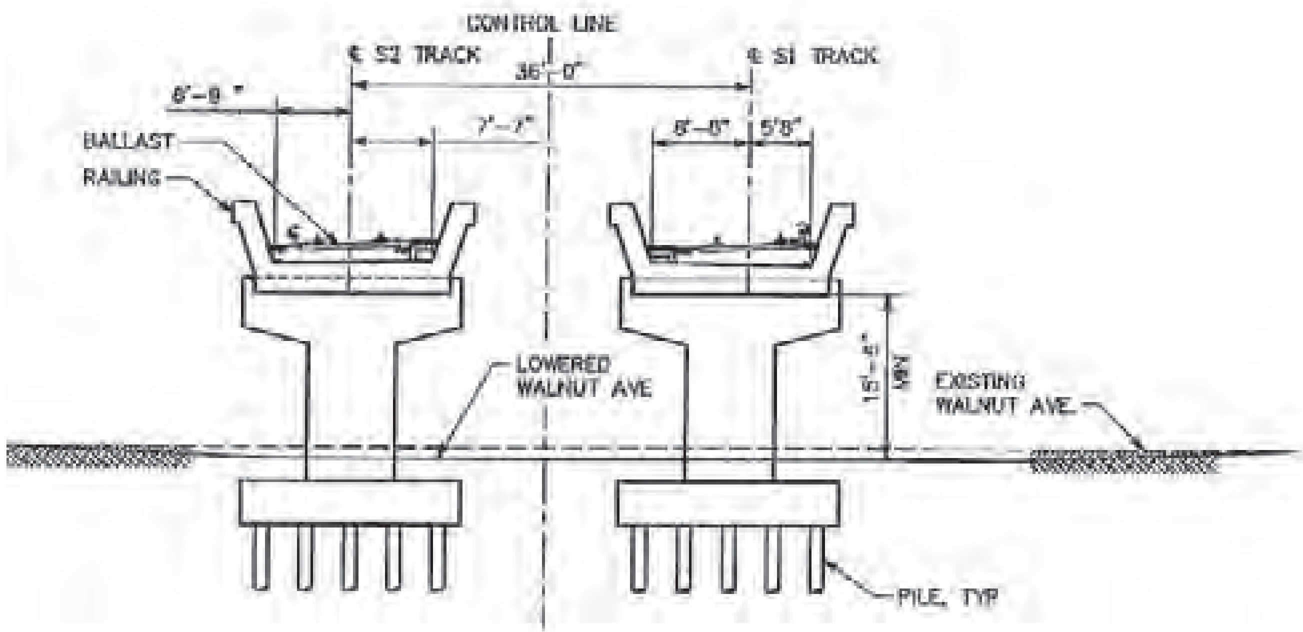
04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

Figure 3-4f
WSX Alternative Alignment
Warm Springs Court to
Mission Boulevard

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

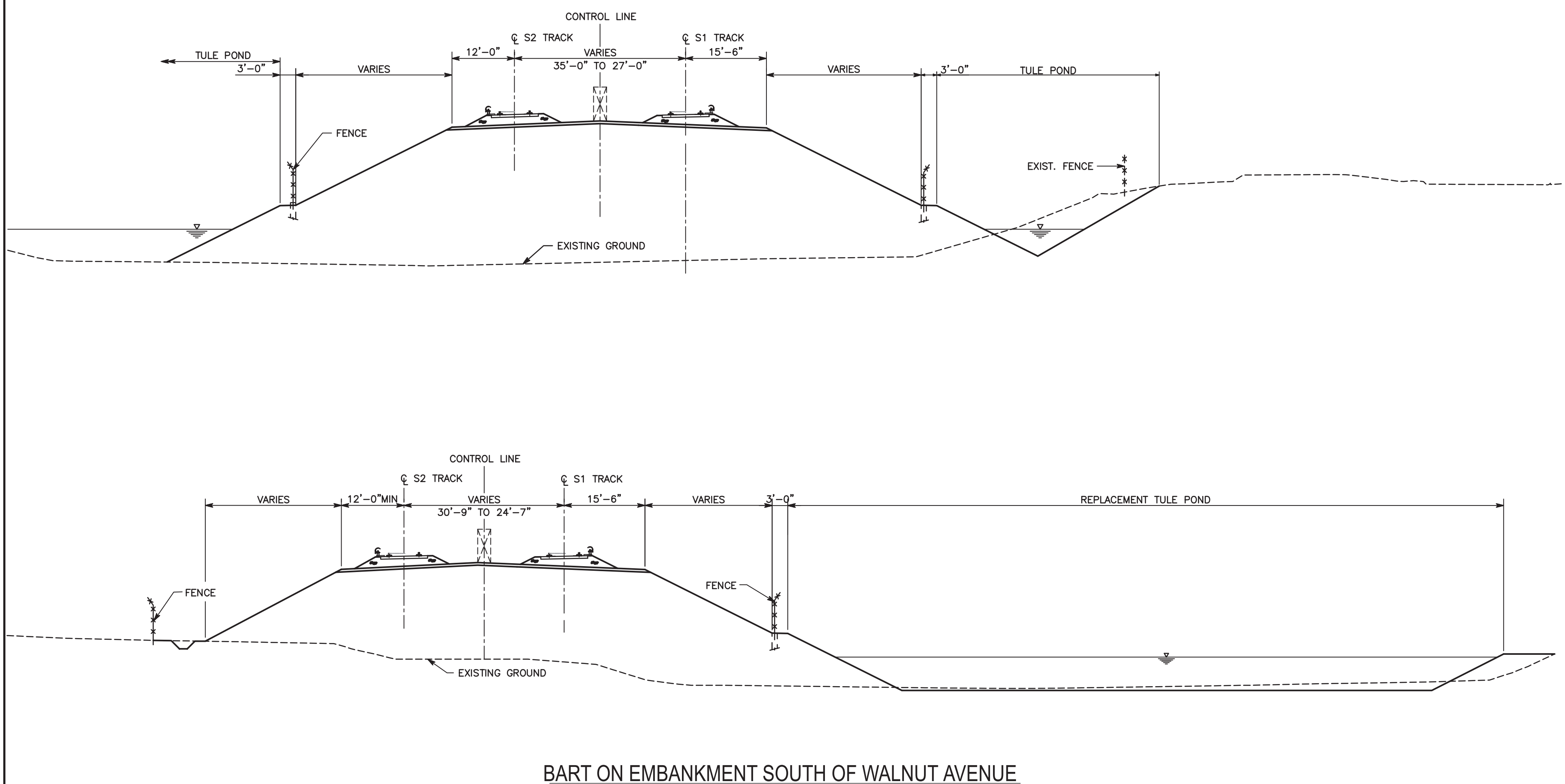


Not to scale

04071.04 (8-05)

Figure 3-5a
Walnut Avenue BART Overpass

Source: Parsons Brinckerhoff 2003.

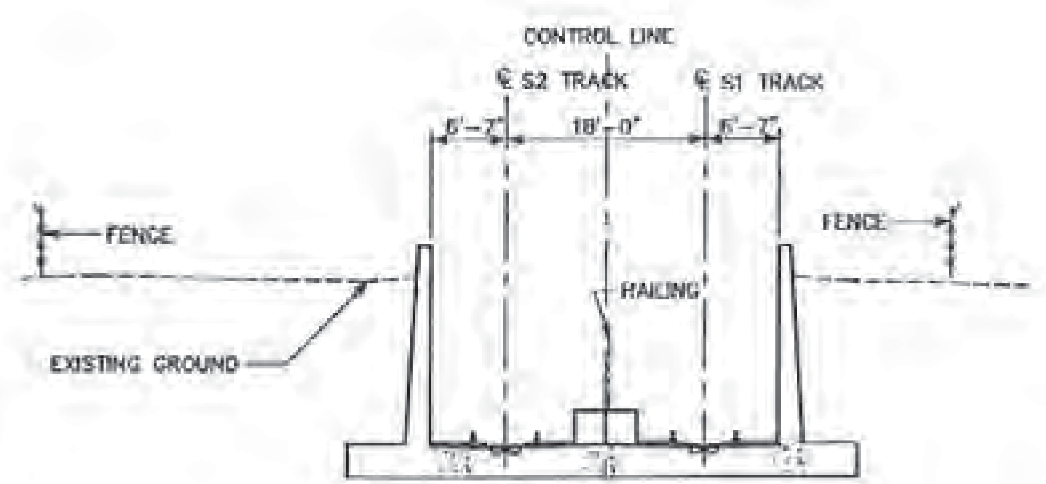


Not to scale

Figure 3-5b
South of Walnut Avenue - Typical Section

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

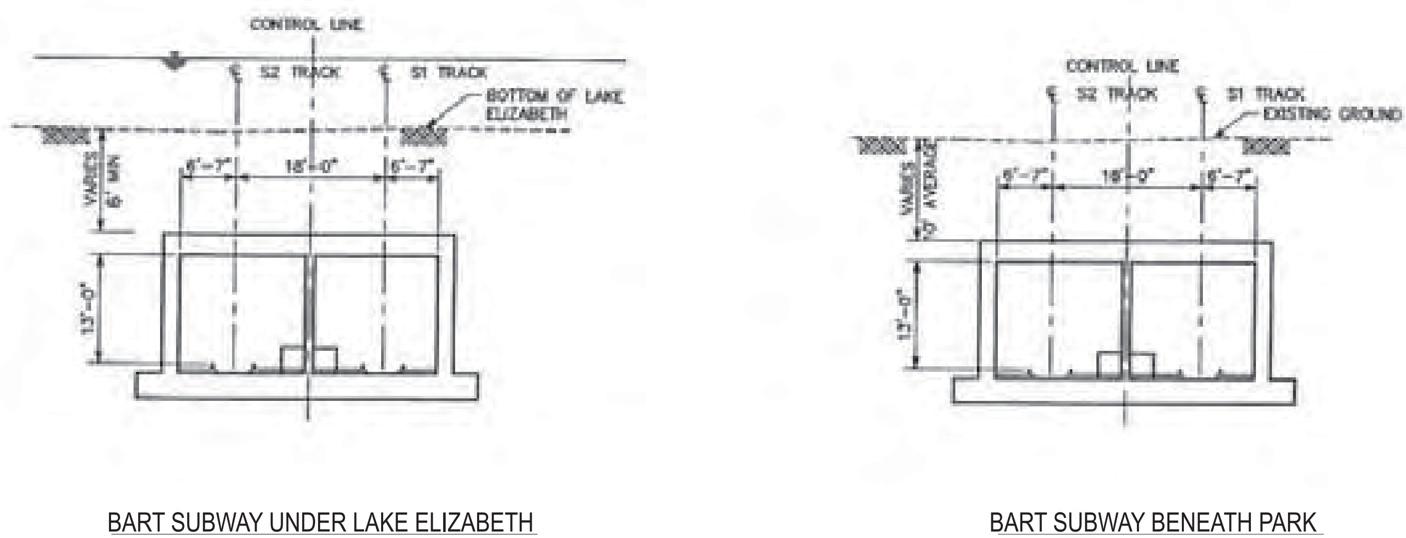


Not to scale

Figure 3-5c
BART Subway Portal (Transition Structure) – Typical Section

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

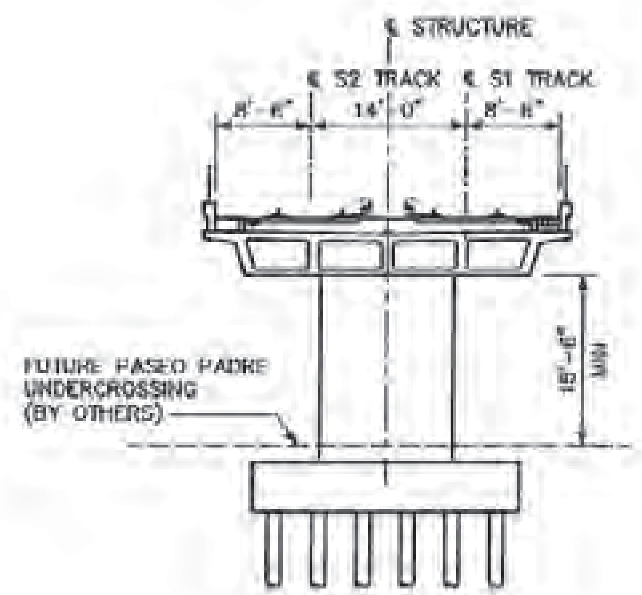


Not to scale

04071.04 (8-05)

Figure 3-5d
BART Subway – Typical Sections

Source: Parsons Brinckerhoff 2003.

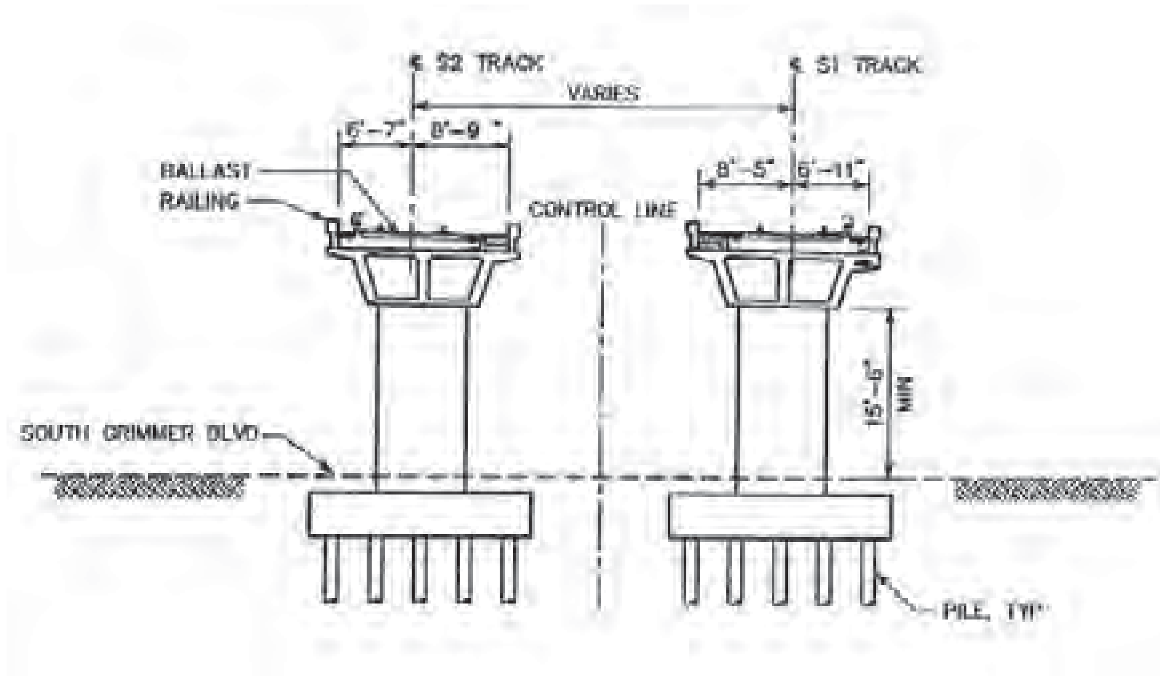


Not to scale

Figure 3-5e
Paseo Padre Parkway BART Overpass

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.



Not to scale

Figure 3-5f
South Grimmer Boulevard BART Overpass

04071.04 (8-05)

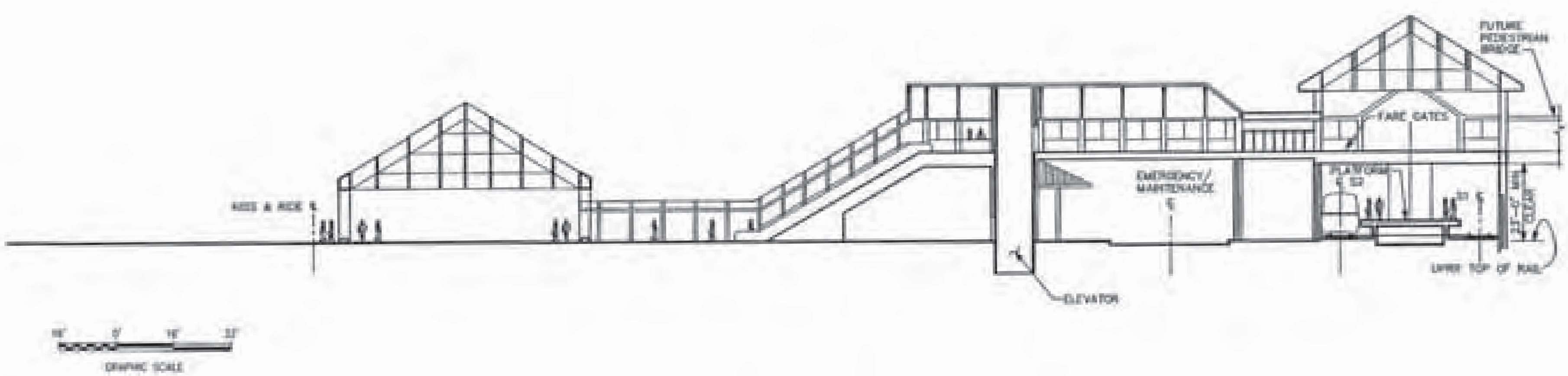
Source: Parsons Brinckerhoff 2003.

BART

Figure 3-6a
Conceptual Site Plan
Warm Springs Station

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

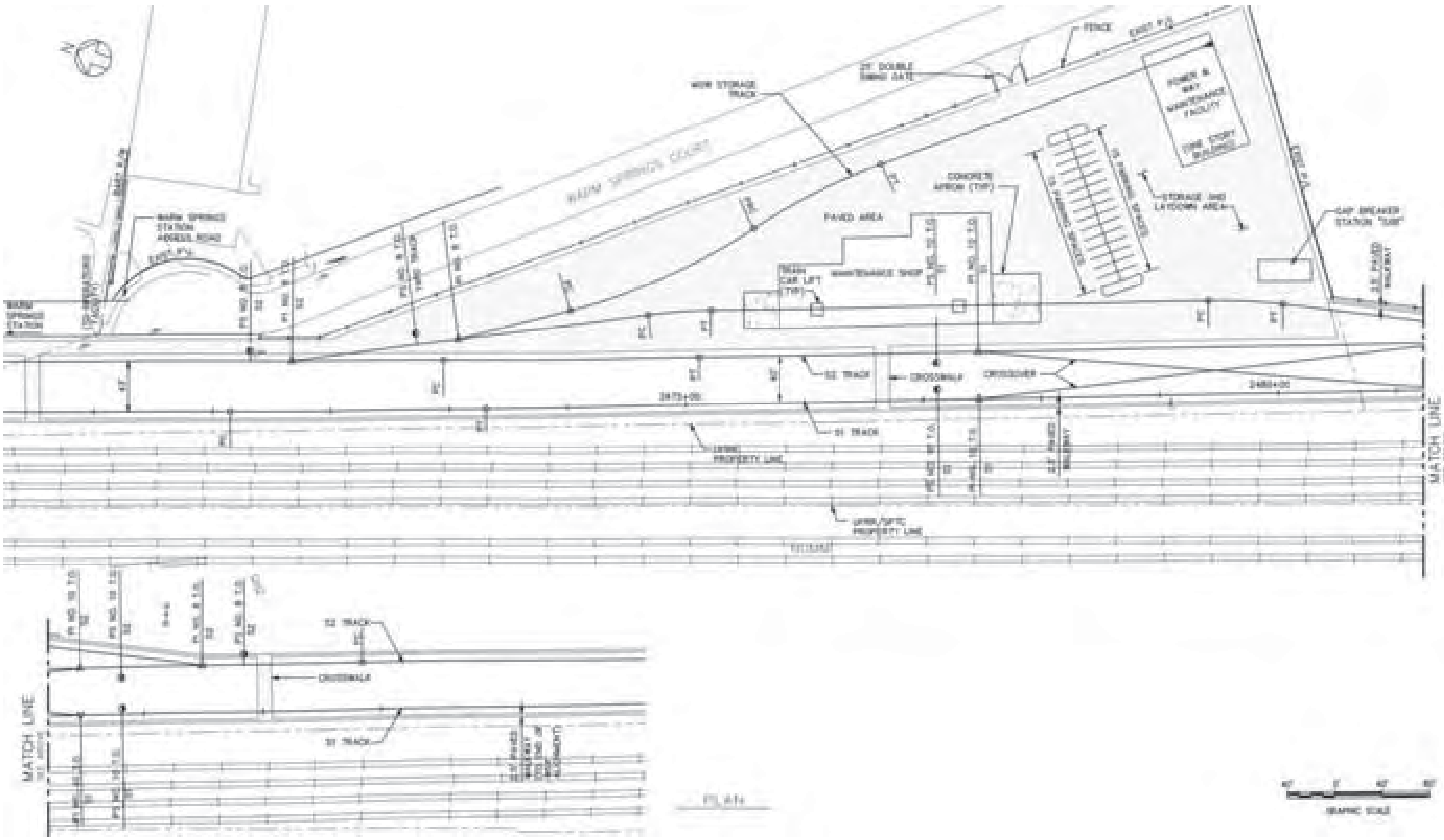


BART

Figure 3-6b
Conceptual Station Section Looking South
Proposed Warm Springs Station

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

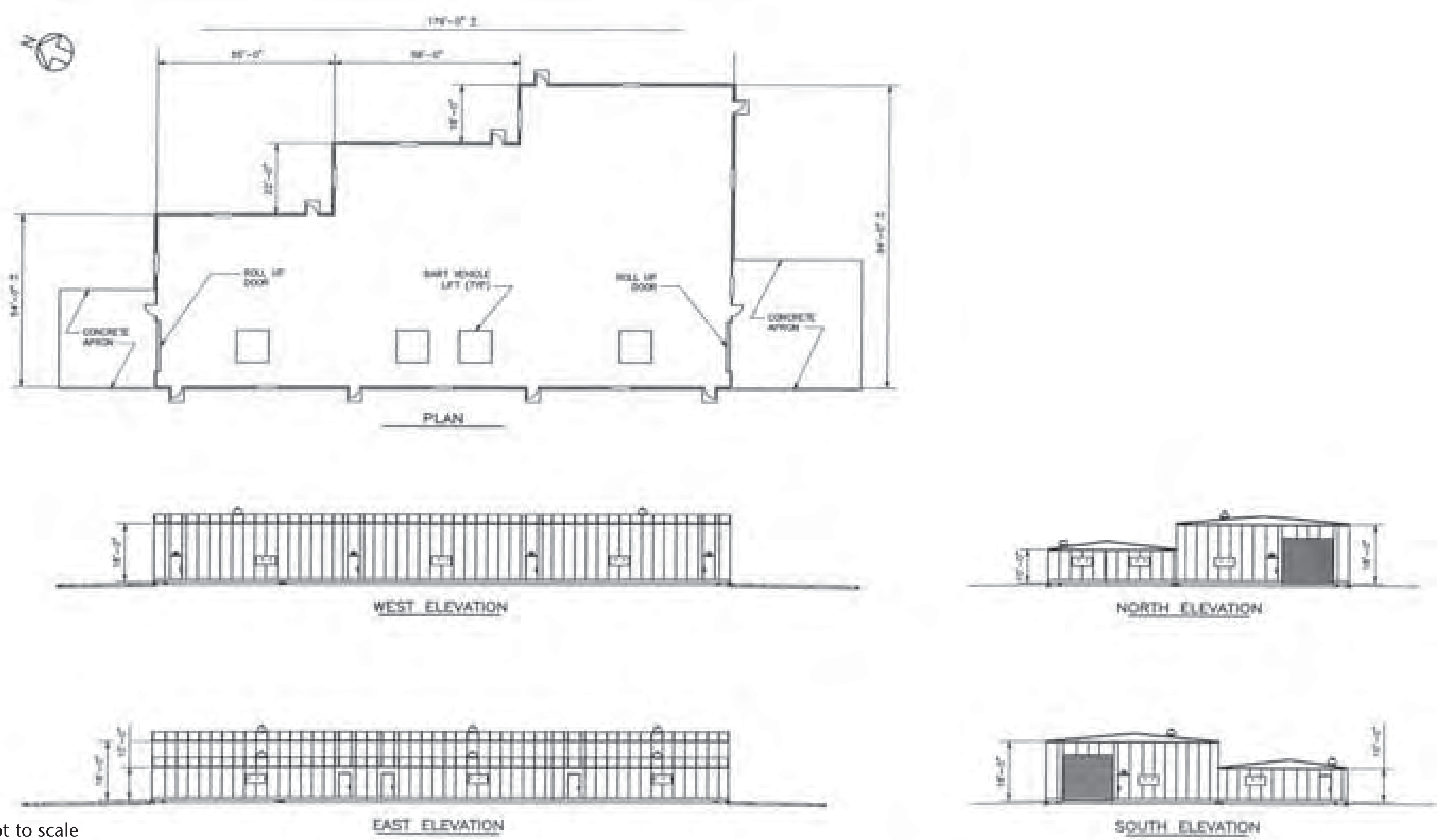


BART

Figure 3-7a
Proposed Maintenance and Storage Facility

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

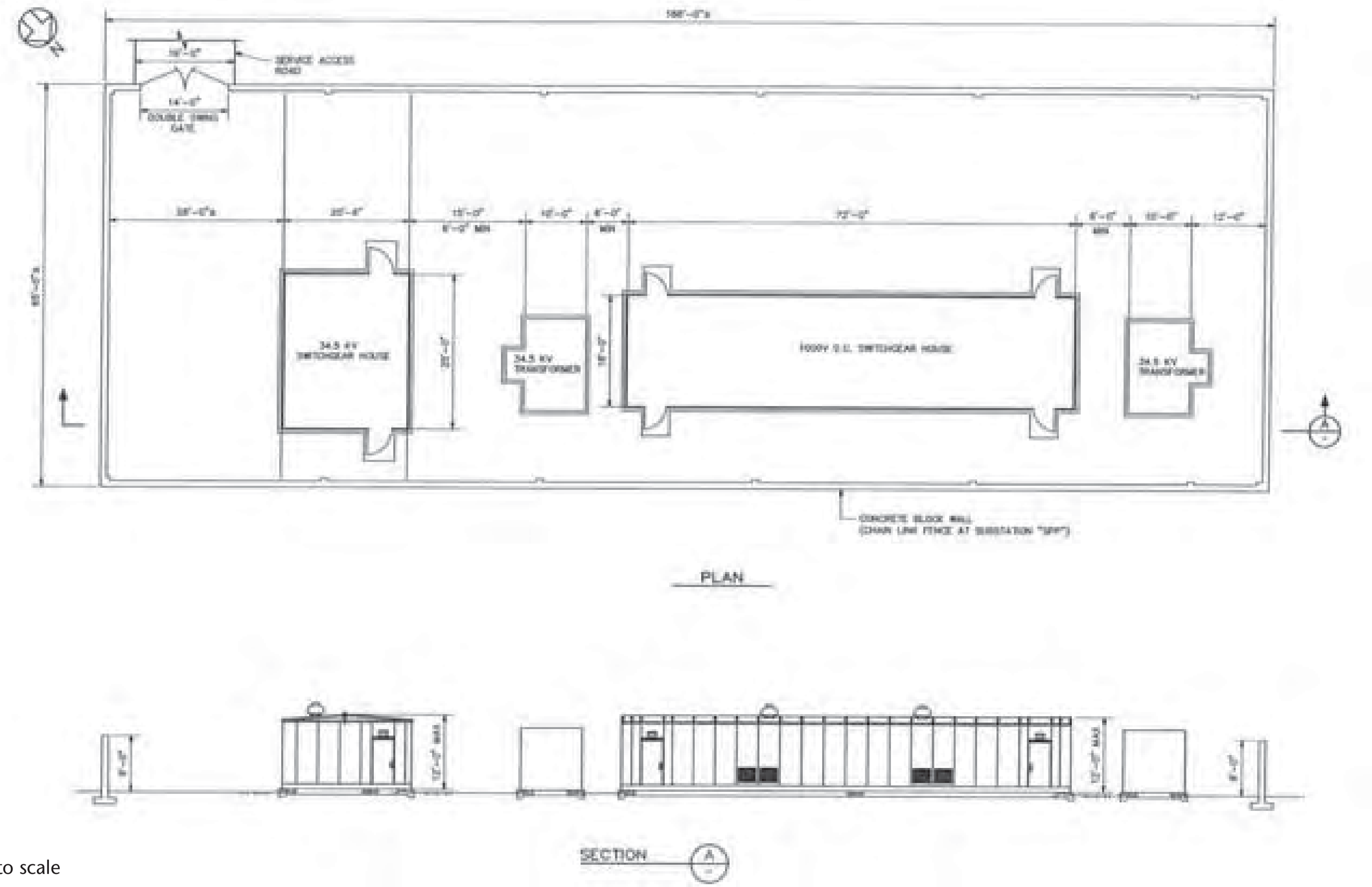


Not to scale

Figure 3-7b
Proposed Maintenance Shop Typical Layout

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

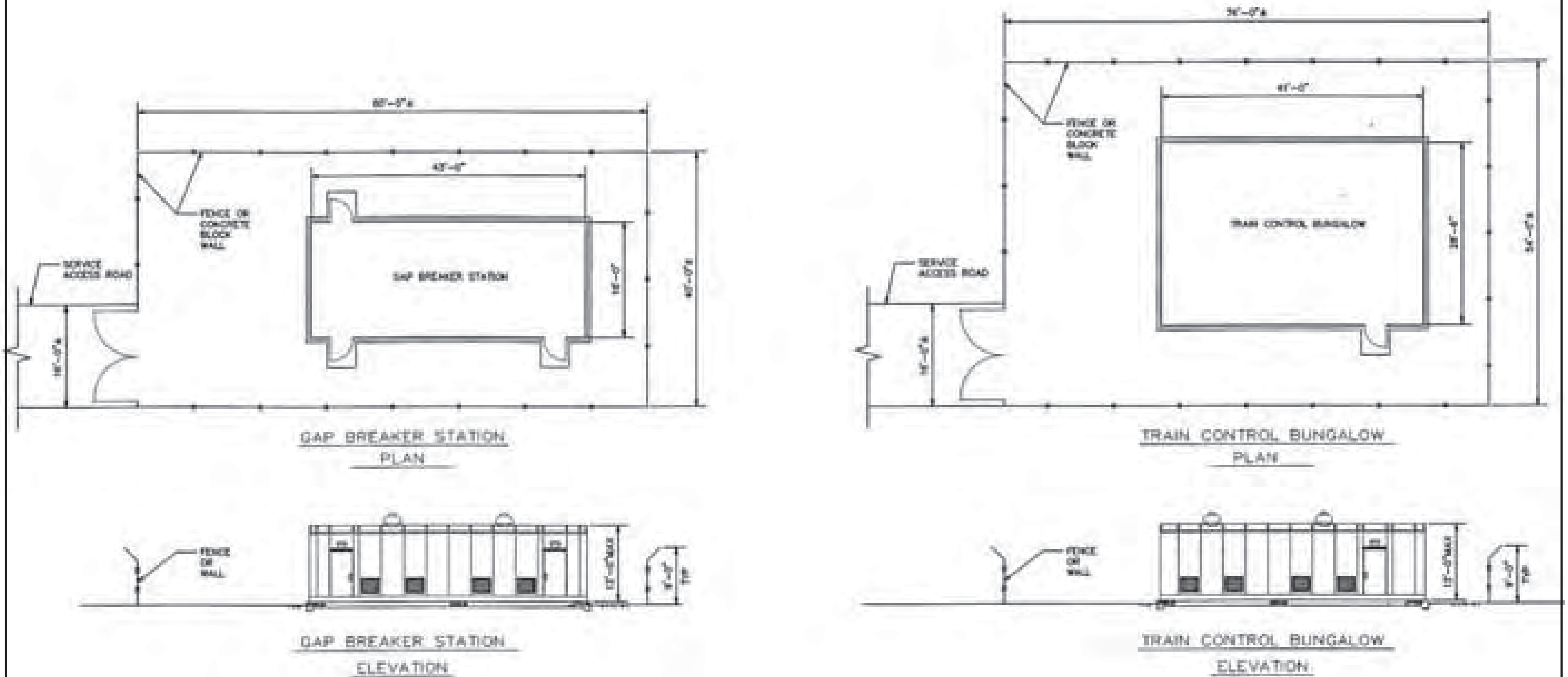


Not to scale

Figure 3-7c
Proposed Traction Power Substation Typical Layout

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

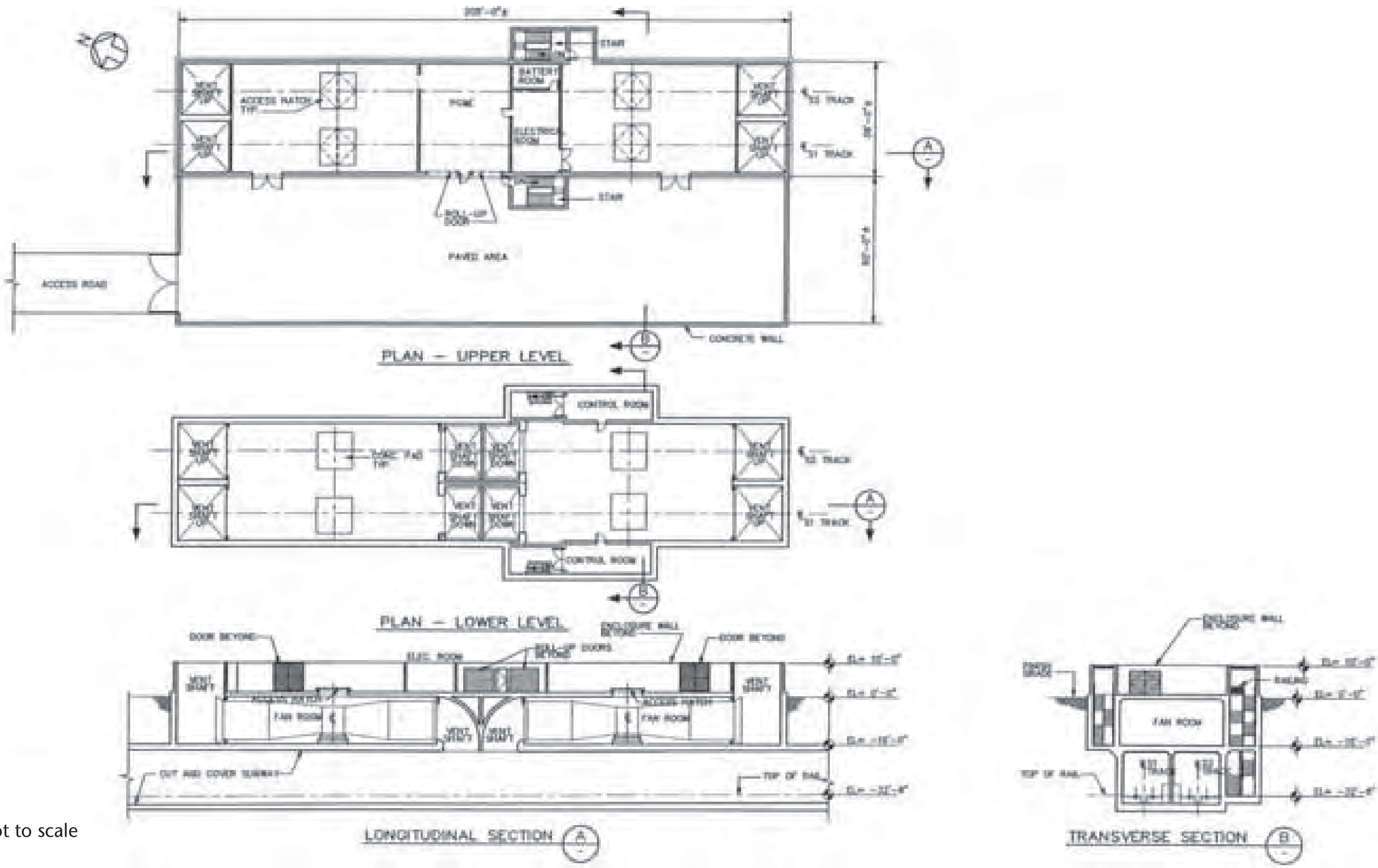


Not to scale

Figure 3-7d
Proposed Wayside Facilities Typical Layouts

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

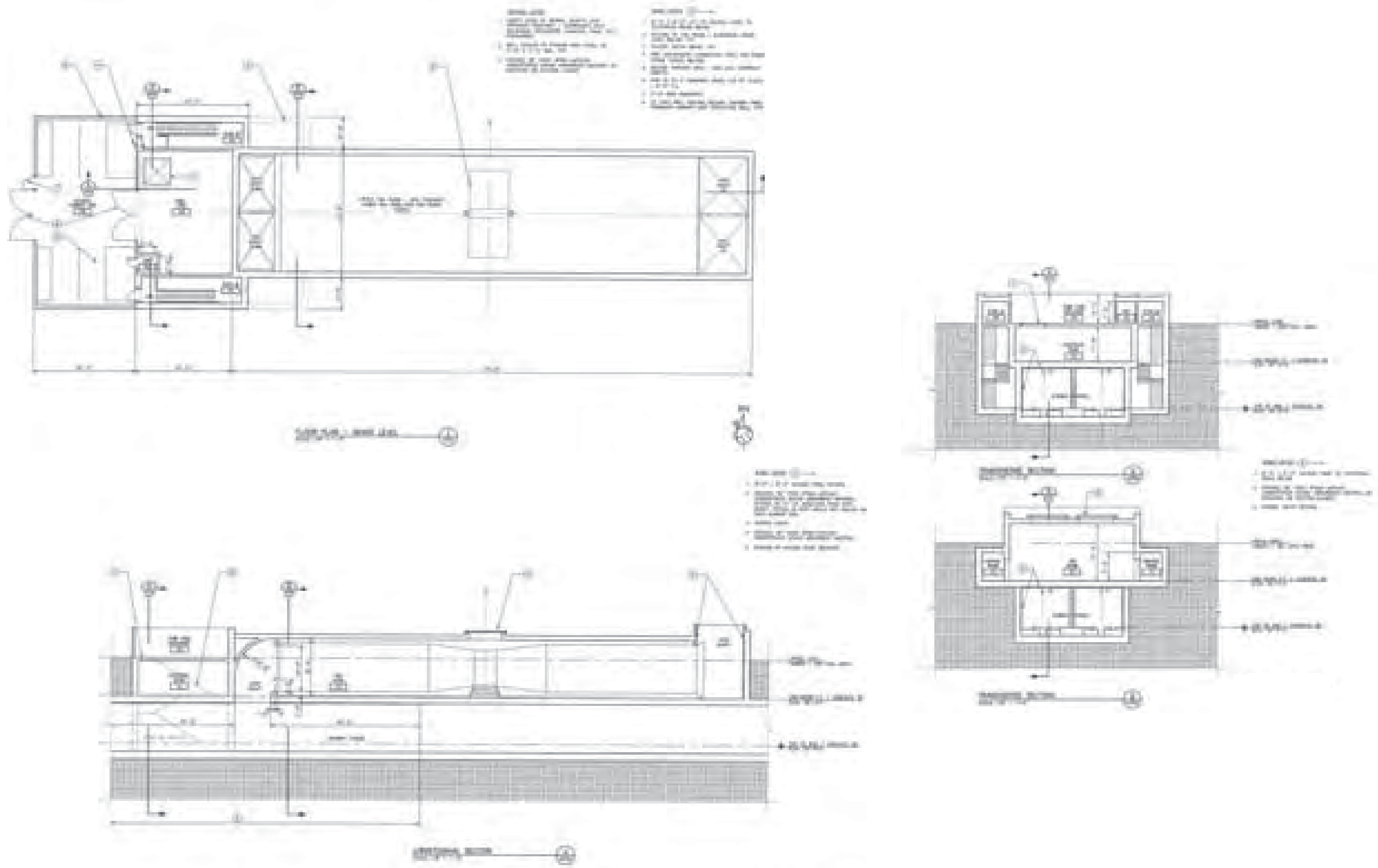


Not to scale

Figure 3-7e
Proposed Ventilation Structure Option 1 Typical Layout

04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.



Not to scale

Figure 3-7f
Proposed Ventilation Structure Option 2 Typical Layout

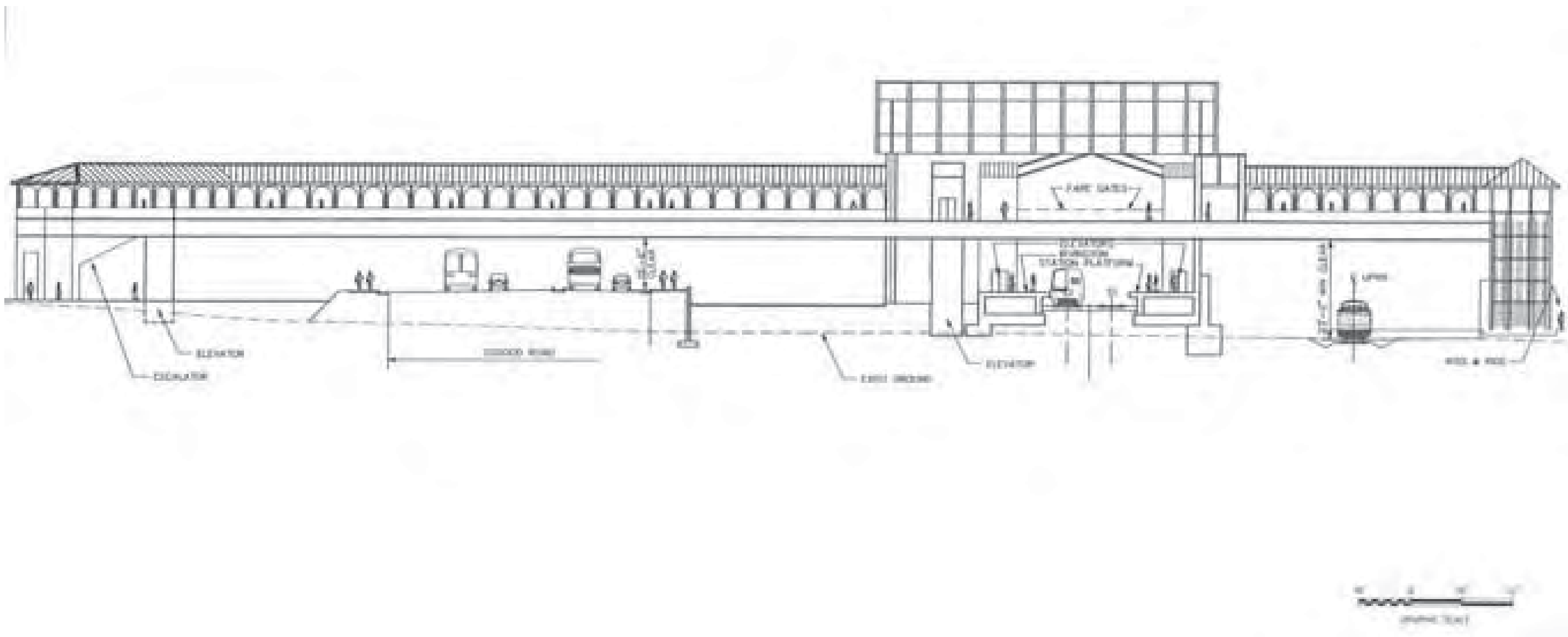
04071.04 (8-05)

Source: Parsons Brinckerhoff 2003.

Figure 3-8a
Conceptual Site Plan
Optional Irvington Station

Source: Parsons Brinckerhoff 2003.

04071.04 (8-05)



04071.04 (8-05)

Figure 3-8b
Conceptual Station Section Looking South
Optional Irvington Station

Source: Parsons Brinckerhoff 2003.

maintenance and emergency access/egress. The WSX Alternative alignment would emerge from the southern portal toward Paseo Padre Parkway in a retained-cut section for approximately 800 feet, transitioning to grade where it would lie between the former SP and WP alignments. In the approach to Paseo Padre Parkway, the alignment would cross over two Hetch Hetchy water pipelines that run parallel to and approximately 140 feet north of Paseo Padre Parkway. The Hetch Hetchy pipelines are part of the Hetch Hetchy Aqueduct water system, which provides water from the Sierra Nevada to the San Francisco peninsula. Although the WSX Alternative alignment would not disturb the Hetch Hetchy water pipelines, the existing structures at the Irvington Pump Station, which is also a part of the Hetch Hetchy water system, would be removed as part of a separate project. The structures at this site consist of the main pump station, various small ancillary buildings (including a garage, storehouse, transfer banks, and chlorinator building) and associated piping, all of which were constructed between 1947 and 1955. These facilities ceased operations in the late 1970s. The entire alignment segment is shown in Figure 3-4b.

A traction power substation[3] would be constructed approximately 650 feet north of Paseo Padre Parkway near the southern subway portal (Figure 3-4b). A train control bungalow[4] would be located approximately 200 feet north of Paseo Padre Parkway. The portal and associated facilities would be accessed via a maintenance road from Paseo Padre Parkway.

As part of the WSX Alternative, the former SP track, which will be moved to an interim location by the city's grade separations project, would be placed in its final location. (For a more detailed description, see Section 3.5.7.)

Paseo Padre Parkway to Washington Boulevard

As described above, both Paseo Padre Parkway and Washington Boulevard will be modified as part of the city's grade separations project. Paseo Padre Parkway will be lowered to pass under the realigned railroad track and BART alignment, and Washington Boulevard will be raised to pass over the realigned railroad track and BART alignment. The former SP alignment will be relocated closer to and parallel to the former WP alignment.

Between Paseo Padre Parkway and Washington Boulevard, approaching the optional Irvington Station site, the alignment would shift to the east, moving from roughly midway between the former SP and WP alignments to the location of the former WP right-of-way, as shown in Figure 3-4c. The WSX Alternative alignment would transition from a moderate embankment to slightly depressed in this segment.

The WSX Alternative alignment would cross the lowered Paseo Padre Parkway on a double-track guideway[5] approximately 32 feet wide. The bridge structure would be supported by abutments on both sides of Paseo Padre Parkway and center piers in the roadway median (see Figure 3-5e).

Approximately 225 feet north of Washington Boulevard, the WSX Alternative alignment would cross the Hayward fault a second time. Because the alignment would be at grade at this point, no special structures would be necessary. This segment of the alignment is shown in Figures 3-4b and 3-4c.

[3] A *traction power substation* is a facility that transforms 34.5 kilovolt AC distribution power to 1000 volts DC power, which is then transmitted to the BART third rail to power the trains.
[4] A *train control bungalow* is a prefabricated structure that houses equipment for the train control system.
[5] *Double-track guideway* refers to a BART bridge on which two tracks are located.

Washington Boulevard to End of WSX Alternative Alignment

From Washington Boulevard south to Prune Avenue, the WSX Alternative alignment would continue at grade along the former WP alignment. The existing former WP track would be replaced in this segment by BART tracks. Just north of South Grimmer Boulevard, the alignment would bear to the east and continue south, crossing over South Grimmer Boulevard, to the end of the WSX Alternative (just south of the Warm Springs Station).

At the Washington Boulevard vehicular overpass created by the city's grade separations project, the WSX Alternative alignment would pass between the easternmost abutment of the overpass and its first set of supporting piers, a distance of approximately 70 feet. The alignment would pass the site proposed for the optional Irvington Station, which is immediately south of Washington Boulevard.

In the northern portion of this segment, three optional locations are proposed for a traction power substation. Two of these locations are adjacent to the optional Irvington Station site, and one is adjacent to and south of Blacow Road just east of the WSX Alternative alignment (Figures 3-4c and 3-4d). In addition, a traction power substation and train control bungalow are proposed on the eastern side of the right-of-way immediately north of Auto Mall Parkway. A gap breaker station[6] is proposed on the eastern side of the right-of-way between Auto Mall Parkway and Prune Avenue (Figure 3-4e).

Continuing at grade, the alignment would cross under the vehicular overpass at Auto Mall Parkway. South of Auto Mall Parkway, the WSX Alternative alignment would continue at grade to just north of South Grimmer Boulevard.

Two new BART bridge structures (one for the northbound BART track, and one for the southbound track) would be constructed slightly to the east of the current location of the former WP bridge site at South Grimmer Boulevard. The bridge structures would be supported by abutments on both the north and south sides of South Grimmer Boulevard and center piers in the roadway median. Figure 3-5f shows a typical cross section of this feature. After crossing over South Grimmer Boulevard, the WSX Alternative alignment would leave the former WP right-of-way and continue at grade into the Warm Springs Station site.

South of the Warm Springs Station, the WSX Alternative alignment would proceed at grade for approximately 3,000 feet to provide tail tracks. In this stretch, the tail tracks would be located on the east side and adjacent to the UP Warm Springs yard tracks[7] that serve the New United Motors Manufacturing, Inc. (NUMMI) plant. The tail track segment would consist of extensions of the two mainline tracks and associated crossovers to facilitate the temporary storage of BART trains, train turn back, and access to the maintenance facility. The tail tracks may later be converted to two through tracks in conjunction with the proposed Silicon Valley Rapid Transit Corridor project, if it is adopted, or with any other future BART extension to the south. The alignment would end approximately 2,000 feet north of Mission Boulevard. This final segment of the alignment is shown in Figures 3-4d through 3-4f.

[6] A gap breaker station is a facility that houses gap breakers, which are used to sectionalize the third rail in case of track emergencies or wayside work, effectively maintaining power to one track while removing it from the other.
[7] *Yard track* refers to track used for train storage. The yard track is located in a train yard off the main line.

3.4.2 Warm Springs Station

The proposed Warm Springs Station would be the new terminus of BART's Fremont line. The station, trackway, ancillary buildings, service and intermodal facilities and parking areas would occupy the approximate 34-acre site designated for the Warm Springs BART Station. The site is located between Grimmer Boulevard to the north, Warm Springs Boulevard to the east, the northernmost portion of Warm Springs Court to the south, and the UP Warm Springs railroad yard to the west.

Grimmer Boulevard would provide east-west vehicular access to the station area. Direct site access would be provided from two signalized intersections along Osgood Road/Warm Springs Boulevard, which provide principal north-south access to the station area. This road is known as Osgood Road to the north of the station site; to the south of the station the road is known as Warm Springs Boulevard. The primary access to the station would be from two new signalized intersections on Warm Springs Boulevard and a two-lane road extension from Warm Springs Court (currently a cul-de-sac). Also as part of the WSX Alternative, Warm Springs Boulevard is proposed to be widened from South Grimmer Boulevard to the southern end of the station parking lot to accommodate the additional traffic lanes and turning movements. A new station access road would be constructed at this site. The existing Warm Springs Court cul-de-sac would be extended as a roadway along the western edge of the station site. The two-lane roadway would extend from Warm Springs Court approximately 200 feet to intersect the internal station roadway and auto traffic would be directed to the east, into the main parking lot circulation. Beyond this point, to the north of the intersection, restricted parking for emergency and maintenance vehicles would be provided along the east side of the station platform. A signalized intersection at Warm Springs Boulevard and Warm Springs Court is proposed to facilitate the proposed Warm Springs Court access. The conceptual site plan for the Warm Springs Station is presented in Figure 3-6a.

The proposed Warm Springs BART Station would be a two-story station as shown in Figure 3-6b. The first story would be an at-grade platform between the two tracks (center-platform) that would be approximately 700 feet long to accommodate 10-car trains. The second story would be an overhead concourse providing passenger access to the platform. An entry plaza on the east side of the station would provide patron access to the stairs, escalators, and elevators leading to the concourse. The entry pavilion would be located at the focal point of pedestrian, auto drop-off, and transit activity. Transit information and retail vendors would be available here, as at other BART stations. Station agents, schedules, local street maps, BART maps, and fare collection equipment all would be located on the overhead concourse. The station would provide facilities for station agents, BART Operations personnel, and BART Police. The station would be designed to allow construction of a future pedestrian bridge to the west, over the adjacent UP tracks.

Fare collection at the proposed Warm Springs Station would be identical to the rest of the BART system. Tickets would be purchased through vending machines located at the station concourse. Entrance to station platforms would be activated by inserting the fare ticket into an entrance gate console that opens the entrance gate.

Access to the station would be provided by facilities consistent with BART's access hierarchy,[8] and would include the following elements.

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[8] The *access hierarchy* establishes the priority of station improvements in conjunction with increasing ridership; partnering with communities; and creating environmentally friendly, efficient site plans, and station area plans.

- Pedestrian walkways, special crosswalks, and entry plazas.
- A bus intermodal center.
- Bicycle lanes linked to the city's major roadways and station bike parking facilities.
- Paratransit and private shuttle drop off.
- Auto pick up/drop off (kiss and ride).
- A taxi area with three spaces, per BART policy.
- Carpool, single-occupancy vehicle parking, and parking for the disabled.

The conceptual station site plan (Figure 3-6a) illustrates the location of the bus drop-off, auto pick-up/drop-off, and daily parking facilities, all of which would be located east of the station and platform area. A total of 2,040 parking spaces would be provided, including daily and short-term parking and parking for the disabled. The bulk of station auto parking would consist of daily parking spaces, clustered near Warm Springs Boulevard. Mid-day parking would be located on the west side of the parking area, near the station entry. Additional mid-day parking would be located south of the bus drop-off area. Short-term auto parking would include drop-off/pick-up and taxi parking facilities. Seven bus bays are provided for bus drop off and pick up, adjacent to the station entry plaza. Buses would access the station from either Warm Springs Boulevard or Warm Springs Court. As with automobile access, primary pedestrian and bicycle access would be from three new intersections on Warm Springs Boulevard.

The proposed Warm Springs Station site plan is designed with a flexible layout of interior "streets," which outline the perimeter of the various parking and intermodal areas and also provide primary pedestrian access. The use of sight lines and appropriate landscaping would mark station entries.

3.4.3 Ancillary Facilities

In addition to the WSX Alternative alignment and primary station facilities, a number of ancillary wayside facilities would be constructed as part of the WSX Alternative. These would include a maintenance shop located south of the Warm Springs Station. In addition, a small supervisor's building would be provided at the southern end of the Warm Springs Station platform to provide a reporting area for train operators and offices for BART supervisors. An emergency power diesel generator will be located in an ancillary building northeast of the station platform. As discussed above, traction power, gap breaker, and train control/communications facilities would be located at regular intervals along the alignment. Furthermore, the subway section under Fremont Central Park would require one or two ventilation structures. As final engineering and design progresses, BART will determine whether one or both structures will be required. For the purposes of analysis in this EIS, a reasonable worst-case assumption was made to analyze both structures as part of the WSX Alternative. Pumping and emergency access/egress facilities would be located at the ventilation structure(s) and at subway portals. Typically, all ancillary facilities would be fenced to prevent unauthorized access. The characteristics of these facilities are described below.

Improvements must meet BART's strategic objectives related to intermodal access and transit-oriented development, and meet BART standards for Americans with Disabilities Act of 1990 (ADA) compliance, maintainability, and system consistency.

Vehicle Maintenance and Storage Facilities

The two tail tracks would extend approximately 3,000 feet south of the Warm Springs Station and would provide storage for BART cars and trains. The tail tracks would lead past a gated maintenance yard adjacent to Warm Springs Court. The maintenance yard would be designed for servicing one or two vehicles at one time and not for BART car storage. The 3-acre maintenance yard would contain a vehicle maintenance shop building, a power and way maintenance shop, an open paved area, a storage track, and approximately 30 parking spaces for BART employees. The vehicle maintenance facilities would consist of rail-car lifts, and associated work areas and shop facilities. The perimeter of the facility would be fenced. A preliminary layout of the maintenance yard is shown in Figure 3-7a. A typical layout for the vehicle maintenance shop is shown in Figure 3-7b.

Traction Power Facilities

Various traction power facilities, such as substations and gap breaker stations, would be required along the wayside to feed electricity to the BART third rail from either the Pacific Gas and Electric Company (PG&E) power system or the BART sub-transmission system. Each of these facilities would contain electrical equipment housed in pre-fabricated enclosures approximately 12 feet in height. The enclosures would be gated and secured by a concrete-block wall or a chain-link fence. A private access road for maintenance vehicles would be provided from the nearest public road, but public access would be restricted. A typical layout for the traction power substations and gap breaker facilities is provided in Figures 3-7c and 3-7d.

Proposed traction power facilities are listed below and illustrated in Figures 3-4a through 3-4f.

- Fremont Station.
- Between the south subway portal and Paseo Padre Parkway.
- South side of Blacow Road, on the east side of the right-of-way.
- Midway between Auto Mall Parkway and South Grimmer Boulevard, on the east side of the right-of-way.
- South side of the Warm Springs Station site.
- Maintenance Facility on Warm Springs Court.

Train Control and Communications Facilities

Various types of advanced train control (ATC) and communications equipment are required both at stations and along the wayside. At the proposed Warm Springs Station, communications equipment would likely be housed in a separate ancillary building located adjacent to the station building itself. Along the wayside, communications antennas less than 30 feet in height may be necessary at the optional Irvington Station and at the tunnel portals. Wayside AATC equipment would include smaller antennas, approximately 16 feet in height, located at intervals along the trackway (approximately every 2,000 feet) and data processing equipment would be enclosed in train control bungalows. Plan and elevation views of a typical train control bungalow are shown in Figure 3-7d.

Based on radio analyses conducted during preliminary engineering, a radio communications antenna of up to 150 feet in height will be necessary at the proposed Warm Springs Station as well.

Drainage Improvements

There are a number of existing streams or drainage lines along the WSX Alternative corridor that may require improvements as part of the project. Stream and channel locations are further described in Section 4.5 (*Hydrology)*.

- Mission Creek: The creek may be temporarily rerouted or piped during construction.
- Channel M: Channel may need to be slightly modified to accommodate improvement of adjacent access road.
- Channel K-1: If the optional Irvington Station is built, the segment of the channel in the optional Irvington Station limits may be placed in a culvert.
- Channels K, I, J, and H: The existing UP culverted crossings will be investigated for structural adequacy and capacity and sufficient length for the BART trackway.
- Channel H-1: A segment of the channel paralleling the UP tracks north of Grimmer Boulevard may be replaced with culverts to accommodate the BART alignment curving to the east as it enters the Warm Springs Station.

Subway Ventilation, Pumping, and Emergency Access Facilities

The approximately 1-mile long subway under Fremont Central Park would require ventilation. Ventilation fans would be housed in one or two structures along the subway alignment, based on the results of a detailed ventilation analysis. Figures 3-4a and 3-4b show the approximate locations of the ventilation structures and associated access road under each ventilation scenario. Ventilation structure access roads would be unpaved gravel roads, approximately 12 feet in width. Each ventilation structure would contain ventilation shafts, fan rooms, and an electrical room. While most of each ventilation structure would be primarily subterranean, some of the structure would be visible on the surface. The facilities would be enclosed by a concrete-block wall around the perimeter. Figure 3-7e shows a typical layout of the single ventilation structure, and Figure 3-7f shows a typical layout of the smaller ventilation structures used in the event two structures are required.

To provide drainage for the subway, pumping units for the retained cut or “U-wall” sections would be located in the ventilation structure(s). The pumping units would discharge to the local storm drainage system. The subway tunnel would also have a sump to collect the normal amount of groundwater seepage. This subway seepage water would be collected and discharged. Several options are under consideration, including discharge to Mission Creek, Lake Elizabeth or wetland area, use for groundwater recharge or for irrigation water (see Chapter 4.5, *Hydrology*). If the pumping activities result in discharge to any surface water body via direct or indirect conveyance, BART would be required to implement water quality measures and monitoring procedures as conditions of coverage under the NPDES General Permit for Stormwater Discharges Associated with Industrial Activities. BART will ensure that the dewatering activities remain consistent with the obligations set forth in the permit. Emergency access/egress from the subway would also be incorporated into the ventilation structures(s) and would be provided at each subway portal. The access facilities would consist of pedestrian stairs and walkways from the subway structure to at-grade points of refuge.

3.4.4 Optional Irvington Station

The WSX Alternative includes an optional Irvington Station. The Irvington Station is optional because funding for the station has not been identified at this time. See Chapter 7, *Financial Considerations*. Table 3-2 provides a summary description of the optional Irvington Station.

Table 3-2. Optional Irvington Station (with WSX Alternative)

Item	Description
Irvington Station Intermodal Facilities	18 acres
	925 parking spaces --daily parking spaces --short-term parking spaces --5 bus bays --parking for the disabled
Estimated Ridership (WSX Alternative with Irvington Station)	
–2010	5,700
–2025	9,100
Capital Cost (2004$)	$757 million
(WSX Alternative w/optional Irvington Station—See Chapter 7)	
Operating Cost (2004$)	$9.49 million
(WSX Alternative w/optional Irvington Station—See Chapter 7)	

Source: San Francisco Bay Area Rapid Transit District

The Irvington Station site would occupy approximately 18 acres. The site straddles the realigned rail corridor and is bounded by Washington Boulevard on the north, residences on Bruce Drive to the east, commercial development to the south, and residences west of the former SP alignment. The Hayward fault lies along the eastern perimeter of the station site, where the ground rises to a steep bluff. The fault passes through the historic Gallegos Winery ruins, located in the northeast corner of the station site. The winery ruins would be maintained unaltered as part of the Irvington Station design. The Ford House, a historic structure located on Osgood Road within the site boundaries for the optional Irvington Station, will be retained with the intention of exploring options for adaptive reuse. A conceptual site plan for the optional Irvington Station is presented in Figure 3-8a.

As part of the city's grade separations project, Osgood Road will be widened and elevated, and Washington Boulevard will be widened and elevated to cross the realigned rail corridor. Vehicular access to the station area would be from Washington Boulevard, Fremont Boulevard, and Olive Avenue from the east and west. Driscoll Road and Osgood Road would provide the principal north-south access.

The station would be a two-story, side-platform station, with the platforms located at grade on either side of the BART tracks. The station platform would extend approximately 780 feet south of

Washington Boulevard to accommodate 10-car trains. The second story, located directly overhead, would be an overhead concourse providing passenger access to the platform. Station agents, schedules, local street maps, BART maps, and fare collection equipment all would be located on the overhead concourse. The station would provide facilities for station agents, BART Operations personnel, and BART Police. The concourse level would extend to the east and to the west, providing a safe pedestrian passageway over both Osgood Road and the relocated former SP railroad tracks. Patron access to the concourse would be provided from three ground level entry plazas by stairs, escalators, and elevators. An illustration of the station section for the optional Irvington Station is shown in Figure 3-8b.

Fare collection for the optional Irvington Station would be identical to the rest of the BART system. Tickets would be purchased through vending machines located at the station concourse. Entrance to station platforms would be activated by inserting the fare ticket into an entrance gate console that opens the entrance gate.

Station access facilities would be located on both the east and west sides of the station, connected by the pedestrian concourse. Access to the station site would be provided by facilities consistent with BART's Access Hierarchy, and would include the following elements.

- Pedestrian walkways, special crosswalks, and entry plazas.
- A bus intermodal center.
- Bicycle lanes linked to the city's major roadways and station bike parking facilities.
- Paratransit and private shuttle drop off.
- Auto pick up/drop off (kiss and ride).
- A taxi area with three spaces, per BART policy.

Vehicular access to the station and parking lot on the station's east side would be provided by one new signalized intersection on Osgood Road. The station's west side would be accessed directly from a new frontage road parallel to Washington Boulevard and connected to Roberts Avenue and Main Street. Disabled parking and five bus bays would be located west of Osgood Road, close to the station platform. Daily parking would be located both east and west of Osgood Road. Mid-day parking would be located on the west side of the station. Sound walls would be provided along the west side of the station between station facilities and adjacent residences. A total of 925 parking spaces would be provided. The pedestrian/bike paths, parking lots, taxi, and auto access areas to the east and west of the station would be connected to the station concourse by the pedestrian concourse. The use of sight lines and appropriate landscaping would mark station entries.

3.4.5 Projected Ridership

Changes in regional travel patterns that would result from the WSX Alternative were estimated based on travel forecast models using a modified regional travel model developed by the Metropolitan Transportation Commission (MTC) and the Santa Clara County Valley Transportation Authority (VTA), in conjunction with BART. Estimated ridership for the WSX Alternative is derived from the model outputs and is presented in Table 3-3.

Table 3-3. Projected Ridership

Project	New Weekday BART Trips*
2010 WSX Alternative	6,000
2010 WSX Alternative (with optional Irvington Station)	7,400
2025 WSX Alternative	8,200
2025 WSX Alternative (with optional Irvington Station)	10,800

Note:
* This table shows system-wide ridership changes (i.e., all BART stations, including those included in the WSX Alternative and the WSX Alternative with optional Irvington Station).

Source: DKS Associates 2002

3.4.6 Operating Plan

Current Operating Plan

Current BART service to Fremont consists of two routes, one serving the Daly City/Fremont corridor and the other serving the Richmond/Fremont corridor. Weekday service on the Daly City/Fremont route operates from 5 a.m. to 7 p.m. Saturday service operates from 9 a.m. to 8 p.m. Service is not provided on this route on Sundays and holidays. Weekday service on the Richmond/Fremont route operates from 4 a.m. to 12 a.m. Saturday service operates from 6 a.m. to 12 a.m. Sunday/holiday service operates from 8 a.m. to 12 a.m.[9]

Proposed Operating Plan

The proposed operating plan for the WSX Alternative consists of two routes, one operating between Warm Springs and Richmond, and the other operating between Warm Springs and the Daly City Station in San Francisco. The proposed operating plan assumes two service scenarios for each route, one beginning in the year 2010, when revenue service is inaugurated, and the other in the year 2025. The service scenarios for 2010 and 2025 are essentially the same, except for weekday headways.[10] For 2010, 15-minute weekday headways are planned, and for 2025, 12-minute weekday headways are planned. No new vehicles are required to operate the service under the 2010 service scenario. The proposed 2010/2025 operating plans for the two routes are shown in Tables 3-4 and 3-5.

Table 3-4. Warm Springs to Richmond Route Operating Plan

	Weekday	Saturday	Sunday/Holiday
Hours of Operation	4:00 a.m. to 12:00 a.m.	6:00 a.m. to 12:00 a.m.	8:00 a.m. to 12:00 a.m.
Headway (minutes)	15 (year 2010) 12 (year 2025)	20	20

Note: Trains would not exceed 10 cars. One-way travel time would be 70 minutes.
Source: San Francisco Bay Area Rapid Transit District

[9] BART stations close at 12 a.m., although trains run until 1 a.m.
[10] *Headway* refers to the scheduled time interval between the arrival of a transit vehicle at a stop and the arrival of the next transit vehicle operating in the same direction at the same stop.

Table 3-5. Warm Springs Station to Daly City Station Route Operating Plan

	Weekday	Saturday	Sunday/Holiday
Hours of Operation	5:00 a.m. to 7:00 p.m.	9:00 a.m. to 6:00 p.m.	9:00 a.m. to 6:00 p.m.
Headway (minutes)	15 (year 2010) 12 (year 2025)	20	20

Note: Trains would not exceed 10 cars. One-way travel time would be 61 minutes.
Source: San Francisco Bay Area Rapid Transit District

The same level of service is anticipated in both service scenarios for the Warm Springs to Richmond route. Trains could include additional cars in year 2025, but the service pattern and frequency would remain the same. For the Warm Springs to Daly City route, there could be a need to operate more frequent service during the peak rush hour or peak periods on weekdays in year 2025.

The estimated travel time from the Warm Springs Station to any point on the existing BART system is approximately 7 minutes longer than the current travel time from the Fremont Station. A trip from the Warm Springs Station to downtown San Francisco would take approximately 50 minutes. If the optional Irvington Station were included, one minute would be added to the travel time.

Fares for trips to and from the Warm Springs and optional Irvington stations will be established consistent with the fare structure throughout the BART system. In addition, in accordance with recently adopted BART policy, fees will be charged for reserved parking[11] at the new stations.

Train Speeds

The WSX Alternative alignment would be designed to accommodate maximum speeds of 80 miles per hour (mph). The typical operating speed is 70 mph. The 80 mph speed is only used to recover lost time following delays. Segments that would be exceptions to the 80 mph design speed include the segment between the Fremont BART Station and Stevenson Boulevard (between 50 mph and 70 mph), the Fremont Central Park subway segment (70 mph), and north of Grimmer Boulevard to Warm Springs Station (70 mph).

3.4.7 Construction Scenario

The elements of the WSX Alternative include trackway (at grade, bridge structures, retained cut, cut-and-cover subway box, retained fill), track work (ballast, ties, rails, special track work, electrified third rail), systems (electrification, communications, automatic train control), wayside facilities, and stations. The total design/construction and testing process is expected to last approximately 4 years.

In some cases, specific details of construction methods to be used are not yet available at the conceptual phase of engineering design, and will be determined during the final design of the project. However, for purposes of analyzing environmental impacts and identifying appropriate mitigation measures, reasonable worst-case assumptions as to construction methods and potential impacts are

[11] *Reserved parking* is up to 25% of a station's parking supply that is reserved for paid patron parking per BART Board of Director's policy as established in 2002.

assumed throughout this document. Construction activities for each of the following WSX Alternative segments (see Section 3.5.1 above for a description of segment locations) are described below.

- Fremont BART Station to Stevenson Boulevard.
- Stevenson Boulevard to Former SP Railroad Right-of-Way (Fremont Central Park).
- Former SP Railroad Right-of-Way to Paseo Padre Parkway.
- Paseo Padre Parkway to Washington Boulevard.
- Washington Boulevard to End of WSX Alternative Alignment.

Construction Activities

Fremont BART Station to Stevenson Boulevard

The section of the WSX Alternative alignment in the existing Fremont Station parking lot would be retained fill (an embankment with low retaining walls at the bottom of the embankment). Potential construction activities would begin with fencing the WSX Alternative alignment and the immediately adjacent construction zone and establishing alternative traffic circulation plans for BART patrons. The construction zone would be an area approximately 250 feet wide, extending south from the existing Fremont Station; it would require the temporary removal of approximately 200 existing parking spaces in the Fremont Station parking lot. Initial construction activities would include excavating and removing existing pavement, which would require construction heavy equipment such as bulldozers, dump trucks, loaders, and backhoes. Following removal of existing pavement, grading would begin to create a base for the earthen fill and the retaining wall foundations. This would require trucks, graders, backhoes, bulldozers, compactors, and similar heavy equipment. Following this site preparation work, retaining walls would be constructed and earthen fill would be brought on site and compacted. Fill material would have to be hauled to the site from adjacent subway excavations and other sources via Walnut Avenue. Retaining wall construction would require equipment such as cranes, concrete-mixer trucks, and delivery trucks; bringing in and compacting earthen fill would require construction equipment such as dump trucks, graders, water trucks, and compactors.

Once the earthen embankment is completed, the subballast, ballast,[12] rail, traction power, and train control systems would be installed on the top of the embankment. Construction equipment for this activity would include delivery trucks, dump trucks, backhoes, cranes, compactors, readymix trucks, and specialized track laying equipment. Ballast would be hauled in from off site.

Construction of the approximately 30-foot-wide opening in the embankment for bus circulation would require erecting forms to construct the cast-in-place concrete structure. Reinforced concrete walls would be constructed on pile foundations. A concrete roof slab would then be placed over the opening and joined to the top of the walls to form a box. Fill would be then placed on top of the concrete box. Construction equipment would include dump trucks, delivery trucks, pile drivers,

[12] *Ballast* consists of the coarse gravel or crushed rock laid to form a bed for the purpose of holding the track in line and elevation. The *subballast* is the layer of impervious soil material under the ballast.

backhoes, cranes, concrete trucks, and concrete pumps. An on-site concrete batch plant is not anticipated.

Construction of the Walnut Avenue overpass would require phasing of construction to maintain traffic flow on Walnut Avenue. To maintain sufficient roadway clearance under the two new BART structures, Walnut Avenue may need to be lowered approximately 1 foot. This would be accomplished in two phases, each phase closing two of the existing four lanes so that two lanes of traffic could be maintained throughout construction. Equipment required for the grade lowering would include excavators, graders, and dump trucks; paving equipment would then be required to place Walnut Avenue at finished grade. Utility relocation requiring backhoes, dump trucks, and light compaction equipment may also be necessary.

The WSX Alternative alignment would pass over Walnut Avenue on two overpass structures, each requiring center piers in the middle of the Walnut Avenue right-of-way. The piers and abutments of these overpass structures would be placed on driven piles and reinforced concrete pile caps. It is anticipated that the center piers for each structure would be cast-in-place reinforced concrete. Traffic lanes on Walnut Avenue would be temporarily narrowed from 4 lanes to 2 lanes to provide space to build the center piers. Equipment required to construct the center piers would include excavators, backhoes, trucks, dump trucks, cranes, pile drivers, concrete trucks, and concrete pumps.

Earthen embankments would be constructed on either side of the Walnut Avenue overpass. The northern embankment would be constructed as part of the embankment at the Fremont BART station. Forms would be erected at Walnut Avenue to construct a concrete abutment on which the overpass structure would rest. The southern embankment would be constructed as a component of the section south of Walnut Avenue (see following paragraphs). Constructing the embankments would require the same kind of construction equipment as that used for the Fremont BART station embankment.

After placing the abutments and center piers, cast-in-place bridge girders would be constructed over Walnut Avenue and connected to the abutments and center piers. After the girders have been constructed, ballast, trackwork, and power facilities would be laid on the new overpass structures. Equipment needed to construct the structures would include cranes, girder delivery trucks; concrete trucks, and concrete pumps would be used to construct the bridge deck. Construction equipment would access this portion of the construction site from Walnut Avenue. During construction of the bridge decks, there would be a temporary reduction in vehicle clearance height. This is normal for this kind of construction, and signs would be placed to warn motorists and truck drivers of the reduction in available clearance. Each bridge would be constructed as a unit from one end to the other.

After crossing Walnut Avenue, the WSX Alternative alignment would continue on an earthen embankment that would cross Tule Pond South immediately south of Walnut Avenue. Construction of this embankment would be similar to the scenario described for the embankment in the Fremont BART station parking lot, except that the portion that crosses Tule Pond would require filling a portion of the existing pond. Construction activities would vary based on final-design-level soils, geotechnical, and hydrological analysis. It is likely, however, that dewatering of all or a portion of Tule Pond would be required to import fill to build up the area to match the height of the Walnut Avenue overpass. The construction sequence might entail driving sheet piles (metal sheets driven into the ground to hold back the surrounding earth from the excavation zone) within the construction zones in Tule Pond and then pumping out the water in the affected portion of the pond. If the dewatering activities result in the discharge to any surface water body via direct or indirect conveyance, BART would be required to implement water quality measures and monitoring procedures as conditions of coverage under the NPDES General Permit for Stormwater Discharges Associated with Construction Activities. BART would ensure that the dewatering activities remain consistent with the obligations set forth in the permit. The equipment required to complete this task would include pile drivers, cranes, trucks, and generators to power pumps. Pumped water would be handled as specified in water quality permits that would be obtained for the WSX Alternative. Following dewatering, fill would be placed in the construction zone and excess fill would be imported to account for ground settlement. This would require compacting the fill brought to the site. Compactor, graders, and trucks would be required for this task.

Once the embankment is completed, the BART trackway and systems would be installed as previously described for the Fremont BART station segment. Construction equipment would access this portion of the construction zone from Walnut Avenue and from Stevenson Boulevard.

The earthen embankment would slope downward from the Walnut Avenue overpass, becoming a retained-cut section that transitions from the embankment to the subway segment that would begin immediately north of Stevenson Boulevard. (Depending on the contractor's construction sequence, the retained cut might be constructed first to provide fill materials for the embankment sections of the alignment, and the area between Walnut Avenue and Stevenson Boulevard outside the immediate construction zone might be used to stockpile excavated materials for later use in embankments in other portions of the alignment and as a storage area for other materials.)

The retained-cut section would consist of an open trench with concrete retaining walls and a concrete base slab, which would serve as the floor of the subway structure upon which the ties and rail would be placed. The retained-cut section would be constructed by excavating the site in a manner that leaves laid-back side slopes. The excavated material could be used for construction of the embankments or removed to pre-approved disposal locations. A horizontal base slab would be poured and then vertical forms would be erected on top of the base slab for the reinforced concrete retaining walls. Depending on the hydrology of the area, dewatering of the retained-cut section, similar to that of the Tule Pond section, may be required. Once the side walls have been poured and the concrete cured, forms would be removed and backfill would be placed behind the walls. Equipment required to build the retained-cut section would include excavators, haul trucks, front loaders, backhoes, cranes, concrete-placing equipment, and compactors. Construction vehicles would access the site from Walnut Avenue and Stevenson Boulevard. A potential contractor laydown area is located adjacent to the construction zone immediately north of Stevenson Boulevard (see Figure 3-4a).

Stevenson Boulevard to Former SP Railroad Right-of-Way (Fremont Central Park)

The WSX Alternative alignment would enter a subway immediately north of Stevenson Boulevard. The subway would be constructed using the cut-and-cover method. Wherever possible, the scenario for the cut-and-cover subway would be an open excavation with laid-back side slopes. However, due to the presence of groundwater resources, installation of a relatively watertight excavation support system is anticipated for much of the northern and possibly central portions of the subway. Such a system may consist of cement deep soil mixing walls with a jet grouted base slab installed in advance of the excavation, to provide stability and minimize groundwater intrusion. When the excavation is complete, construction of the base slab would commence, followed by construction of the subway walls and roof. Walls and roof may be constructed as separate operations or together as one operation at the contractor's election. Once the subway box is completed, trackwork would be installed, followed by installation of train systems. The area around the subway box would be backfilled and the site restored to the previous grade.

Because the subway construction would use open excavation, Stevenson Boulevard would be affected. To minimize traffic disruption on Stevenson Boulevard, traffic lanes would be temporarily diverted to Fremont Central Park property, south of the existing alignment of Stevenson Boulevard. Once construction is completed, Stevenson Boulevard would be restored to its current alignment. Construction equipment for the cut-and-cover subway segment would reach the site from Stevenson Boulevard and would be the same as for the retained-cut section. Earthmoving equipment would be needed to break up and remove Stevenson Boulevard, and paving equipment would be required for the Stevenson Boulevard detour and reconstruction. Existing utilities in Stevenson Boulevard would have to be relocated or temporarily supported in place during construction. Temporary signs warning drivers of the upcoming detour would be installed and remain in place for the duration of the detour.

The WSX Alternative alignment through Fremont Central Park would be a continuation of the cut-and-cover subway structure and would be constructed as described above. The segment north of Lake Elizabeth within the park would include one subway ventilation structure (there is an option for two). The ventilation structure would be built as a component of the cut-and-cover subway structure and would not require separate excavation.

The cut-and-cover subway structure, including contractor laydown areas for equipment and material storage and staging, would require temporary relocation of park facilities. Because the construction zone would divide recreational areas such as ball fields and a dog-run facility, a relocated ball field parking area and a temporary dog-run facility would be provided. A temporary pedestrian bridge would be constructed over the cut-and-cover subway construction just north of Lake Elizabeth to maintain pedestrian trails (see Figure 3-4a). The temporary bridge would consist of metal plates with concrete side barriers and fencing crossing over the excavation. Construction fencing would be installed to separate the park from the construction zone. Construction vehicles would access the site from Stevenson Boulevard.

The portion of the WSX Alternative alignment under Lake Elizabeth would be constructed using the cut-and-cover method. Site preparation work would begin with construction of a temporary cofferdam, likely of earthen fill, placed at the mouth of the eastern cove of the lake (see Figure 3-4b). To provide a continuous pedestrian walkway, a pedestrian pathway detour would be placed on top of the cofferdam. When the cofferdam is in place, the area east of the cofferdam would be dewatered by pumping water into the western side of the lake. When dewatering is completed, the alignment would be excavated with laid back slopes, which means that the walls of the excavation would be at an approximately 2:1 horizontal to vertical ratio to stabilize the soil and avoid cave ins while the subway structure is being constructed. When subway construction is completed, the lake bottom would be backfilled over the subway structure; water would be pumped back into the lake's eastern cove from the western side of the lake; and the cofferdam would be removed to restore the lake over the alignment.

Equipment required to construct the Lake Elizabeth portion of the subway would include that identified for other cut-and-cover sections. In addition, excavators with dredging (clamshell) buckets and dewatering pumps would be used. Construction access to the site would be from Stevenson Boulevard. The construction laydown sites located in the park would be used to construct the Lake Elizabeth portion of the alignment (see Figure 3-4b).

Cut-and-cover subway construction methods would also be used in the portion of the park south of Lake Elizabeth. Facilities constructed in this portion of the WSX Alternative alignment may include an additional ventilation structure. Because the area south of the lake contains dense, mature riparian forest vegetation and a segment of the old Mission Creek bed crosses the alignment, the construction zone would be as narrow as possible. It is likely that the contractor would drive sheet piles and limit construction vehicle access to only one side of the excavation. Equipment needed to construct this portion of the alignment would be the same as that needed for cut-and-cover construction in the area between Walnut Avenue and Stevenson Boulevard, with the addition of pile drivers to drive sheet piles. Access would likely be from the railroad right-of-way to the south. Following subway construction, all park, lake and existing facilities and amenities would be restored.

Former SP Railroad Right-of-Way to Paseo Padre Parkway

The WSX Alternative alignment would continue in a subway structure crossing under the former SP tracks. The cut-and-cover technique would be used to construct this segment. The cut-and-cover subway structure would be constructed up to the former SP tracks, which will have been moved to the east to an interim alignment by the city's grade separations project. BART would construct its subway alignment to a point just west of the interim SP alignment, and would then relocate the interim SP alignment to its final location over the WSX Alternative subway. BART would complete construction of the WSX Alternative alignment without further impacts on the relocated SP alignment.

After the SP tracks have been relocated westward to the final alignment, the cut-and-cover excavation would continue to the south to a subway portal located east of the final SP alignment. Cut-and-cover construction techniques in this area would be the same as those described for the Walnut Avenue to Stevenson Boulevard segment of the alignment.

Where the WSX Alternative alignment exits the subway portal, a retained-cut section would be excavated, transitioning to an at-grade alignment approximately 1,200 feet north of Paseo Padre Parkway. The at-grade alignment would rise from a retained-cut alignment near the subway portal to a maximum of 8 to 10 feet above grade at Paseo Padre Parkway. This would require import of fill material and some excavation of existing material. Prior to placement of fill just north of Paseo Padre Parkway, the existing Irvington Pump Station structures would be removed as part of a separate project. Construction of the retained-cut subway transition and at-grade sections would be similar to that described for the initial segment from south of Tule Pond.

A number of ancillary structures would be constructed in the segment between the former SP tracks and Paseo Padre Parkway. These facilities, shown in Figure 3-4b, would consist of the subway portal and emergency access stairways, which would be built as part of the below-grade facilities, and traction power and train control facilities, which would be built along the alignment after it comes to grade. Construction equipment used in this segment would be the same as that used for the Fremont BART Station to Stevenson Boulevard segment. A temporary contractor laydown area could be located in the open field between the two railroad alignments (see Figure 3-4b). Access would be from Paseo Padre Parkway. A temporary rail welding facility would be set up in this area to weld rail sections into 800-foot strings ready for installation in the section between Paseo Padre and the Fremont BART Station. Rail to be welded would be trucked in 39-foot lengths or shipped in by rail using the old WP tracks (no longer in use). The rail would be stored on site, initially in stacks of short sections, then later in stacks of 800-foot strings. This location would also be used for short-term storage of other construction materials.

Paseo Padre Parkway to Washington Boulevard

A vehicular underpass will be constructed at Paseo Padre Parkway as part of the city's grade separations project. At this point the WSX Alternative alignment would move onto an overpass bridge structure. It may be possible to coordinate the construction of the BART overpass with Fremont's underpass construction. A coordinated construction approach between the two projects would most likely be less disruptive to the public than constructing the BART overpass after the city's grade separations project has been completed. The overpass would be a single concrete structure supporting both the northbound and southbound BART tracks, with a center pier in the median of the parkway. A construction process similar to that described for the Walnut Avenue overpass would be used to build the BART overpass at Paseo Padre Parkway, once the roadway underpass was completed. Construction equipment would access the construction site from Paseo Padre Parkway and would use the potential temporary construction laydown area north of the parkway described above.

Portions of the WSX Alternative alignment south of Paseo Padre Parkway to Washington Boulevard would be below existing ground level, requiring excavation. Other portions of the alignment would be slightly above existing ground level, requiring placement of imported fill. Construction activities in this segment would include grading and soil compaction to create the level subbase for the tracks. It may be possible to balance soil cut and fill demands in this segment to reduce or avoid the need for dump trucks to transport soil from off site. Scrapers would likely be used to move dirt in this section. For a portion of the former WP right-of-way, the existing ballast would be removed along with the top 12 to 24 inches of underlying material.

After the subbase has been prepared, subgrade drainage, ballast, trackwork, and systems facilities would be installed. Equipment required to construct this segment of the alignment would include graders, compactors, dump trucks, concrete trucks, scrapers, cranes, and specialized track-laying equipment. Ballast would be hauled in by truck from off site.

Washington Boulevard to End of WSX Alternative Alignment

The WSX Alternative alignment would continue at grade under the Washington Boulevard roadway overpass, which will be completed as part of the city's grade separations project prior to BART construction. At-grade construction for this segment would be the same as that described for the at-grade portions of the Paseo Padre Parkway to Washington Boulevard segment. All along the former WP right-of-way, the existing ballast would be removed along with the top 12 to 24 inches of underlying material. New subgrade material and ballast would be imported and compacted. The current track footprint would be widened to two tracks, or 35 to 40 feet. Traction power and train control facilities would be constructed in the area south of Washington Boulevard and adjacent to Auto Mall Parkway. The construction techniques for these facilities would be similar to that for the same facilities in the former SP right-of-way to Paseo Padre Parkway segment.

Crossing the ACFCD channel, which runs parallel to the alignment north of South Grimmer Boulevard, would require construction of a new box culvert. This could require altering the existing culvert and streambed to install the new culvert. Construction activities may include excavation and removal of existing drainage structures under the railroad tracks, grading of the existing channel, and installation of precast box culverts underneath the WSX Alternative alignment. Equipment required for this task would include excavators such as backhoes and graders, dump trucks, cranes, and concrete-mixing and delivery vehicles.

Construction of the segment between Auto Mall Parkway and South Grimmer Boulevard would require import of fill material to elevate the tracks beginning approximately 1,500 feet north of Grimmer Boulevard to match the grade needed for a BART overpass at Grimmer Boulevard. Because of limitations on right-of-way, a low retaining wall would be constructed along the east side of the alignment.

Two BART bridge structures would be constructed over Grimmer Boulevard. The structures would be constructed using the same method as described for the Walnut Avenue overpass in the Fremont BART Station to Stevenson Boulevard segment, although no lowering of the roadway would be required at Grimmer Boulevard. Center piers for each of the two structures would be placed in the median of Grimmer Boulevard. Construction access for this segment would be from Washington Boulevard, the dead-end streets of Blacow Road and Prune Avenue, and Osgood Road/Warm Springs Boulevard (see Figure 3-4e).

Retained-fill construction would be required at the southern abutment of the Grimmer Boulevard overpass. The alignment would come to existing grade near the southern end of the BART Warm Springs Station platform. At-grade construction, with minimal need for imported fill, would continue south of the BART Warm Springs Station platform to the end of the tail track.

Warm Springs Station Site

Development of the BART Warm Springs Station would require clearing the site of existing development and vegetation; grading and leveling to prepare the ground for paving of parking areas and roadway entrances; and typical building construction activities for the station and platform, including pouring foundations, framing, and finish construction work. Equipment needed to construct the station would include backhoes, graders, cranes, concrete-placing and paving machinery, and dump trucks. Construction access would be from South Grimmer Boulevard and Warm Springs Boulevard.

Train control and traction power facilities would be installed adjacent to the Warm Springs Station. The construction techniques for these facilities would be similar to that for the same facilities in the former SP to Paseo Padre alignment segment. The station site would also be used as storage and a contractor laydown site during construction.

The maintenance facility south of the BART Warm Springs Station would require the installation of ballast, trackway, and power facilities, in addition to the erection of maintenance buildings using standard building construction techniques. Construction access would be from Warm Springs Court.

A temporary rail welding facility may be constructed in the Warm Springs station site for welding, grinding, and cutting of the rails. The rail welding facility would be approximately 1,000 feet long and 300 feet wide. It would be an open air facility with room to maneuver trucks and forklifts around the rail welding machine. The purpose of the facility is to weld 80-foot sections of steel rail into 800-foot long sections for the WSX Alternative. The welding machine itself would be approximately 20 feet by 50 feet. The 39-foot rail sections could be shipped by freight rail on the UP alignment or, in a worst-case situation, by truck via Warm Springs Court and stored at this location. The finished 800-foot sections would be placed on the alignment of the WSX Alternative.

Construction of the new station access roadway would involve removing the existing curb at Warm Springs Court and grading 200 feet for the new roadway. The new roadway from Warm Springs

Court would be paved with reinforced concrete to ensure durability and reduce wear and tear from buses. Construction would also involve pouring and forming new curbs for the roadway.

Optional Irvington Station

Because funding has not yet been identified for the optional Irvington Station, construction would likely occur later than the construction of the WSX Alternative. Should funding for the optional station become available, it is possible that the station could be constructed concurrently with the WSX Alternative. Construction methods for the optional Irvington Station would be similar to those described above for the BART Warm Springs Station. Construction access would be from Osgood Road for construction on the east side of the BART alignment and from the new frontage road parallel to Washington Boulevard for the west side of the station. (Construction access would not be available from Washington Boulevard because of its future elevation as an overpass.)

Should construction of the optional Irvington Station occur after commencement of BART revenue service to Warm Springs, construction methods would be highly constrained and controlled in and around the BART trackway. Contractor work plans outlining specific personnel, equipment, materials, and timeframes required to conduct discrete tasks would be submitted to BART Operations in advance for coordination and approval. BART Operations staff would monitor all such work to ensure a safe working and operating environment. It is likely that train movements would be single-tracked through the construction zone on a temporary basis so as to increase available work areas and safety buffer zones. The side platform configuration of this station as well as the location of track crossovers to the north and south would both serve to ease the logistical challenges of a phased construction scenario.

Coordination with Utility Providers

BART is currently working with utility providers to identify the location of utilities in the WSX Alternative corridor and coordinate any future project-related activities to minimize service disruption. BART has contacted and is coordinating with public utility providers such as the Alameda County Water District, the San Francisco Public Utilities Commission, the Alameda County Public Works Agency, and sanitation districts. In addition, BART is coordinating with telecommunications utility providers and electrical service providers. BART is also working closely with the City of Fremont to ensure that utilities that could be affected by both the city's grade separations project and the WSX Alternative are dealt with in a coordinated manner.

Coordination with Union Pacific Railroad

BART will coordinate with UP, particularly with respect to the subway crossing of the former SP track and the general restrictions that may apply to the BART contractor working alongside the operating UP track. BART and the City of Fremont are actively coordinating the design of the former SP track alignment to minimize disruption to the operating UP line.

3.5 Alternatives Considered but Dismissed from Further Analysis

3.5.1 Introduction

As stated in the Notice of Intent to prepare an EIS for the Warm Springs project (69 Fed. Reg. 18150), published by FTA on April 6, 2004:

> FTA does not intend to consider in detail alternatives that were evaluated during the CEQA process and found not to satisfactorily meet the project's purpose and need. At the same time, FTA intends that this EIS not be merely a ratification of decisions already made. FTA therefore seeks comments during scoping, on the alternatives to be considered in the EIS, in light of the analyses and coordination activities performed by BART and publicized prior to FTA's involvement.

The scoping comments received by FTA and BART did not raise new alternatives or issues regarding alternatives other than those addressed during the CEQA process (with one exception, discussed below). Accordingly, Section 3.6.2 describes alternatives considered in the 1992 EIR, and Section 3.6.3 describes those considered in the 2003 SEIR, with a brief discussion of the previous analyses and the reasons why these alternatives were eliminated from detailed study in this EIS. The detailed analyses of alternatives considered in the 1992 EIR and 2003 SEIR are incorporated herein by reference as provided by the CEQ NEPA regulations, 40 CFR. section 1502.21. The 1992 EIR and 2003 SEIR are available for review upon request at BART's offices at 300 Lakeshore Drive, 21st floor, Oakland, CA 94612.

One new alternative was raised during the scoping process for this EIS: an "interim busway" that would be constructed along the existing railroad alignment, which would be replaced by the WSX Alternative at a later date. That alternative is described in Section 3.6.4, with a brief discussion of the reasons why it was eliminated from more detailed study in this EIS.

3.5.2 Alternatives Considered in the 1992 EIR

Since the 1992 EIR was certified, there have been extensive changes in the project setting and project circumstances. These changes include the implementation of grade-separation projects by the City of Fremont. As a result of these changes, the following build alternatives and design options are not feasible or could result in more significant environmental impacts than the WSX Alternative. Therefore, they were not carried forward for analysis in this EIS.

1992 Alternative 2: No Project, Programmed Transportation Improvements

1992 Alternative 2 did not include a BART Warm Springs extension, but did include highway and transit improvements that were programmed in the 1990 State Transportation Improvement Program (STIP), as well as those funded by the Alameda County Measure B sales tax revenues. Transit improvements would have included the Dublin, West Pittsburg, and Colma BART extensions, as well as implementation of AC Transit's Comprehensive Service Plan (CSP).

Some of the highway improvements included modifications to the interchanges at Dixon Landing Road and I-880/SR 262 in Fremont, and at I-880 and Durham Road (now Auto Mall Parkway). A road widening on I-880 from Niles Road to SR 92 was also programmed.

The AC Transit CSP assumed that a timed-transfer system would be implemented throughout the Fremont/Newark service area. A timed-transfer system involves the collection and dispersion of several bus routes from a hub called at a transit center. All buses would arrive at the transit center at the same time to facilitate easy transferring for passengers. In the CSP, two new timed-transfer transit centers were assumed within this service area, one at the site of the proposed Irvington BART Station, and one in Newark. The CSP also assumed a new route that would have operated between the proposed Irvington Transit Center and the South Main Transit Center in Milpitas, to facilitate a connection between AC Transit and VTA services.

The proposed BART extensions described under this alternative have all been completed. However, because of funding constraints, AC Transit's CSP was never implemented in this area. In 1999, AC Transit implemented the Fremont–Newark Transportation Development Plan, which revised existing bus routes and added new services in areas that were not previously served. The level of bus service in this plan was not as extensive as that assumed in the CSP, which included a total of 19 routes. An extensive timed transfer network at the BART stations, and an express route from Warm Springs to the Fremont BART Station via I-680 were also assumed. A transit center was also proposed at the Irvington Station site. Some of the highway improvements programmed in the 1990 STIP have been completed.

This alternative was dismissed from further consideration for the following reasons.

- This alternative would not satisfy the project purpose and need to alleviate traffic congestion, enhance transit accessibility, improve air quality and energy efficiency, and promote transit-oriented "smart growth" land uses.
- This alternative does not support the anticipated population growth in the *Fremont General Plan*.
- The Alameda County Measure B sales tax, which was approved by voters in 1986, provided funding for the 1992 Proposed Project. Because 1992 Alternative 2 did not include the 1992 Proposed Project, it does not satisfy the mandate of Measure B.

1992 Alternative 3: Transportation Systems Management

The 1992 Transportation Systems Management (TSM) Alternative included the benefits of various existing or programmed transit and highway improvements, as in 1992 Alternative 2, and also included the BART extension to the San Francisco International Airport and the Tasman Corridor Light Rail Transit (LRT) system from east San Jose to Sunnyvale or Mountain View. Additional transit improvements would have included changes to AC Transit's services, as defined previously, in the CSP. In addition, changes to the Santa Clara County Transit District's (now Santa Clara Valley Transportation Authority or VTA) bus-route network to complement the BART extension were proposed. Highway improvements in the study area included in this alternative were high occupancy vehicle (HOV) lanes on I-880, from SR 238 south to the Montague Expressway.

BART has completed construction on the four-station extension from Colma to the San Francisco International Airport in San Mateo County, with a terminal station in Millbrae, California. VTA's Tasman Corridor LRT system was extended to provide service to Mountain View in 1999.

Additional highway improvements in the project area included in this alternative were HOV lanes on I-880 from SR 238 south to the Montague Expressway, which have not been completed. As described above under 1992 Alternative 2, the programmed highway and transit improvements have already been completed, with the exception of AC Transit's CSP.

This alternative was dismissed from further consideration for the following reasons.

- This alternative would not satisfy the project purpose and need to alleviate traffic congestion, enhance transit accessibility, improve air quality and energy efficiency, and promote transit-oriented "smart growth" land uses.
- The alternative does not support the anticipated population growth in the *Fremont General Plan*.
- The Alameda County Measure B sales tax, which was approved by voters in 1986, provided funding for the 1992 Proposed Project. Because 1992 Alternative 3 did not include the 1992 Proposed Project, this alternative does not satisfy the mandate of Measure B.

1992 Alternative 4: 5.4-Mile Extension with Two Stations and Relocated Railroad

Alternative 4 consisted of a 5.4-mile, two-station extension to Warm Springs, with stations at Warm Springs and Irvington. Leaving the Fremont BART Station proceeding southeasterly on a raised embankment over Walnut Avenue, the alignment would have continued on an embankment through Tule Pond. Midway between Walnut Avenue and Stevenson Boulevard, the alignment would have transitioned to an aerial structure over Stevenson Boulevard, through Fremont Central Park, and over the east arm of Lake Elizabeth. The aerial alignment would have crossed to the east side of both the former SP and WP tracks, which were to be relocated. As proposed, 1992 Alternative 4 traveled under Washington Boulevard and remained below grade until reaching the proposed Irvington Station. It then continued at grade until it rose on an embankment or aerial structure to cross over the Grimmer Boulevard underpass to arrive at the proposed elevated Warm Springs Station. From the Warm Springs Station, tailtracks would have been extended at grade for approximately 3,000 feet. The tailtrack area would have contained a rail-car wash facility and a small emergency maintenance and inspection pit. The Central Park design options and vertical alignment option at Paseo Padre Parkway described below were applied to this alternative.

The Irvington Station in this alternative was proposed as a below grade, center-platform station with an at-grade concourse on the east side of the right-of-way. The Warm Springs Station was proposed to accommodate more parking (approximately 2,300 spaces total) than is currently proposed in the WSX Alternative.

Alternative 4 required the UP tracks to be relocated slightly westward. Due to the track relocations that are part of the City of Fremont's grade separations project, this action would not be feasible.

This alternative was dismissed from further consideration for the following reasons.

- The restricted railroad access to customers on the eastern side of the alignment makes this alternative infeasible.
- The visual impacts of the alternative would be greater than those of the WSX Alternative.

1992 Adopted Project (Alternative 5: 5.4-Mile Extension with Two Stations)

Alternative 5, Design Option 2A, as identified in the 1992 EIR was the project adopted by the BART Board of Directors in 1992 (the 1992 Adopted Project). As proposed, the alignment of the 1992 Adopted Project (identified as Alternative 5, Design Option 2A, in the 1992 EIR) would have begun at the existing elevated Fremont BART Station and extended southeasterly. The alignment would have followed an aerial alignment through Fremont Central Park that skirted the eastern edge of Lake Elizabeth. The alignment would have continued on an aerial structure over the former Southern Pacific (SP) railroad track, curved south between the former SP railroad track and the former Western Pacific (WP) railroad track, and crossed over Paseo Padre Parkway. The alignment would have then transitioned to a below-grade crossing under Washington Boulevard to arrive at the Irvington Station. From the Irvington Station, the alignment would have risen to grade and remained at grade over the Blacow Road underpass and under the Auto Mall Parkway overpass. From Auto Mall Parkway, the alignment would have risen to an embankment and an aerial structure to cross the former WP railroad track at Grimmer Boulevard and continued above grade to the elevated Warm Springs Station. The alignment would have then transitioned to grade and would have had approximately 3,000 feet of tail track south of the Warm Springs Station.

When the WSX EIR was certified in 1992, Fremont did not support the recommended project alternative (Alternative 5, Design Option 2A, in the 1992 EIR), which included an aerial alignment over Lake Elizabeth in Fremont Central Park. Fremont did support an alternative that included a subway alignment under Lake Elizabeth (Design Option 2S in the 1992 EIR). Sufficient funds were not available to construct either alternative.

The principal modification of the 1992 Adopted Project that is reflected in the 2003 SEIR and in this EIS is the change from an aerial structure over Fremont Central Park and Lake Elizabeth to a subway alignment. In addition, as compared to the 1992 Adopted Project, the WSX Alternative is at grade for a much greater portion of the alignment. The aerial alignment was dismissed from further consideration in this EIS based on its permanent adverse impacts to visual and park resources and the lack of support from the local community and the City of Fremont.

The 1992 Adopted Project also included a subway design option (identified as Design Option 2S in the 1992 EIR) that would have substituted a subway alignment under Fremont Central Park for the aerial alignment proposed as Design Option 2A. The BART alignment under this design option would have emerged from the subway structure, crossed the former SP track, and continued between the former SP track and the former WP track. This subway alignment was necessary in the 1992 Adopted Project to accommodate the two active freight rail lines. The WSX Alternative analyzed in this EIS includes a different subway alignment that is very similar to the alignment of Design Option 1 in the 1992 EIR, which has become feasible as a result of the city's grade separations project.

1992 Alternative 6: 7.8-Mile Extension with Two Stations (No Irvington Station)

1992 Alternative 6 was described as a 7.8-mile extension with no station in the Irvington District. From the Fremont BART Station south to Washington Boulevard, the alignment would have been the same as described in 1992 Alternative 4. However, a vertical alignment variation or design option was introduced at Washington Boulevard. Since there would have been no Irvington Station, the design option would have provided an aerial crossing over Washington Boulevard as an alternative to the sub-grade crossing. In either case, the former SP and WP tracks would have remained at grade at Washington Boulevard. From Washington Boulevard to the Warm Springs Station, the alignment would have been the same as described in the above discussion of 1992 Alternative 4. Leaving the Warm Springs Station site, the alignment would have proceeded southward at grade on new tracks placed just east of the UP tracks. The alignment would have crossed over grade separations at Mission Boulevard and Warren Avenue. In addition to the Warm Springs Station, a station was proposed at South Warm Springs. The South Warm Springs Station would have been located approximately 2,000 feet north of Kato Road between Warm Springs Boulevard between the former SP and WP tracks, on a 42-acre site. South of this station, BART tailtracks would have extended at grade for approximately 3,000 feet crossing over a depressed Kato Road. Vehicle maintenance facilities would have been located in this vicinity.

This alternative was dismissed from further consideration because it is longer than the WSX Alternative (7.8 miles vs. 5.4 miles) and would result in greater environmental impacts.

1992 Alternative 7: 7.8-Mile Extension with Two Stations (No Irvington Station)

1992 Alternative 7 was described as a 7.8-mile, two-station extension, mostly on an aerial structure, with no Irvington Station, and running east of the UP tracks outside of railroad rights-of-way, from south of Washington Boulevard to the end of the line. From the Fremont BART Station, the alignment would have been the same as described in 1992 Alternative 4. Beginning at Paseo Padre Parkway, the alignment would have continued on an aerial structure crossing Washington Boulevard. After crossing Washington Boulevard, it would have transitioned over to the east of the UP tracks and outside of the railroad rights-of way. The alignment would then have lowered to grade, passed under the existing overpass at Durham Road, and risen to an aerial structure crossing over Grimmer Boulevard, and continued to an elevated Warm Springs Station. From Warm Springs Station to South Warm Springs Station, the Alternative 7 alignment was proposed to be the same as described under 1992 Alternative 6.

With Alternative 7, significant visual impacts would have resulted due to the aerial BART structure over Washington Boulevard and through the Irvington district. The unmitigable visual impacts of the structure and of the associated sound walls in the vicinity of Washington Boulevard and the surrounding Irvington redevelopment area also contributed to determining that Alternative 7 was infeasible. Additionally, the aerial structure over Washington Boulevard could have resulted in the increased risk of structural damage or collapse during strong seismic activity.

For the WSX Alternative, the Washington Boulevard overpass that is included in the city's grade separations project may not preclude an aerial BART structure at this location. However, such a structure would be unwarranted with the availability of railroad right-of-way for the BART alignment that occurs as a result of the grade separation at Washington Boulevard. Since Washington Boulevard will be reconfigured as an overpass, an aerial crossing would be neither feasible nor necessary.

This alternative was dismissed from further consideration because it would be 2.4 miles longer than the WSX Alternative (7.8 miles vs. 5.4 miles) and would result in greater environmental impacts.

1992 Alternative 8: 7.8-Mile Extension along Osgood Road and Warm Springs Boulevard, with Two Stations (No Irvington Station)

1992 Alternative 8 was described as a 7.8-mile, two-station extension of BART south from the Fremont Station. The alignment of this alternative was similar to that described under Alternative 7 through Central Park and Lake Elizabeth, and past Paseo Padre Parkway. From Paseo Padre Parkway, the alignment would have stayed on an aerial structure, crossed over Washington Boulevard and the UP tracks, and continued on an aerial structure to the center of Osgood Road. On the aerial structure, the alignment would have crossed over Durham Road (now Auto Mall Parkway) and Grimmer Boulevard to the Warm Springs Station, which would have been located west of Warm Springs Boulevard. From the Warm Springs Station, the alignment would have continued on an aerial structure (in the center of Warm Springs Boulevard) over Mission Boulevard and Warren Avenue and turned to the west just north of Whitney Place, terminating at an elevated station south of Whitney Place, between Warm Springs Boulevard and the UP tracks.

1992 Alternative 8 would have continued on past the proposed Warm Springs Station to a South Warm Springs Station. A total of 2,100 parking spaces at Warm Springs were proposed under this alternative. The South Warm Springs Station site proposed was the same as that proposed under 1992 Alternative 7, except for the omission of one parcel at the intersection of Scott Creek/Kato Road and Warm Springs Boulevard, and the addition of parcels northeast of the site. A total of 2,400 parking spaces were proposed at this station.

This alternative was dismissed from further consideration for the following reasons.

- This alternative would require that the Pacific Gas & Electric Company (PG&E) transmission towers along Osgood Road and Warm Springs Boulevard be raised to provide clearance over the BART structure. In addition, the aerial structure associated with this alternative would result in unavoidable adverse visual impacts south of Washington Boulevard along Osgood Road and Warm Springs Boulevard. The city's grade separations project has enabled an at-grade alignment for BART to be considered as part of the WSX Alternative, which would substantially reduce these significant visual impacts.
- This alternative would be 2.4 miles longer than the WSX Alternative (7.8 miles vs. 5.4 miles) and would result in greater environmental impacts.

1992 Alternative 9: 5.4-Mile Extension with One Station (Warm Springs)

1992 Alternative 9 was described as a 5.4-mile, one-station extension along the same route as described under 1992 Alternative 4. The single proposed station was at Warm Springs, where a total of 2,300 parking spaces would have been provided. Since this alternative included no Irvington Station, the aerial crossing design option at Washington Boulevard was included. The Central Park design options and the vertical alignment design option described below also applied to this alternative.

1992 Alternative 9 included a vertical design option with an aerial crossing over Washington Boulevard. Washington Boulevard will now be reconfigured as a vehicular overpass as part of the city's grade separations project. The proposed at-grade BART alignment would pass beneath Washington Boulevard, and through the site proposed for the optional Irvington Station. Since

Washington Boulevard will be reconfigured as an overpass, an aerial crossing would be neither feasible nor necessary.

This alternative was dismissed from further consideration because it does not include an Irvington Station option and is inconsistent with transit-oriented development. Lack of an Irvington Station option is inconsistent with BART's Extension Staging Policy, which was in effect in 1992, during early project planning. BART's current System Expansion Policy, adopted in 1999, effectively supercedes the Extension Staging Policy. The new policy includes goals to demonstrate a commitment to transit-supportive growth and development and to develop projects in partnership with communities that will be served. The Irvington Concept Plan being developed by the City of Fremont incorporates the principles of transit-oriented development. Such transit-oriented development would not be implementable with this alternative.

1992 Alternative 10: 7.8-Mile Extension with One Station (South Warm Springs)

1992 Alternative 10 was described as a 7.8-mile, one-station extension along the same route as described under 1992 Alternative 8, with a single proposed station to be located in South Warm Springs near Scott Creek/Kato Road. The vertical alignment for this alternative was essentially the same as that of 1992 Alternative 9, with the same tailtrack and ancillary facilities. Like 1992 Alternative 6, a vertical design option applied at Washington Boulevard. The Central Park design options, the vertical alignment design options at Paseo Padre Parkway and Warren Avenue, and the UP relocation option south of Warren Avenue all applied to this alternative. Total parking supply under this alternative would have been approximately 3,400 spaces.

This alternative was dismissed from further consideration because it would be 2.4 miles longer than the WSX Alternative (7.8 miles vs. 5.4 miles) and would result in greater environmental impacts.

1992 Alternative 11: 7.8-Mile Extension with Two Stations (No Warm Springs Station)

1992 Alternative 11 was described as a 7.8-mile, two-station extension with no Warm Springs Station. From the existing Fremont BART Station south to the Alameda County line, this alternative would have been the same as in 1992 Alternative 10, except for the deletion of the Warm Springs Station. The aerial crossing of the UP tracks and Grimmer Boulevard would have been the same. Other station locations and alignment characteristics would also have been the same as previously described. The Central Park design options, vertical alignment design options at Paseo Padre Parkway and Warren Avenue, and UP relocation option south of Warren Avenue also applied to this alternative.

This alternative was dismissed from further consideration because it would be 2.4 miles longer than the WSX Alternative (7.8 miles vs. 5.4 miles) and would result in greater environmental impacts.

1992 Central Park Design Options

In the Fremont Central Park area, several variations in the vertical and horizontal alignment of the BART extension were considered in the 1992 EIR. These design options were as follows.

1992 Design Option 1 (Subway)

Under this design option, the vertical alignment would have been under Stevenson Boulevard, Lake Elizabeth, and Paseo Padre Parkway. This alignment is similar to that of the WSX Alternative; the key difference is that it would have crossed under Paseo Padre Parkway, an additional 0.5 mile of subway. This design option would have been applicable to 1992 Alternatives 4 through 11. Although there is a slight difference in the alignment, 1992 Design Option 1 is very similar to the WSX Alternative. The changes in the alignment that occur due to the city's grade separations project now make a subway alignment under Lake Elizabeth feasible.

1992 Design Option 2A (Aerial)

Under this design option, the BART alignment would have been moved east around Lake Elizabeth. North of Central Park, the alignment would have been on an embankment over Walnut Avenue, and on an aerial structure over Stevenson Boulevard. This design option was routed over a slightly more easterly section of Central Park, and would have avoided Lake Elizabeth and continued south, crossing over Paseo Padre Parkway. This design option would have been applicable to 1992 Alternatives 4 through 11. As noted previously, this design option, combined with 1992 Alternative 5, represented the 1992 Adopted Project.

1992 Design Option 2A (aerial) was incorporated in the 1992 Adopted Project. This option is considered to be infeasible because of the significant visual impacts of the aerial alignment to Fremont Central Park and Lake Elizabeth. In addition, the design option was not supported by the local community or the City of Fremont. The city has expressed support for the WSX Alternative with a subway alignment under Lake Elizabeth, instead.

1992 Design Option 2S (Subway)

Under this design option, the proposed BART alignment would have moved around Lake Elizabeth similar to 1992 Design Option 2A. The vertical alignment north of Central Park would have been on an embankment over Walnut Avenue and transitioned to a subway under Stevenson Boulevard. After Stevenson Boulevard, the vertical alignment would have continued in a subway, following the same route as 1992 Design Option 2A. The alignment would have also traveled under a section of Central Park that was further east and would have skirted Lake Elizabeth and continued south, crossing under Paseo Padre Parkway. Option 2S was also applicable to all 1992 Alternatives 4 through 11. This option is not feasible because it would disrupt activity at the City of Fremont's golf course, which is located between the former WP and former SP alignments east of Central Park.

1992 Design Option 3 (Aerial)

Under this design option, the BART vertical alignment would have been on an embankment over Walnut Avenue and an aerial structure over Stevenson Boulevard. The alignment would have passed over a portion of Central Park that was further east, and would have avoided Lake Elizabeth. Finally, the alignment would have continued south on the west side of the UP track and crossed over Paseo Padre Parkway. This design option would have been applicable to 1992 Alternatives 4 through 11.

1992 Design Option 3 (Aerial) was found to be infeasible because of the alignment's incompatibility with a land use proposed by the city, as well as the proximity of this aerial alignment to residences along the western side of the 1992 Proposed Project corridor. The WSX Alternative alignment would reduce these impacts.

1992 Central Park Design Option 3 located the alignment on the west side of the UP tracks. This option is not feasible because of the track relocations that are part of the city's grade separations project.

1992 Other Design Options (4–6)

These variations represented vertical and horizontal changes along the alignment in locations other than the Fremont Central Park area.

1992 Design Option 4 – Paseo Padre Parkway Design Option

Under this design option, the alignment would have been at grade at Paseo Padre Parkway, with the parkway going over the BART alignment and the former SP and WP tracks. This design option would have been applicable to 1992 Alternatives 4 through 11 and to the Central Park design options.

Design Option 4 (Paseo Padre Parkway) was found to be infeasible because of the significant visual impacts that would result from the high overpass that would be required to clear the at-grade BART alignment and the railroad tracks. The city's grade separations project will place Paseo Padre Parkway below grade and allow the BART alignment to pass over the depressed roadway, which would reduce these impacts.

1992 Design Option 5 – Washington Boulevard Design Option

A vertical design option at Washington Boulevard would have provided for an aerial crossing over Washington Boulevard instead of a crossing below Washington Boulevard, which would have been raised. This design option would have been applicable to 1992 Alternatives 6, 9, and 10 only.

1992 Design Option 5 (Washington Boulevard) was found to be infeasible because of significant visual impacts. The BART aerial structure and raised embankment would have affected the view from surrounding residential neighborhoods, and it would have posed a potential risk of structural damage or collapse during seismic activity. The city's grade separations project has enabled an at-grade alignment for BART to be considered as part of the WSX Alternative. This would substantially reduce significant visual impacts.

1992 Design Option 6 – Warren Avenue Design Option

At Warren Avenue, the alignment would have been on an aerial structure over the roadway, with Warren Avenue remaining at grade instead of being depressed in an underpass. This design option would have been applicable to 1992 Alternatives 6, 7, 10, and 11 only.

1992 Design Option 6 (Warren Avenue) was found to be infeasible because this option was not applicable to a project that is only 5.4 miles in length. Warren Avenue is located outside of the limits of the WSX Alternative, which is also 5.4 miles in length.

1992 Design Option 7 – UP Relocation or "End" Design Option

Under this design option, a horizontal alignment would have relocated the UP tracks to the west between 0.5 mile south of Warren Avenue to just north of Dixon Landing Road would have relocated the UP tracks to the west, allowing BART to utilize the existing UP right-of-way. This design option would have been applicable to 1992 Alternatives 6, 7, 10, and 11 only.

1992 Design Option 7 (UP Relocation) was also not applicable to a 5.4-mile project, and therefore was found to be infeasible. This would also be true regarding the WSX Alternative.

3.5.3 2003 Alternatives Eliminated from Detailed Study in this EIS

The following alternatives were considered but dismissed from further analysis because they were determined to be infeasible or were determined to insufficiently meet the project purpose and need. These alternatives were raised during the scoping process conducted for the 2003 SEIR. All of these alternatives were considered but eliminated from detailed study in the 2003 SEIR, with the exception of the Bus Alternative (with BRT and busway components), which was evaluated in the 2003 EIR.

2003 Taxi Service from Warm Springs to Fremont

Taxi service is private automobile transportation that would likely be cost prohibitive and not economically viable for most passengers. This would not provide transportation services in an equitable manner to all segments of the population.

2003 Chauffeur Driven Limousine from Warm Springs to Fremont

Similarly, chauffeur driven limousines are also privately operated and use a mode of transportation not operated by BART or other public transit carriers. Because these services operate with automobiles as private transportation, they do not offer the opportunity to achieve the goal of relieving automobile congestion on regional roadways. In addition, they would not provide transportation services that would make efficient and effective use of financial resources.

2003 Capitol Corridor Passenger Rail Service

The Capitol Corridor interregional rail service is operated by BART along with several other agencies through the Capitol Corridor Joint Powers Agency (CCJPA). BART provides day-to-day management support to the CCJPA. The service operates through two regions and several counties throughout Northern California, from San Jose to Sacramento. The alignment of the Capitol Corridor rail service currently includes a stop at Fremont/Centerville, to the north and west of the BART alignment. There has been no proposed discontinuance of this interregional rail service, so the BART alignment could not replace this service. There have also not been any proposals to alter the route of the Capitol Corridor from Union City to San Jose from its current Alviso route to a Warm Springs route on the UP right-of-way. Given the mandate of the Capitol Corridor to provide only inter-city service, a spur route from Union City to Warm Springs would not be permitted. Therefore, such an alternative would be infeasible.

2003 Commuter Rail Service

Commuter rail is defined as “long-haul rail passenger service operating between metropolitan and suburban areas, whether within or across the geographical boundaries of a state, usually characterized by reduced fares for multiple rides, and commutation tickets for regular, recurring riders” (American Public Transportation Association 2002). BART operates long-haul rail passenger service within the metropolitan and suburban communities in the greater Bay Area. BART serves four Bay Area counties; San Francisco, Alameda, Contra Costa, and San Mateo. BART provides reduced fares on high-value ticket purchases. As such, BART fulfills the definition of commuter rail service. A commuter rail alternative in the project area is already being considered with the WSX Alternative.

Commuter rail service between Union City and San Jose using the UP right-of-way has been considered and rejected in the past. Unlike the Union City BART Station, the Fremont BART Station does not have standard gauge railroad tracks in close proximity. A commuter rail alternative from the Fremont Station would be the WSX Alternative as described above. VTA completed a major investment study (MIS) in November 2001 and rejected a commuter rail alternative between Warm Springs and San Jose. Before finishing this study, VTA also considered commuter rail service between Union City and San Jose with a station at Warm Springs. Of the six alternatives studied in depth in the MIS, the commuter rail alternative in the UP alignment had the lowest ranking and was rejected from further consideration. Some of the reasons for its low ranking included low ridership, noise impacts of commuter trains running in residential areas, and strong opposition by residents along the UP railroad corridor. These reasons also apply to commuter rail service between Union City and Warm Springs.

2003 Light Rail Transit (LRT)

An LRT alternative most likely would consist of an alignment extending approximately 5.4 miles from the Fremont BART Station to a station in Warm Springs and an optional intermediate station at Irvington. Although LRT can run on surface streets without requiring grade separations, the availability of the UP right-of-way between Warm Springs and Paseo Padre Parkway would make this the preferred alignment in this segment. Between Paseo Padre Parkway and the Fremont Station, the LRT alignment would most likely follow the UP alignment north to Stevenson Boulevard, turn west on Stevenson Boulevard to run in the median, and then follow the WSX Alternative alignment between Stevenson Boulevard and Walnut Avenue. This alignment along Stevenson Boulevard would eliminate the median and require intrusion into the sidewalk and likely require acquisition of additional right-of-way.

An LRT would be affected by several factors not associated with either the WSX Alternative or the Bus Alternative. Northbound commuters would have to transfer from bus or automobile to the LRT at Warm Springs and subsequently transfer from LRT to BART at the Fremont BART Station. Southbound riders also would have to transfer twice between Fremont and Warm Springs (BART to LRT, LRT to bus/automobile). Transit studies have demonstrated that the more mode transfers passengers must make to reach their destinations, the less likely they are to use transit. This double mode-transfer penalty for LRT users would decrease ridership compared to the WSX Alternative. Further ridership reduction would occur due to the longer travel time for LRT compared to BART over the same distance.

Typically, one of the primary reasons that LRT costs are less than heavy rail is LRT’s minimal grade separation requirements. In the UP corridor, grade separations are not an issue. Capital costs for LRT, including cost of right-of-way, construction, vehicles, and maintenance facilities would be less than costs for the WSX Alternative; however, LRT ridership also would be significantly less than the WSX Alternative ridership. In particular, LRT would require an entirely new fleet of vehicles for the system, as well as maintenance facilities; whereas BART and bus operators would be augmenting their existing vehicle fleet and could use existing maintenance facilities. Additional consideration would also be necessary at the LRT interface at the Fremont BART Station. LRT traveling at grade along the proposed BART alignment or city streets would require a ramp and elevated platform to allow cross platform transfers to BART, or with an at-grade LRT station design, additional vertical circulation (stairs, escalators, elevators) between the LRT terminus and the BART platform. Both designs would require modification of the existing BART station, including changing auto and bus circulation and loss of station parking.

Future extension of LRT south of Warm Springs, and a commensurate increase in ridership, is unlikely. For practical purposes, selection of a 5.4-mile, Fremont BART-to-Warm Springs LRT system would not allow for future non-LRT transit extensions in the UP railroad corridor. Construction of LRT would preclude a future BART extension southward, unless the LRT system (and LRT financial investment) was removed. Also, there is no reasonable likelihood of an LRT extension in the regional corridor south from Warm Springs. LRT was examined in VTA's MIS and rejected as a transit alternative. The primary reasons for the elimination of LRT by VTA were that LRT in Santa Clara County would be limited to 2- and 3-car trains due to constraints on the Tasman and Downtown East Valley light rail line, slower guideway speeds (55 miles per hour maximum), and traffic congestion and LRT coordination problems at the East Julian Street and East Santa Clara Street grade crossings. In addition, Santa Clara County's Measure A specifically provided funding for a BART extension into Santa Clara County, and if any Measure A funding was to be used for LRT, it would require voter approval.

2003 Bus Alternative (with BRT and busway components)

During the 2003 SEIR scoping process, it was suggested that a bus alternative be considered for further analysis in the 2003 SEIR. Although bus alternatives had been previously analyzed in earlier studies, such an alternative was not analyzed in the 1992 EIR.[13] Changes in the circumstances underlying the previous environmental analysis, including advancements in bus operations known as bus rapid transit (BRT),[14] have arisen since 1992 and led to the analysis of this option in the 2003 SEIR. Analyses of the Bus Alternative are presented in detail in the 2003 SEIR, Chapter 5, Alternatives Analysis, and in the Transportation Technical Report for the Proposed BART Warm Springs Extension (San Francisco Bay Area Rapid Transit District 2003), and are incorporated by reference herein. As a result of these analyses, at the conclusion of the CEQA process, the Bus Alternative was rejected from further consideration as unable to fulfill the project goals and objectives as effectively as the WSX Alternative.

Developed in conjunction with AC Transit and VTA, the Bus Alternative was designed to provide high-quality service similar to the WSX Alternative. The Bus Alternative incorporated several BRT components, including a busway between Paseo Padre Parkway and Warm Springs and transit centers at the WSX Alternative Warm Springs BART Station site and the optional Irvington Station site. The service along the busway included a limited number of stops between the Warm Springs Transit Center and the Fremont BART Station.

The Bus Alternative incorporated many of the elements typically associated with BRT, including exclusive right-of-way, limited stops, improved passenger boarding facilities, prepaid fares, real-time passenger information, traffic priority at intersections, passenger boarding at the same height as the bus, and signal priority. Certain other typical BRT elements were considered inappropriate for the

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[13] Bus options were considered in the Fremont-South Bay Corridor Final Report prepared by DKS Associates in 1993 and the Santa Clara Valley Transportation Authority Silicon Valley Rapid Transit Corridor Major Investment Study Final Report (MIS) prepared by Earth Tech, Inc. in November 2001. These studies are incorporated by reference herein pursuant to 40 C.F.R. Section 1502.21. These studies are available for review upon request at BART's offices at 300 Lakeside Drive, 21st floor, Oakland, CA 94612.

[14] *Bus rapid transit (BRT)* is a rubber-tired vehicle operation that is configured to offer speeds and capacity similar to rail transit, with exclusive travel lanes, busways or HOV lanes, limited stops and signal preemption.

Bus Alternative, such as unique vehicles. It was assumed that both bus operators would use rolling stock that is similar to their current fleet. Articulated buses, similar to the ones currently in operation, would be needed for the county-to-county bus trips.

Bus Routes, Transit Centers, and Operating Plan

The Bus Alternative included the creation of a paved busway within the former WP right-of-way in place of the WSX Alternative (Figure 3-9). The busway would have run along the WSX Alternative alignment in the former WP right-of-way from South Grimmer Boulevard to Paseo Padre Parkway, for a distance of approximately 3 miles. Access to the busway at Paseo Padre Parkway would have been provided by flyover ramps that would pass over the adjacent at-grade UP railroad track. Between Paseo Padre Parkway and the Fremont BART Station, buses would operate on local streets. The proposed route would be on Paseo Padre Parkway and Walnut Avenue between the north end of the busway and Fremont BART Station entrance.

The busway would have carried both VTA and AC Transit routes, and passengers could have boarded any bus operating in the busway. Stops were located at the Fremont BART Station and at two transit centers, which were located on the same sites as the Warm Springs Station and the optional Irvington Station. Additional stops were located at Paseo Padre Parkway and Stevenson Boulevard, Auto Mall Parkway and Grimmer Boulevard, and Auto Mall Parkway and Warm Springs Boulevard. Both the transit centers and regular stops would have facilitated connections to other local bus routes within Fremont. The estimated travel time between the Fremont BART Station and the Warm Springs Transit Center would have been approximately 15 minutes with the additional stops identified above.

To further reduce travel times, the Bus Alternative included signal preemption and upgrades to eight intersections along the path of the included bus routes. Passengers would be informed of bus schedules through the use of “next-bus” technology, which would announce the impending arrival of the buses at each bus shelter and passenger waiting area.

The busway would have been open to both VTA and AC Transit express buses, which would have provided an average headway of 7.5 minutes between Fremont BART and the Warm Springs area. This service level would be equivalent to the service provided under the operating plan for the WSX Alternative with the optional Irvington Station. The bus routes are shown in Figure 3-9.

Projected Ridership Comparison

Ridership projections for the Bus Alternative compared to the WSX Alternative were estimated using the VTA-Modified MTC Model that was developed by MTC and VTA. The Bus Alternative would have generated fewer riders than the WSX Alternative. This is true for both the 2010 and 2025 scenarios. For 2010, the Bus Alternative would generate approximately 4,200 new linked transit trips daily compared to 4,700 for the WSX Alternative and 5,700 for the WSX alternative with the optional Irvington Station.[15] In 2025, the Bus Alternative would generate 6,300 linked transit trips compared to 7,200 for the WSX Alternative and 9,100 for the WSX Alternative with the optional Irvington Station.

As discussed in Chapter 5 of this EIS, Other NEPA Considerations, the Santa Clara Valley Transit Authority (VTA) is considering the Silicon Valley Rapid Transit Corridor Project (SVRTC), which

[15] The change in linked transit trips indicates the number of new patrons attracted to a new transit service. A “linked trip” consists of all modes used from the beginning of the trip to the end of the trip.

would be an extension of BART service from BART's proposed future terminus at Warm Springs through Milpitas, to downtown San Jose in Santa Clara. In the Draft EIS/EIR for the SVRTC project, issued in 2003, VTA evaluated a bus alternative that is referred to herein as the "SVRTC Enhanced Bus." The SEIR analysis considered the cumulative consequences if both BART and VTA were each to choose its respective bus alternative.[16] It is assumed that, if the Bus Alternative were implemented by BART and the SVRTC Enhanced Bus were implemented by VTA, the Enhanced Bus routes would have utilized the dedicated busway to travel to the Fremont BART Station, eliminating the requirement to transfer at the Warm Springs Transit Center. In 2025, the Bus Alternative with SVRTC enhanced bus would generate approximately 13,700 linked trips, compared to 33,400 with the WSX Alternative plus SVRTC and 33,200 with WSX Alternative, plus optional Irvington Station and SVRTC.

Comparison of the Bus Alternative and WSX Alternative

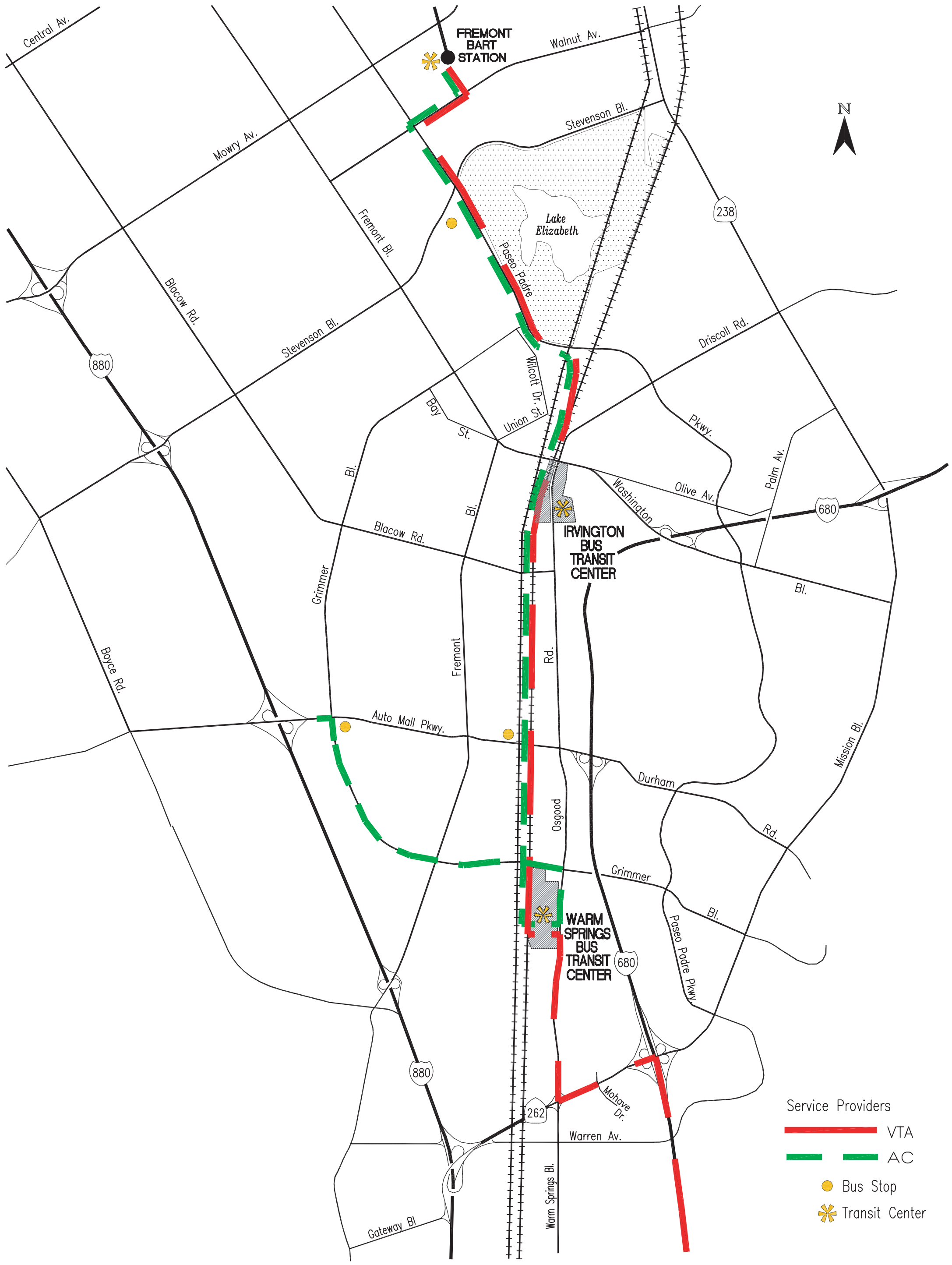
The analysis of the Bus Alternative in the 2003 SEIR included sections on hazardous materials; hydrology; biological resources; land use and planning; population, economics and housing; aesthetics; cultural resources; transportation; noise and vibration; air quality; and energy. The Bus Alternative would have avoided or reduced some of the impacts associated with the WSX Alternative, such as temporary loss of flood storage capacity, impacts to wetland and riparian habitat, disturbance of archaeological sites, temporary visual impacts to Fremont Central Park, and noise and vibration impacts. However, the Bus Alternative would have had the potential to disturb hazardous materials during construction and have a more extensive impact on hydrology and water quality than the WSX Alternative. In addition, the Bus Alternative would have had a significant, unavoidable impact on sensitive species (burrowing owl) and a significant visual impact (bus flyover at Paseo Padre Parkway and UP alignment). However, due to lower ridership, the Bus Alternative would not achieve the same degree of beneficial effects as the WSX Alternative, such as a reduction in roadway traffic volumes, increased transit ridership, reductions in air pollution emissions, and reduction in regional energy consumption. In addition, while the Bus Alternative would have offered a high quality service, it would not have been as successful as the WSX Alternative in promoting transit-oriented development or in supporting smart, efficient, and desirable growth patterns. For these and other reasons, BART has concluded that the Bus Alternative is not as effective in meeting the project's goals as is the WSX Alternative. Because the Bus Alternative does not sufficiently meet the project's purpose and need, it is not analyzed in this EIS. Further details regarding the analysis of the Bus Alternative may be found in the 2003 SEIR.

3.5.4 Alternative Proposed in the EIS Scoping Process

Interim Busway

This alternative was suggested during the 2004 scoping period for this EIS. This alternative would entail construction of an interim bus guideway along the surface portions of both the BART Warm Springs alignment and the Warm Springs to San Jose BART alignment proposed for VTA's SVRTC project. The comment suggests that the construction of a busway along the combined alignment

[16] VTA's Draft EIS/EIR for the SVRTC project evaluates a "Baseline Alternative," as required by federal law, which incorporates an enhanced level of bus service to the BART Warm Springs Station using existing roads and highways. To avoid confusion, VTA's "Baseline Alternative" is referred to in this EIS as the "SVRTC Enhanced Bus."



04071.04 (8-05)

Source: DKS Associates 2003.

Figure 3-9
Proposed Bus Alternative Alignment

could be implemented more quickly and would be less expensive than a BART extension. The alignment and structures could then be converted to use for BART trains when more funding becomes available in the future.

The costs involved in modifying the existing railroad alignment for the busway project, although less than the cost of the WSX Alternative with a subway alignment, still would be considerable. Construction of the busway would require upgrading and paving the existing railroad right-of-way to accommodate two-way bus traffic. Improvements to the railroad roadbed for the busway would require widening, relocation of utilities, drainage improvements, and remediation of any hazardous materials within the right-of-way, i.e., it would require many of the same investments required for the WSX Alternative. An interim busway alternative would also require construction of access and station facilities at intermediate points along the guideway, as well as at both the north and south termini. Stations sites would require facilities for parking, ticketing, boarding, and restrooms, and would need to be accessible to local buses, autos, bicycles, and pedestrians. Access to stations could require local street improvements, as well as the costs of the station facilities themselves, similar to station costs associated with the WSX Alternative.

An interim busway alternative would require buses to leave the bus guideway and travel on surface streets around Fremont Central Park in order to reach the existing Fremont BART Station. Like the permanent Bus Alternative discussed above, an interim busway would also require construction of a flyover structure between Paseo Padre Parkway and the busway. Analysis for the 2003 Bus Alternative, evaluated in the 2003 SEIR, indicated that the connecting flyover would be costly and would create unavoidable visual impacts for neighborhoods east and west of the flyover structure. The bus flyover would then have to be demolished when a BART extension was constructed at the end of the interim period.

BART anticipates that the WSX extension could be operating by 2010. VTA anticipates that the SVRTC project could begin revenue service in 2015. Therefore, the window for operation of an interim busway could be as short as 5 years. Construction of a BART extension following the interim busway project would require removing the paved guideway and bus station structures. The paving would need to be removed to allow placement of ties and rails, and the BART rail system requires facilities on a much larger scale than bus facilities, which could not be converted to BART use. (For example, a BART station platform is 700 feet long.) Therefore, a large percentage of the costs invested in an interim bus alternative would not be converted to BART use and would be lost. The loss of capital investments and the potentially short operating life combine to diminish the value of this alternative.

Chapter 4

Environmental Analysis

Section 4.1

Introduction to Environmental Analysis

4.1.1 Introduction

This section provides an overview of the environmental analysis chapter, which includes Sections 4.2 through 4.18. The environmental analysis sections describe the setting, impacts, and mitigation measures for the WSX Alternative. This section also provides background information that will assist the reader in understanding the analysis.

4.1.2 Scope of the Environmental Impact Statement

The purpose of this EIS is to disclose any effects that might occur as a result of the proposed action. On April 6 2004, FTA, as the federal lead agency, published a Notice of Intent (NOI) for the preparation of an EIS for the BART Warm Springs Extension Project in the Federal Register, consistent with Section 1501.7 of the Council on Environmental Quality (CEQ) NEPA Regulations. (A copy of the NOI is included in Appendix A of this document.)

BART and FTA have determined that the environmental resource areas listed below will be analyzed in this EIS. The environmental analysis incorporated herein identifies the environmental impacts of the WSX Alternative and the No-Build Alternative on those resource areas, as well as the mitigation measures proposed to reduce the impacts of the proposed action. The resource areas are listed below in the order in which they appear in this document.

- Transportation
- Soils, Geology, and Seismicity
- Hazards and Hazardous Materials
- Hydrology
- Wetlands
- Biological Resources
- Land Use and Planning
- Parks and Recreation
- Population, Economics, and Housing

- Aesthetics
- Cultural Resources
- Noise and Vibration
- Air Quality
- Energy
- Utilities and Public Services
- Safety and Security
- Environmental Justice

4.1.3 Resource Study Area

The area studied for the WSX Alternative is defined in Section 1.4 in Chapter 1 and depicted in Figure 1-5. This area was considered in the process of making the determinations of appropriate study areas for each resource. The extent of the area studied for a resource varies depending on the characteristics of each environmental resource area being analyzed (e.g., the hydrology study area is defined by the physical limits of the watershed; the cultural resources area is defined by the Area of Potential Effect, etc.). The study area for each environmental resource area is therefore defined in the corresponding resource section.

4.1.4 Overview and Terminology of Impacts and Mitigation Measures

As required by NEPA, this EIS examines the expected project and cumulative impacts of the WSX Alternative. Sections 4.2 through 4.18 analyze the potential impacts of the WSX Alternative and the No-Build Alternative for each of the environmental resource areas. Each section identifies impacts and mitigation measures for one resource area. Chapter 5 analyzes the potential cumulative impacts of the WSX Alternative on each of the environmental resource areas and provides mitigation measures to minimize the project's contribution to cumulative impacts.

4.1.4.1 Impacts

Types of Effects

A proposed action may have the following types of effects, which are identified in this EIS.

- **No effect:** A proposed action that does not alter the environmental status quo would be considered to have *no impact.*
- **Adverse effect:** A proposed action that would negatively affect an environmental condition or resource value extant prior to taking the proposed action would be considered to have an *adverse impact*.

- **Beneficial effect:** *Beneficial* impacts may occur where the proposed action would eliminate or reduce a situation that is considered detrimental within the affected environment.

Operational Impacts

Operational impacts are long-term, repeated, or ongoing impacts; they include all effects of operating and maintaining all aspects of the WSX Alternative, including trackways, trains, stations, parking lots, and associated equipment and facilities.

Construction Impacts

Construction-related impacts refer to the temporary effects of construction activities related to the WSX Alternative, such as contractor laydown areas, site preparation, and installation of trackways and structures.

4.1.4.2 Mitigation Measures

Under NEPA, an EIS must include a discussion of the means to mitigate adverse environmental effects. Whether or not the impacts of a proposed action will be "significant" must be determined at the outset, since an EIS is required only if there will be significant impacts. However, once a decision to prepare an EIS is made, the EIS reports all adverse effects and suggests appropriate mitigation measures. In developing mitigation measures for adverse environmental effects, BART is guided by definitions in the CEQ NEPA Regulations (Section 1502.16[h]), which define mitigation as:

- avoiding the impact altogether by not taking certain actions;
- minimizing impacts by limiting the degree or magnitude of the action;
- rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- reducing or eliminating impacts through preservation and maintenance;
- compensating for impacts by replacing or providing substitute resources; or
- compensating for secondary impacts caused by mitigation measures proposed in one resource area that may indirectly affect another.

As stated in 23 CFR 771.105(d), it is FTA policy that measures necessary to mitigate adverse impacts (both significant and not significant) be incorporated into the proposed action. Mitigation measures would be eligible for federal funding if:

- the impact for which the mitigation was proposed actually resulted from the project, and
- the proposed mitigation represented a reasonable public expenditure, considering, among other things, the extent to which the proposed measures would assist in complying with a Federal statute, Executive Order, or other Administration regulation or policy.

It is the responsibility of FTA and BART to ensure that the mitigation and enhancement measures committed to in the environmental document, as well as those contained in permits, are carried out. A summary of mitigation/enhancement commitments will be included in the Record of Decision (ROD) for this EIS and made available to appropriate project personnel to help to ensure that these important features are properly implemented. As part of the CEQA environmental decision process, a Mitigation Monitoring and Reporting Plan was adopted by the BART Board of Directors (Appendix B). The Mitigation Monitoring and Reporting Plan, as well as any additional mitigation measures identified in the EIS, will become a part of the ROD prepared by FTA. Adverse effects and mitigation measures addressed in this Final EIS are summarized in the Executive Summary in Table ES-2.

Section 4.2
Transportation

4.2.1 Introduction

This section describes the existing transportation conditions in the study area, analyzes the WSX Alternative's potential transportation-related impacts and benefits in comparison to the No-Build Alternative, and identifies measures to mitigate the impacts. The existing conditions for roadways, traffic, transit services, pedestrian, and bicycle facilities in the study area are reviewed. The primary areas of analysis for this section are transit, traffic, and parking. The analysis in this section is based on the *Transportation Technical Report for the Proposed BART Warm Springs Extension*, which is available for review at the BART offices at 300 Lakeside Drive, 21st Floor, Oakland, CA 94612.

This transportation analysis also assumes that the City of Fremont grade separations project will proceed independently of the WSX alternative, providing an auto underpass at Paseo Padre Parkway and an auto overpass at Washington Boulevard where each crosses the rail corridor. These grade separations allow the at-grade rail alignment required for the WSX Alternative.

4.2.2 Affected Environment

For the study area in general, regional roadway access, regional transit services, intersection, and existing traffic conditions are described below. Detailed setting information is provided for the areas near the proposed Warm Springs Station and the optional Irvington Station, including information on parking facilities and local pedestrian and bicycle facilities.

Regional Roadway Access

Several types of roadways serve Fremont, according to the *Fremont General Plan* (City of Fremont, 1991 as amended), including freeways and local arterials. Freeways (including interstate highways and state routes) are high-speed, high-capacity facilities with grade-separated intersections that are intended to meet the need for longer trips. Freeways are under Caltrans jurisdiction. Arterials are high-capacity local facilities that meet demand for longer, through trips in the community. Arterials have controlled access, can be divided, and typically have two to three lanes in each direction. The other types of streets in the city are parkways, collectors, and local roadways.

The regional roads in the vicinity of the study area are I-880, I-680, Mission Boulevard (includes SR 262 and SR 238), Stevenson Boulevard, Auto Mall Parkway/Durham Road, Fremont Boulevard, Grimmer Boulevard, and Warm Springs Boulevard/Washington Boulevard/Osgood Road. These roads are described below and shown in Figure 4.2-1. Table 4.2-1 and Figure 4.2-2 summarize the traffic volumes of the roadways. Use of these regional roadways for access to the proposed BART stations is discussed below under *WSX Alternative Conditions*.

Interstate Highways

I-880 runs generally north–south (northwest–southeast) through the East Bay just west of the study area. On a regional level, the interstate passes through Fremont as it runs between San Jose and Oakland. The segment of I-880 closest to the study area is an eight-lane facility, including one lane in each direction designated as a high-occupancy-vehicle (HOV) lane during peak periods.

I-680 runs north–south, then east–west, east of the study area. On a regional level, the interstate passes through Fremont as it runs between San Jose and eastern Alameda and Contra Costa Counties (eventually to Fairfield). The segment of I-680 in the study area vicinity is a six-lane facility. Along this corridor, Caltrans has installed an HOV lane in the southbound direction between the SR 237 and SR 84 interchanges with I-680. An auxiliary lane in the southbound direction between the Auto Mall Parkway and SR 262 interchanges with I-680 was completed in 2001. There are plans to build a northbound HOV lane when funding becomes available.

State Routes

Mission Boulevard (includes SR 238 and SR 262) is a four-lane facility in southern and eastern parts of the study area. Mission Boulevard runs east from its interchange with I-880, intersects with I-680, then gradually turns northward intersecting with another portion of I-680 and continuing to the north. Two parts of Mission Boulevard are designated as state routes: SR 262 between I-880 and the southern intersection with I-680, and SR 238 north of the northern intersection with I-680. (To minimize confusion, these segments are referenced by their state route designations in this chapter.)

Arterials

Stevenson Boulevard runs generally east–west just north of the optional Irvington Station. Stevenson Boulevard and Blacow Road would provide access to I-880 from the optional Irvington Station area. Stevenson Boulevard is generally a four-lane arterial. It becomes six lanes immediately west of the Civic Center Drive intersection, but narrows back to four lanes immediately east of the Fremont Boulevard intersection. There is an interchange where Stevenson Boulevard intersects I-880.

Auto Mall Parkway/Durham Road runs east–west through Fremont between Mission Boulevard and the Tri-Cities Landfill. It is a major, four- to six-lane arterial with interchanges at I-880 and I-680. Auto Mall Parkway was formerly known as Durham Road west of I-680; Durham Road is still the roadway designation east of I-680.

Fremont Boulevard extends from the southern part of Fremont, where there is an interchange with I-880, to a second interchange with I-880 in the northern part of Fremont. Fremont Boulevard is a primary north–south circulation route in Fremont. Currently, the roadway alternates between four and six lanes throughout the vicinity of the study area.

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Source: DKS Associates 2002

Figure 4.2-1
Regional Roads

Source: DKS Associates 2002 and City of Fremont 2000.

Figure 4.2-2
Average Daily Traffic Volumes (2000)

Table 4.2-1. 2000 Traffic Volumes in Fremont

Street	Segment From	Segment To	2000 Average Daily Traffic Volume
I-880	SR 262/Mission Boulevard	Auto Mall Parkway	161,000
	Auto Mall Parkway	Stevenson Boulevard	170,000
	Stevenson Boulevard	Mowry Avenue	173,000
I-680	SR 262/Mission Boulevard	Durham Road	147,000
	Durham Road	Washington Street	136,000
	Washington Street	Mission Boulevard/SR 238	131,000
Auto Mall Parkway	I-680	Osgood Road	47,800
	Osgood Road	Grimmer Boulevard	37,000
	Grimmer Boulevard	I-880	55,900
Blacow Road	Fremont Boulevard	Grimmer Boulevard	16,600
	Grimmer Boulevard	Stevenson Boulevard	24,800
	North of Stevenson Boulevard		23,300
Durham Road	Mission Boulevard	Paseo Padre Parkway	4,600
	Paseo Padre Parkway	I-680	9,400
Fremont Boulevard	W. Warren Avenue	Lakeview Boulevard	15,000
	I-880	W. Warren Avenue	22,300
	Grimmer Boulevard	I-880	30,100
	Auto Mall Parkway	Grimmer Boulevard	14,600
	Blacow Road	Auto Mall Parkway	32,100
	Washington Boulevard	Blacow Road	20,100
	Grimmer Boulevard	Washington Boulevard	32,800
	Stevenson Boulevard	Grimmer Boulevard	36,400
Grimmer Boulevard	Auto Mall Parkway	Blacow Road	21,200
	Blacow Road	Fremont Boulevard	19,200
	Fremont Boulevard	Paseo Padre Parkway	12,500
Mission Boulevard	I-880	Warm Springs Boulevard	68,100
	Warm Springs Boulevard	I-680	63,900
	I-680	Paseo Padre Parkway	29,700
	Grimmer Boulevard	Paseo Padre Parkway	26,400
	Durham Road	Grimmer Boulevard	20,500
	Washington Boulevard	Durham Road	26,400
	I-680	Washington Boulevard	20,400
	Driscoll Road	I-680	36,200
	Stevenson Boulevard	Driscoll Road	35,100
	Walnut Avenue	Stevenson Boulevard	33,000
	Mowry Avenue	Walnut Avenue	30,800
Osgood Road	Auto Mall Parkway	Grimmer Boulevard	17,600
	Washington Boulevard	Auto Mall Parkway	15,200
South Grimmer Boulevard	Mission Boulevard	Paseo Padre Parkway	3,400
	Paseo Padre Parkway	Warm Springs Boulevard	7,000
	Warm Springs Boulevard	Fremont Boulevard	22,100
	Fremont Boulevard	Auto Mall Parkway	22,600
Stevenson Boulevard	Paseo Padre Parkway	Fremont Boulevard	27,900
	Fremont Boulevard	Blacow Road	40,300
	Blacow Road	I-880	62,700
Warm Springs Boulevard	Grimmer Boulevard	Mission Boulevard	24,100
Washington Boulevard	Mission Boulevard	Paseo Padre Parkway	12,700
	Paseo Padre Parkway	I-680	16,300
	I-680	Osgood Road	23,000
	Osgood Road	Fremont Boulevard	31,400

Source: City of Fremont 2000

Grimmer Boulevard is a four-lane arterial. It begins at Paseo Padre Parkway and extends south past Auto Mall Parkway where it curves east past Fremont Boulevard and I-680 to end at Mission Boulevard. There is no access to I-680 from Grimmer Boulevard.

Warm Springs Boulevard/Osgood Road is a two-lane road that runs north–south from the City of Milpitas to Washington Boulevard in Fremont. Osgood Road extends from Washington Boulevard to Grimmer Boulevard. Warm Springs Boulevard extends south from Grimmer Boulevard to the City of Milpitas where it turns into Milpitas Boulevard.

Washington Boulevard extends from Fremont Boulevard to Mission Boulevard. It provides access from I-680 to the proposed optional Irvington Station. Washington Boulevard is currently four lanes.

Driscoll Road is a four-lane road that runs generally east–west (northeast–southwest) from SR 238 to Washington Boulevard. At Washington Boulevard, Driscoll Road becomes Osgood Road.

Traffic Conditions

The level of traffic congestion on roadways and at intersections is generally expressed in terms of volume-to-capacity (V/C) ratio and level of service (LOS). The methods for measuring V/C ratios and the LOS assigned to particular V/C ratios are typically based on Transportation Research Board Circular 212 (1980), a nationally recognized methodology for analyzing LOS.

For the WSX Alternative, LOS calculations were made using Fremont's adopted methodology, a variant of the Circular 212 methodology. The V/C ratio represents the ratio of traffic using a given intersection to the overall carrying capacity of that intersection (hence, a V/C ratio of 1.00 indicates that the intersection is at its maximum carrying capacity). LOS is indicated by a letter grade of A–F, which is assigned based on the V/C ratio. Table 4.2-2 shows the correlation between the V/C ratio and LOS under the Circular 212 methodology, and presents a general description of each LOS letter grade. Fremont's adopted methodology represents an increase in lane capacity per local conditions.

Table 4.2-2. Signalized Intersections Level of Service Criteria

Level of Service	V/C Ratio	Description
A	0.00-0.60	Free Flow/Insignificant Delays: No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication.
B	0.61-0.70	Stable Operation/Minimal Delays: An occasional approach phase is fully utilized. Many drivers begin to feel somewhat restricted within platoons of vehicles.
C	0.71-0.80	Stable Operation/Acceptable Delays: Major approach phases fully utilized. Most drivers feel somewhat restricted.
D	0.81-0.90	Approaching Unstable/Tolerable Delays: Drivers may have to wait through more than one red indication. Queues may develop but dissipate rapidly, without excessive delays.
E	0.91-1.00	Unstable Operation/Significant Delays: Volumes at or near capacity. Vehicles may wait through several signal cycles. Long queues form upstream of intersection.
F	> 1.00	Forced Flow/Excessive Delays: Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

Source: Transportation Research Board 1980

For the intersections in the project study area, LOS calculations were made for the weekday morning (a.m.) and afternoon (p.m.) peak hours. The a.m. peak hour represents the 1-hour period with the highest traffic volumes between 7:00 a.m. and 9:00 a.m. The p.m. peak hour is the 1-hour period with the highest traffic volumes between 4:00 p.m. and 6:00 p.m.

Intersection Operations

The intersections that affect access to either the Warm Springs or optional Irvington Station areas were analyzed for this EIS. The intersections are discussed below under their respective station areas. While the intersections are discussed under the two station study areas for description purposes, all intersections have been analyzed for the WSX Alternative (both with and without the optional Irvington Station), because any of the study intersections may potentially be affected under each scenario.

The locations of the intersections are shown in Figure 4.2-3. The numbers attached to each intersection correspond directly to the numbers on each figure. In addition, these numbers are used throughout the impacts and mitigation section for ease of reference.

The existing intersection lane configurations are shown in Figure 4.2-4. The existing turning-movement volumes are shown in Figure 4.2-5. The existing turning-movement volumes were used to calculate the existing LOS at these intersections.

Warm Springs Station Area

The intersections analyzed respective of the Warm Springs Station are listed below and shown in Figure 4.2-4. Two of the intersections presented in this list, numbers 11 and 12, will only be analyzed under WSX Alternative conditions because they would exist only under future conditions if the WSX Alternative were implemented.

1. Osgood Road/Durham Road-Auto Mall Parkway.
2. I-680 southbound ramps/Durham Road-Auto Mall Parkway.
3. I-680 northbound ramps/Durham Road-Auto Mall Parkway.
4. Osgood Road/Warm Springs Boulevard-South Grimmer Boulevard.
5. Fremont Boulevard/South Grimmer Boulevard.
6. Fremont Boulevard/I-880 northbound ramps.
7. Fremont Boulevard/I-880 southbound on-ramp/Cushing Parkway.
8. Fremont Boulevard/I-880 southbound off-ramps.
9. Warm Springs Boulevard/SR 262 (Mission Boulevard).
10. Mojave Drive/SR 262 (Mission Boulevard).
11. Warm Springs Boulevard/proposed Warm Springs Station north driveway (project conditions only).

12. Warm Springs Boulevard/proposed Warm Springs Station south driveway (project conditions only).

Table 4.2-3 lists the existing LOS for each intersection in the proposed Warm Springs Station area. Four intersections have a V/C ratio greater than 0.85 (the Fremont target), and one has a V/C ratio of 0.85. There are no intersections in the proposed Warm Springs Station area that currently operate at LOS E or F.

Table 4.2-3. Results of the Level of Service Analysis: Existing Conditions – Warm Springs Station Area

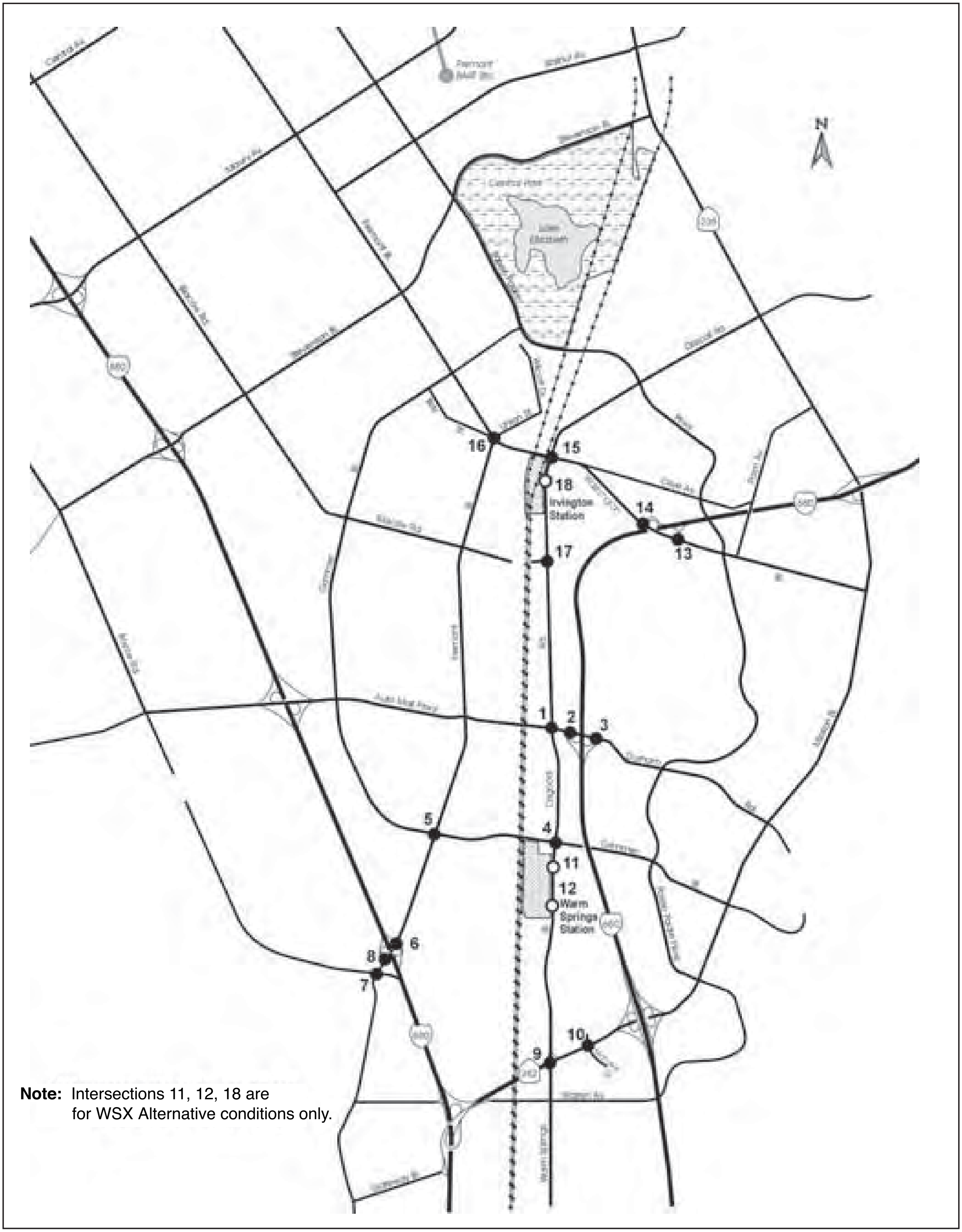
	a.m. Peak Hour		p.m. Peak Hour	
Intersection[a]	LOS [b]	V/C [c]	LOS [b]	V/C [c]
1. Osgood Road/Durham Road/Auto Mall Parkway[d]	D	0.84	D	0.87
2. I-680 SB Ramps/Durham Road/Auto Mall Parkway[e]	D	0.88	C	0.75
3. I-680 NB Ramps/Durham Road/Auto Mall Parkway[f]	A	0.54	A	0.39
4. Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard	B	0.62	C	0.74
5. Fremont Boulevard/South Grimmer Boulevard	D	0.85	A	0.44
6. Fremont Boulevard/I-880 NB Ramps	A	0.57	A	0.33
7. Fremont Boulevard/I-880 SB On Ramp/Cushing Parkway	C	0.76	A	0.42
8. Fremont Boulevard/I-880 SB Off Ramps	D	0.90	A	0.39
9. Warm Springs Boulevard/Mission Boulevard	D	0.87	D	0.81
10. Mohave Drive/Mission Boulevard	B	0.66	D	0.81

Notes:
[a] Numbers correspond with the numbers on the intersection diagrams.
[b] LOS = Level of Service.
[c] V/C = Volume-to-capacity ratio.
[d] The City of Fremont's naming convention for this intersection is Osgood Road/Auto Mall Parkway.
[e] The City of Fremont's naming convention for this intersection is I-680 SB Ramps/Durham Road.
[f] The City of Fremont's naming convention for this intersection is I-680 NB Ramps/Durham Road.
Source: DKS Associates 2002

Optional Irvington Station Area

One intersection (Osgood Road/Blacow Road, number 17), will be analyzed under future scenarios only, including the No-Build Alternative. At present this intersection has very low traffic turning into and out of Blacow Road, and currently operates as an unsignalized intersection. The City of Fremont has recently completed construction of a city maintenance facility along Blacow Road in the immediate vicinity of this intersection. This facility will increase the turning movements turning into and out of Blacow Road. To ease these turning movements, the intersection is currently being signalized. The access intersection into the optional Irvington Station will be analyzed under project conditions only because the intersection does not currently exist.

1. I-680 northbound ramps/Washington Boulevard.
2. I-680 southbound ramps/Washington Boulevard.
3. Osgood Road/Driscoll Road/Washington Boulevard.



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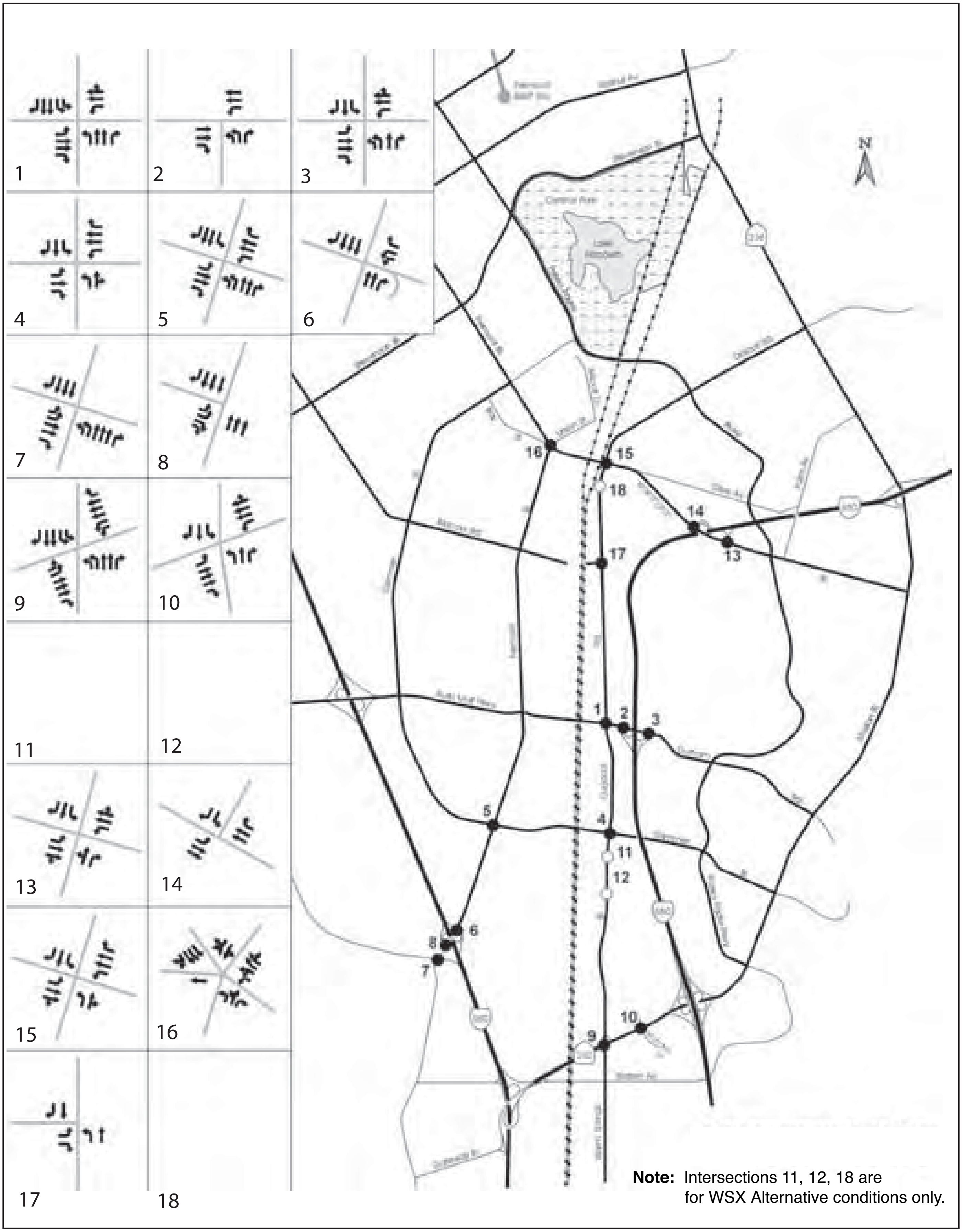
Source: DKS Associates 2002

Figure 4.2-3
Existing Study Intersections



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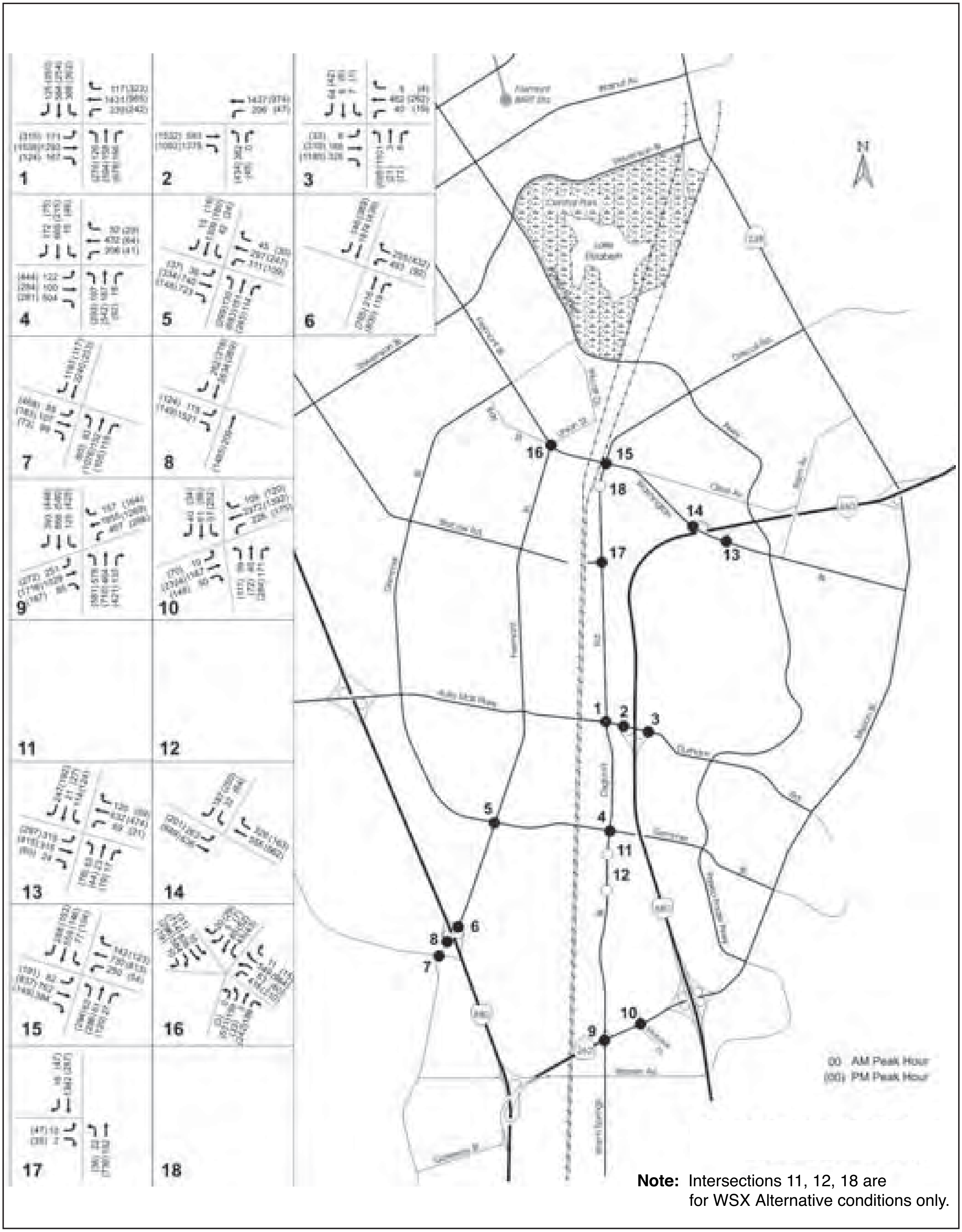
Source: DKS Associates 2002

Figure 4.2-4
Existing Intersection Configuration



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Source: DKS Associates 2002

Figure 4.2-5
Existing Turning Movement Counts

4. Fremont Boulevard/Washington Boulevard/Union Street/Bay Street.
5. Osgood Road/Blacow Road (future-year analysis only).
6. Osgood Road/proposed optional Irvington Station access road (project conditions only).

Table 4.2-4 lists the existing LOS for each intersection in the optional Irvington Station area. Only the Osgood Road/Driscoll Road/Washington Boulevard intersection currently operates at a V/C ratio below Fremont standard of 0.85. No intersections are currently operating at LOS E or F.

Table 4.2-4. Results of Level of Service Analysis: Existing Conditions – Optional Irvington Station Area

	a.m. Peak Hour		p.m. Peak Hour	
Intersection[a]	LOS [b]	V/C [c]	LOS [b]	V/C [c]
13. I-680 NB Ramps/Washington Boulevard	A	0.6	A	0.56
14. I-680 SB Ramps/Washington Boulevard	A	0.41	A	0.40
15. Osgood Road/Driscoll Road/Washington Boulevard	D	0.86	C	0.72
16. Fremont Boulevard /Washington Boulevard/Union Street/Bay Street	A	0.60	C	0.74

Notes:
[a] Numbers correspond with the numbers on the intersection diagrams.
[b] LOS = Level of Service.
[c] V/C = Volume-to-capacity ratio.
Source: DKS Associates 2002

Public Transit Services

BART, AC Transit, and VTA provide public transit services (commuter rail, light rail, and bus) in the study area. The service area for transit routes is shown in Figure 4.2-6a. AC Transit operates in Alameda and Contra Costa Counties. AC Transit provides the primary local bus service to the Fremont BART Station; 17 bus routes serve the station. The existing AC Transit services surrounding both the Warm Springs and the optional Irvington Station vicinities are discussed later in this section.

VTA provides both light rail and local bus services in Silicon Valley. VTA operates three express bus routes that connect Santa Clara County to the Fremont BART Station, only one of which (Route 180) operates throughout the day, 7 days per week.

BART operates train service from the Fremont BART Station to Richmond in Contra Costa County and to the San Francisco International Airport and Millbrae in San Mateo County. The daily ridership at the Fremont BART Station is approximately 12,800. Headways[1] on the Daly City and Richmond lines are each 15 minutes on weekdays and 20 minutes after 7:15 p.m. on weekday evenings and weekends. Direct service to Daly City is not offered evenings and Sundays, but passengers can transfer to the Dublin/Pleasanton–Daly City line at the Bay Fair Station in San Leandro.

[1] A *headway* is defined as the time interval between two vehicles moving in the same direction on a particular route

AC Transit has increased transit services in the study area in recent years. AC Transit implemented a major restructuring of its bus service in Fremont, Newark, and Union City based on its *Fremont–Newark Transportation Development Plan*. The plan revised existing routes and added new services in areas that were not previously served.

Warm Springs Station Area

AC Transit Routes 215 and 218 serve the area near the proposed Warm Springs Station, as shown in Figure 4.2-3. Route 215 serves Newpark Mall, Central Avenue, the Fremont BART Station, and the Warm Springs District via Mission Boulevard, Driscoll Road, and Warm Springs Boulevard. Service along the portion of Route 215 between the Fremont BART Station and the Warm Springs District on weekdays operates from 6:00 a.m. to 10:00 p.m. Buses operate every 30 minutes during the peak hours and every 60 minutes at other times. There is no weekend service. The entire route serves about 530 passengers per day. Route 218 serves Ohlone College and the Fremont BART Station via Paseo Padre Parkway, Grimmer Boulevard, and Mission Boulevard. The route operates weekdays every 30 minutes from 6:00 a.m. to 10:00 p.m.; it does not operate on the weekend. The route averages about 400 passengers per day. (Alameda–Contra Costa Transit District 2002.)

Optional Irvington Station Area

AC Transit Route 215 serves the area close to the optional Irvington Station, as shown in Figure 4.2-3. Route 215 serves the Fremont BART Station and the Warm Springs District via Mission Boulevard, Driscoll Road, and Warm Springs Boulevard. It operates on weekdays every 30 minutes from 6:00 a.m. to 10:00 p.m., and on weekends every hour from 7:00 a.m. to 7:00 p.m. Route 210 also travels along Fremont Boulevard/Washington Boulevard between South Hayward BART Station and Ohlone College (located west of I-680). (Alameda–Contra Costa Transit District 2002.)

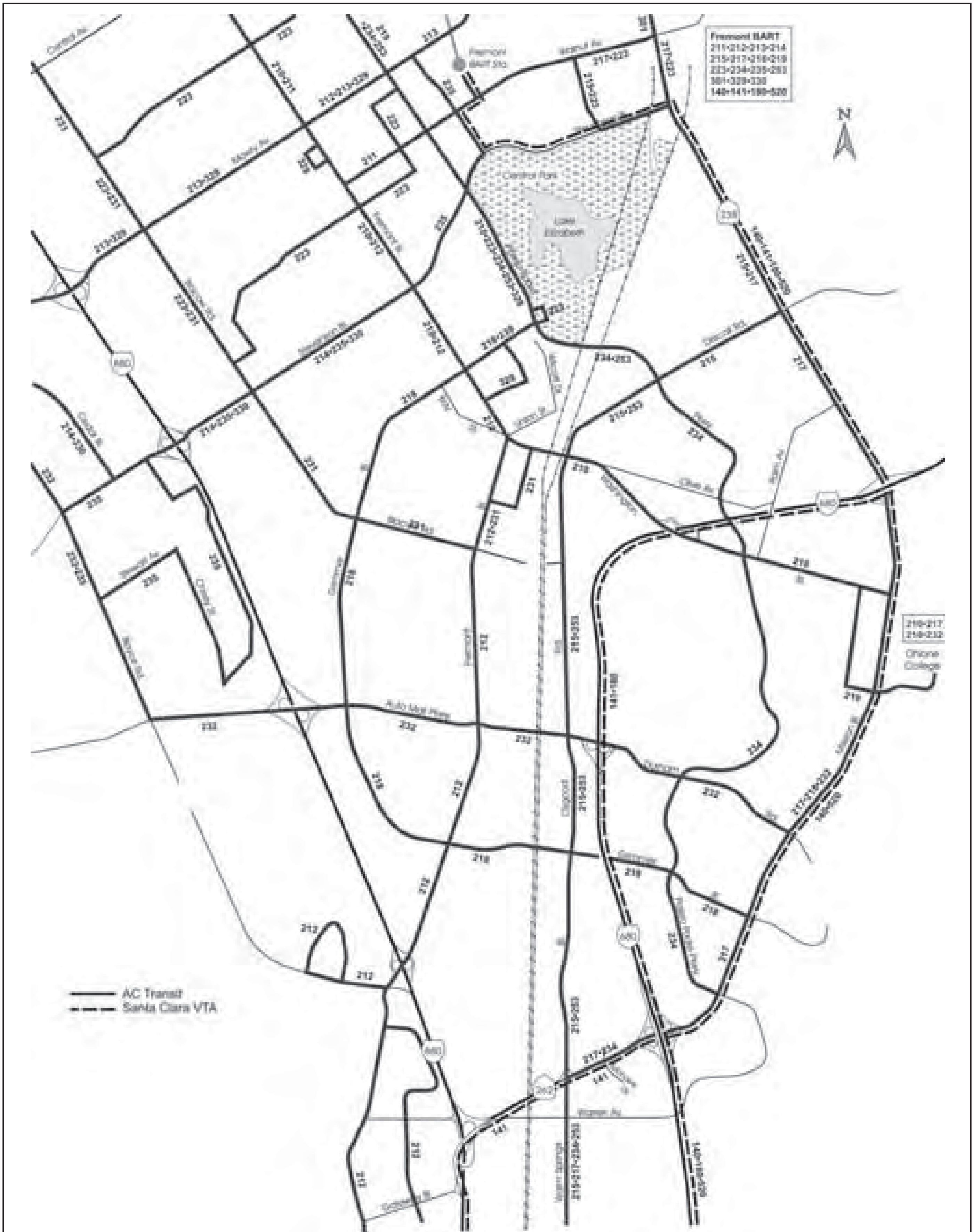
Parking

There are currently 2,030 spaces available at the Fremont BART station for BART patrons. This parking area is often filled to capacity. There are approximately 30 spaces available for the Hertz BART car-sharing program, nearly 20 spaces available for disabled person parking, more than 60 spaces available for designated carpool vehicles, and nearly 50 spaces available for parking after 10:00 a.m. There are currently 92 spaces set aside for monthly permits at the Fremont BART Station, at a price of $63.00 per space per month.

There is no parking allowed on any of the roads surrounding the proposed Warm Springs Station site. Close to the optional Irvington Station site, parking is not allowed on Washington Boulevard in the vicinity of the station. Parking is allowed on the southern leg of Osgood Road near the optional Irvington Station. This parking is unrestricted at present. There is no off-street parking in the station study areas.

Pedestrian Facilities

In general, the access roads leading to the proposed Warm Springs Station site are not pedestrian oriented. Due to the mixed industrial-commercial nature of the area and the fact that the proposed station site and adjacent parcels are undeveloped, not all streets in the station area have sidewalks, and there are no sidewalks adjacent to the proposed station site itself. Streets in the project vicinity



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Source: DKS Associates 2002

Figure 4.2-6a
Existing Transit Service

that do have sidewalks include the north side of South Grimmer Boulevard, and portions of Warm Springs Boulevard south of the station site.

The optional Irvington Station area is generally not pedestrian oriented. There are sidewalks on Washington Boulevard and Fremont Boulevard in the vicinity of the proposed optional station. (The Fremont grade separations project will provide grade-separated pedestrian crossings when it is complete.) Currently there is a sidewalk on the west side of Osgood Road in the vicinity of the station site, but not on the east side, which is undeveloped.

Bicycle Facilities

The primary goal of the City of Fremont's bicycle and pedestrian program is to provide bicyclists and pedestrians with safe and accessible routes to all destinations within the city and outside the city, which are served by public roads, trails, transit and rail (City of Fremont 2004a). According to the 2002 *City of Fremont Bicycle and Pedestrian Plan*, the proposed Warm Springs Station area contains the following bicycle facilities. Class II Bikeways[2] are present on Auto Mall Parkway between I-880 and Mission Boulevard, South Grimmer Boulevard between Fremont Boulevard and Mission Boulevard, and Fremont Boulevard between Blacow Road and I-880. Class III Bikeways[3] are located on Warm Springs Boulevard from Auto Mall Parkway south past the Warm Springs Station site and terminate north of Mission Boulevard (see Figure 4.2-6b) .

According to the 2002 *City of Fremont Bicycle and Pedestrian Plan*, the optional Irvington Station area contains several bicycle facilities. There are Class II Bikeways on Driscoll Road between Washington Boulevard and Mission Boulevard, and on Paseo Padre Parkway west of Driscoll Road. There are Class III Bikeways on Fremont Boulevard between Grimmer Boulevard and Washington Boulevard, and on Washington Boulevard between Mission Boulevard and I-680. There are frontage road facilities (roads running parallel to the main thoroughfare and separated by a median) on Fremont Boulevard between Walnut Avenue and Grimmer Boulevard, and on Blacow Road west of Grimmer Boulevard. The *Alameda Countywide Bicycle Plan* illustrates existing and proposed bicycle facilities in Alameda County (Alameda County 2001).

4.2.3 Description of Analysis Scenarios

4.2.3.1 List of Scenarios

This section describes the transportation elements of WSX Alternative and No-Build Alternative scenarios, as well as anticipated future transit services in the study area. The following scenarios are addressed in the impact analysis.

- No-Build Alternative (2010 and 2025).

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[2] Class II Bikeways are defined by Caltrans as bicycle lanes that are separated from traffic lanes by use of a painted stripe on the pavement and are designated as bike lanes by the use of white *Bike Lane, End,* and *Begin* "guide" signs. (California Codes, Streets and Highway Code Section 890.4.) Internet access on 11/14/04. Also, MUTCD 2003 California Supplement. Part 9 Traffic Controls for Bicycle Facilities. California Department of Transportation. May 20, 2004. Internet access on 11/14/04.

[3] Class III Bikeways are defined by Caltrans as bicycle routes that are not separated from traffic lanes but are designated by the use of green *Bike Route, End, a*nd *Begin* "guide" signs. (see previous citation)

- WSX Alternative (2010 and 2025).
- WSX Alternative with optional Irvington Station (2010 and 2025).
- WSX Alternative plus Silicon Valley Rapid Transit Corridor Project (SVRTC) (2025).
- WSX Alternative with optional Irvington Station plus SVRTC (2025).

The last two scenarios, which predict the conditions anticipated if both the WSX Alternative and the BART alternative for VTA's proposed SVRTC project are adopted and constructed, were modeled for purposes of analyzing potential cumulative impacts of the two projects under these scenarios. Those scenarios are discussed in detail in Chapter 5, Section 5.2, *Cumulative Effects*, of this document.

4.2.3.2 Scenario Descriptions

No-Build Conditions

Existing traffic conditions in the study area are described above, but other projects and modifications to the roadway network will be in place before the WSX Alternative is implemented, and further regional growth is anticipated during that period. Accordingly, the WSX Alternative's impacts would not be accurately represented by comparison with currently existing conditions. Instead, in accordance with professional standards for traffic impact analysis, the WSX Alternative's impacts are compared to projected future conditions if the WSX Alternative is not built (i.e., No-Build conditions). For purposes of this comparison, No-Build conditions were examined for two future time periods, known as "horizon years." The two horizon years selected for this analysis are 2010, when the WSX Alternative would be operational, and 2025, when SVRTC would be operational if it is adopted. No-Build conditions for 2010 and 2025 are described below.

2010 No-Build Conditions

For use in future travel activity, the City of Fremont staff provided information regarding all approved and proposed projects within the study area. Only those projects that would affect at least one study intersection (Figures 4.2-4 and 4.2-7) were included in the analysis. Trips generated by these projects were assigned to the street network along the most reasonable paths based on the existing intersection locations.

There are several proposed network modification projects within the transportation study area; some are roadway changes, including widening, while others are changes to the intersection geometry. The following list outlines the projects within the transportation study area that are included in the City of Fremont's Impact Fee Program and are expected to be completed by 2010 (City of Fremont 2002).

- Roadway projects:
  - Cushing Parkway: connection between Catellus Development to Fremont Boulevard.
  - Fremont Boulevard (Washington Boulevard to Blacow Road): curb and gutter improvements, sidewalk construction.

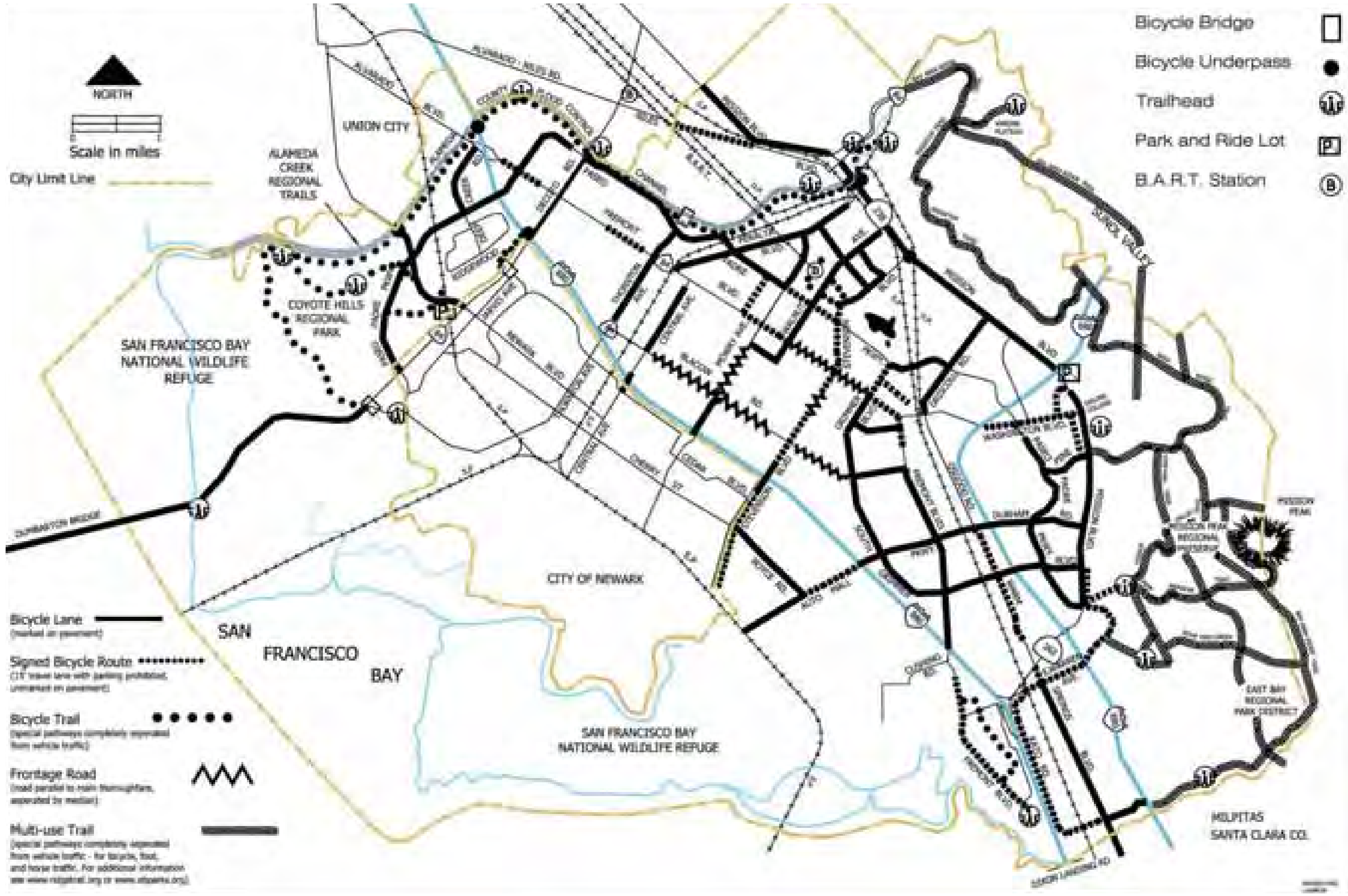

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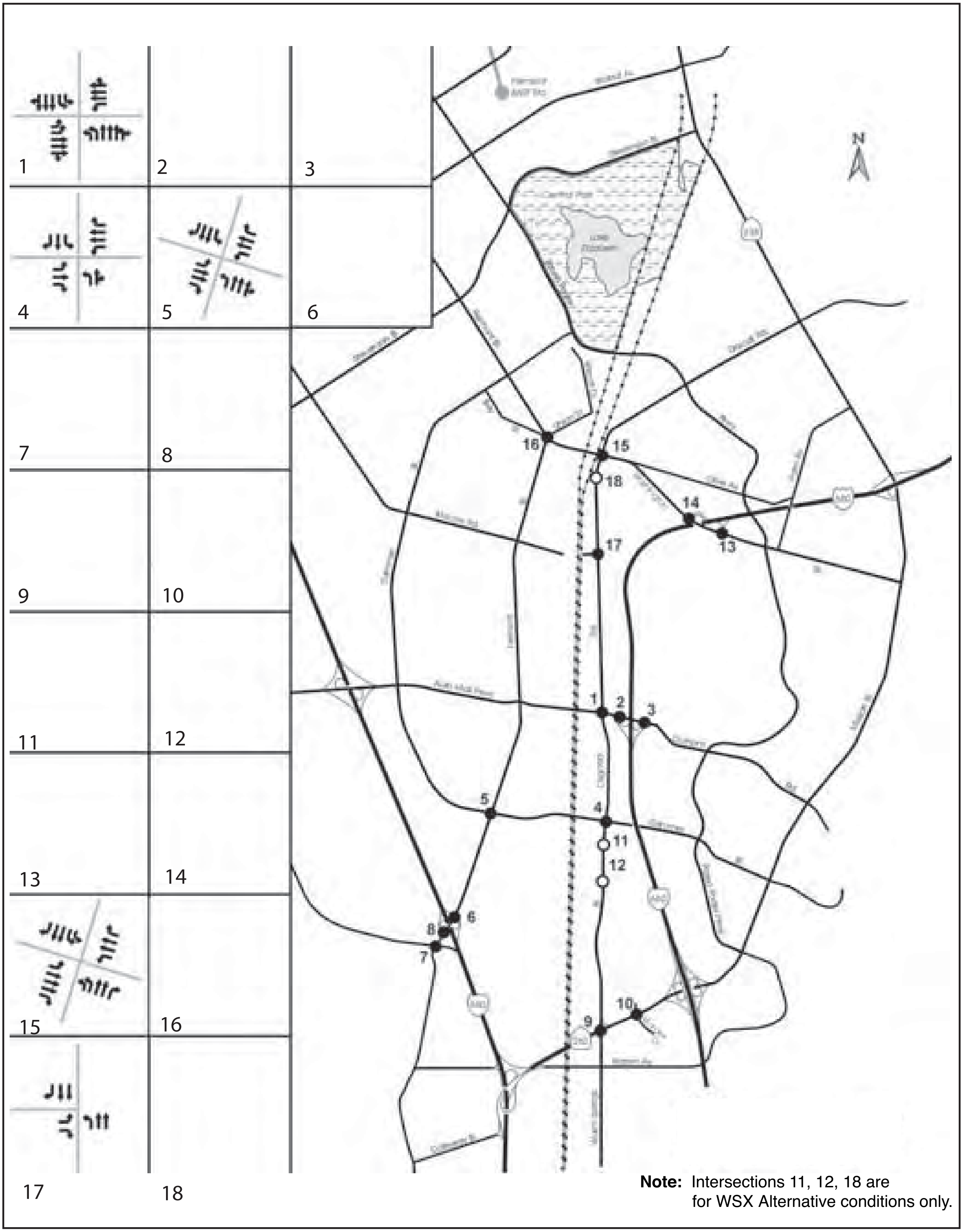
Figure 4.2-6b
Existing Bicycle Commuter Map



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Source: DKS Associates 2003.

Figure 4.2-7
2010 No–Build Intersection Configuration Changes

   - Osgood Road: widening to two lanes in each direction between Washington Boulevard and South Grimmer Boulevard, along with new curb, gutter, and sidewalk construction.

- Intersection projects:
   - Osgood Road and Washington Boulevard: signal modification.
   - Osgood Road and Auto Mall Parkway: signal modification.
   - Fremont Boulevard and Grimmer Boulevard: signal modification.
   - Osgood Road and Blacow Road: new signal.

In addition, regionally funded roadway projects were identified based on discussions between the Alameda County Congestion Management Agency (ACCMA) and the City of Fremont. ACCMA has included the following list of roadway projects in its travel forecasting model.

- Widen Washington Boulevard from two lanes to four lanes between Driscoll Road/Osgood Road and I-680 interchange.
- Widen Auto Mall Parkway from four lanes to six lanes between Osgood Road and I-680 interchange.
- Widen Grimmer Boulevard from two lanes to four lanes between Warm Springs Boulevard and I-680 overpass.
- Widen Warm Springs Boulevard from two lanes to four lanes between Grimmer Boulevard and Mission Boulevard.
- Extend Auto Mall Circle south of Boyce Road (four lanes) to join Cushing Parkway.
- Widen Cushing Parkway from four lanes to six lanes between Northport Loop West and Fremont Boulevard.

The City of Fremont has also implemented a program to eliminate existing at-grade railroad crossings (the City of Fremont's grade separations project). The following information is based on information from CCS Planning and Engineering (2002). One of the proposed grade separations will affect the intersection of Washington Boulevard/Driscoll Road/Osgood Road. Associated geometric changes at this intersection are listed below.

- Eastbound movement (from Fremont Boulevard to I-680): one left-turn lane, three through lanes, and one dedicated right-turn lane will be provided; a merge will be required on the eastern side of the intersection.
- Northbound movement (from Osgood Road to Driscoll Road): two left-turn lanes, two through lanes, and one right-turn lane will be provided.
- Southbound movement (from Driscoll Road to Osgood Road): two left-turn lanes, two through lanes, and one right-turn lane will be provided.

In addition, a new traffic signal is proposed as part of the grade separations project for the Washington Boulevard/Meredith Avenue intersection (east of the Washington Boulevard/Driscoll

Road/Osgood Road intersection). Osgood Road would be widened south of Washington Boulevard before the construction of the grade separations project. Washington Boulevard, beginning west of the Driscoll Road/Osgood Road intersection, would also be widened to four lanes (two in each direction) to the I-680 southbound and northbound on- and off-ramps.

2025 No-Build Conditions

To generate travel forecast model results for 2025 No-Build conditions, discussions were held with the City of Fremont, ACCMA, and MTC to establish the transportation network. The road projects assumed to be completed by 2025 in the VTA-modified MTC model are listed below.

- Grade separation of Paseo Padre Parkway and the existing UP railroad lines.
- Grade separation of Washington Boulevard and the existing UP railroad lines.
- Widening of Cushing Parkway between North Loop Road and Fremont Boulevard.
- Widening of Driscoll Road between Mission Boulevard and Chilton Avenue.
- Widening of Durham Road between Osgood Road and I-680.
- Widening of Mowry Avenue between I-880 and Blacow Road.
- Widening of Paseo Padre Parkway between Driscoll Road and Mowry Avenue.
- Widening of South Grimmer Boulevard between Warm Springs Boulevard and Old Warm Springs Boulevard.
- Widening of Washington Boulevard between I-680 and Mission Boulevard.

WSX Alternative Conditions

This section identifies the specific transportation-related elements that would be constructed at the proposed Warm Springs Station and at the optional Irvington Station if the WSX Alternative were implemented.

Warm Springs Station

Roadway Access

The proposed Warm Springs Station would be located on the southwest corner at the intersection of South Grimmer Boulevard and Warm Springs Boulevard. Direct access to the project site would be provided along Warm Springs Boulevard via two signalized intersections and one right-in, right-out driveway. A secondary access point would be provided via a proposed extension of Warm Springs Court.

From I-880, it is expected that regional traffic would access the station via the Fremont Boulevard interchange, then South Grimmer Boulevard (from the west) and then access the station from Warm Springs Boulevard. Between I-880 and the station, Fremont Boulevard and South Grimmer Boulevard are both four-lane facilities. East of Warm Springs Boulevard (the east edge of the station), South Grimmer Boulevard is a two-lane facility. Traffic from I-880 could also use the SR 262 (Mission Boulevard) interchange, then Warm Springs Boulevard to access the station (from the south). At the SR 262/Warm Springs Boulevard intersection, SR 262 is six lanes and is heavily congested during both the a.m. and p.m. peak periods.

From I-680, access to the station would be from the interchange with Auto Mall Parkway/Durham Road (from the north) or the interchange with SR 262/Mission Boulevard (from the south). Traffic using the Auto Mall Parkway/Durham Road interchange would use Osgood Road/Warm Springs Boulevard to access the station directly. Warm Springs Boulevard currently has two lanes, but the City of Fremont plans to widen it to four lanes.

A third access route to the proposed Warm Springs Station would be via Mission Boulevard and Paseo Padre Parkway. Paseo Padre Parkway is a two-lane residential street between Grimmer Boulevard and Mission Boulevard.

Parking Conditions

On-site parking would consist of daily parking (available for up to 24 hours), midday parking (free spaces for customers who arrive at stations after 10:00 a.m.), carpool (each car must have at least two passengers when parking), and disabled parking (which would be located adjacent to the station's east entry pavilion and concourse), with BART staff parking integrated near the station. A total of 2,040 spaces would be provided. Areas for patron pick up and drop off by private automobile would also be provided.

Bicycle Facilities

The proposed Warm Springs Station would include bicycle parking facilities adjacent to the station's conceptual entry pavilion on the north and south sides of the station. Bicycle lanes would be provided along all major driveways connecting with city streets and leading to the main station entrance. The City of Fremont has plans to expand bicycle facilities along Osgood Road/Warm Springs Boulevard to include bicycle lanes in each direction under the city's Capital Improvement Program. The city's plans for bicycle facilities will be taken into account in the provision of bicycle access facilities during the station design process.

Pedestrian Circulation

Major streets providing access to the proposed station would be designed for safe and convenient pedestrian access and would include sidewalks, landscape buffers, and enhanced crosswalks at signalized intersections. Within the proposed station site, special crosswalks would accommodate pedestrian movements and connect patron parking areas with the main station entry point provided as part of the WSX Alternative. Pedestrian facilities that would be provided throughout the station include benches, stairs, escalators and waiting areas. Lighting plans would focus special illumination on these walkway and waiting areas. Pedestrian access to the Warm Springs Station would be available from Warm Springs Boulevard and Warm Springs Court. Any city plans affecting pedestrian amenities in the vicinity of the Warm Springs Station will be taken into account in the provision of pedestrian access facilities during the station design process. Station design will provide access according to the most current version of the Americans with Disabilities Act (ADA) requirements. BART coordinates with a disability task force that provides design guidance on making BART facilities more accessible for the disabled community.

Public Bus Transit Service

Future additional bus transit service is proposed to and from the proposed Warm Springs Station, when the two existing bus operators would restructure their routes to serve the proposed Warm Springs Station. No change to bus schedules or to bus fares is anticipated. Based on conceptual plans, it is anticipated that seven bus layover bays would be provided within the station area. It is also anticipated that buses would access the station to and from the Warm Springs Boulevard/south driveway intersection with secondary access from the extended Warm Springs Court entrance.

Paratransit and Shuttle Service

Paratransit and shuttle services currently operate at the Fremont BART station. It is standard professional practice in transportation modeling to assume that these services would be provided by private companies and local employment centers at a new station. The paratransit and shuttle service stop would be located directly adjacent to the elevators at the main station entry based on conceptual plans for the Warm Springs Station.

Paratransit services are those services provided to people with disabilities who are unable to use fixed-route transit service. These services often require the patron to call ahead of time and will result in the patron being picked up at the door (for example at home) and then dropped off at the door at the other end of the trip (for example the doctor).

Shuttle services are those services that normally operate on a fixed route between two destinations with no intermediate stops along the route. The most common shuttles are employee-based shuttles that serve one employment center and the local transit center or station. Shuttles connecting with major employment centers include those proposed by Pacific Commons and the potential employee shuttle service for NUMMI. Other potential shuttles may serve educational facilities, hotels, and visitor centers in the vicinity.

Taxi Service

Similar to the provision of shuttle and paratransit services, taxis are currently provided by local taxi companies at the Fremont BART station. It is standard professional practice in transportation modeling to assume similar services would be provided at any new station. Taxi service would be provided by local taxi companies to and from the proposed Warm Springs Station. Based on conceptual plans for this station taxis would access the station from the Warm Springs Boulevard/south driveway intersection, Warm Springs Court and the right-in, right-out driveway only. Taxis would drop-off and pick-up passengers via a one-way designated road near the kiss-and-ride area. It is anticipated that taxis would exit at the north driveway with access to Warm Springs Court and Warm Springs Boulevard.

Kiss-and-Ride

Based on conceptual plans kiss-and-ride traffic would access the proposed Warm Springs Station from Warm Springs Boulevard/north driveway intersection, Warm Springs Boulevard/south driveway intersection, Warm Springs Court and the right-in, right-out driveway. It is anticipated that the kiss-and-ride area would be adjacent to the east entry pavilion.

Emergency and Maintenance Vehicle Access

Emergency and maintenance vehicles would have access to the proposed Warm Springs Station from Warm Springs Boulevard/north driveway intersection, Warm Springs Boulevard/south driveway intersection, Warm Springs Court and the right-in, right-out driveway. Emergency and maintenance vehicles would have their designated parking area directly adjacent to the platform and under the elevated pedestrian walkway according to conceptual plans for this station.

Optional Irvington Station

Roadway Access

The proposed optional Irvington Station would be located near the southwest corner of the intersection of Washington Boulevard and Driscoll Road/Osgood Road. Direct vehicular access to the station and parking areas would be along Osgood Road via one signalized intersection, a right-in, right-out driveway located on the east side of Osgood Road, and a one-way driveway on the west side of Osgood Road. Secondary access would be provided from Main Street, west of Driscoll Road under Washington Boulevard. Osgood Road is currently two lanes, but the City of Fremont has a capital improvement project to widen Osgood to four lanes prior to the BART station being built.

Many routes could be used to access the optional Irvington Station. Regional traffic could use either I-880 or I-680, then access the station via one of the interchanges listed below. Access from I-880 would be via Stevenson Boulevard, Auto Mall Parkway, or Fremont Boulevard from the south. Traffic from I-880 via the Stevenson Boulevard interchange would access the optional Irvington Station from Fremont Boulevard and then Olive Avenue. From Auto Mall Parkway, vehicles would access the site via Fremont Boulevard and then Olive Avenue or via Osgood Road. Vehicles traveling to or from the Fremont Boulevard interchange would access the optional Irvington Station via Fremont Boulevard and then Olive Avenue, or Grimmer Boulevard then Osgood Road, and from Auto Mall Parkway via Osgood Road. Access from I-680 would be via the Washington Boulevard interchange east of the station.

Local traffic from the west would use Blacow Road and Fremont Boulevard. Blacow Road is currently divided in two sections that do not connect: a four-lane section that terminates just west of the existing railroad tracks, and a two-lane section that terminates on the east side of the tracks. The City of Fremont currently does not plan to connect the two sections of Blacow Road across the UP right-of-way.

Local traffic from the north would use Fremont Boulevard north of Washington Boulevard, then use Washington Boulevard to access the station or Driscoll Road. Fremont Boulevard is four lanes north of Washington Boulevard. Driscoll Road is also a four-lane road until it meets Osgood Road.

Local traffic from the south would use Osgood Road or Fremont Boulevard. Fremont Boulevard is four lanes south of Blacow Road, and two lanes between Blacow Road and Washington Boulevard.

Local traffic from the east would use Washington Boulevard. Washington Boulevard has one lane in each direction east of Driscoll Road/Osgood Road then widens to two lanes in each direction at the I-680 interchange. The City of Fremont plans to widen all of Washington Boulevard to four lanes from Fremont Boulevard to Mission Boulevard.

Parking Conditions

There are no off-street parking facilities in the area that would be affected by construction of the station. On-site parking would consist of station parking (available for up to 24 hours), midday parking (free spaces for customers who arrive at stations after 10 a.m.), disabled parking (located near the west walkway entrance, south of Osgood Road via the Main Street connection), and official BART parking. A total of 960 spaces would be provided.

Bicycle Facilities

The optional Irvington Station would include bicycle lockers on both the east and west side of the station. Bicycle lanes within the BART station site would connect with street access routes to the station and would link to station entry points, bike locker, and other bike parking. The city's plans for bicycle facilities will be taken into account in the provision of bicycle access facilities during the station design process.

Pedestrian Circulation

Pedestrian walkways and enhanced crosswalks would be incorporated into main streets with entry to the BART station and adjacent parking areas. A signalized intersection would be provided at the Osgood Road-Driscoll Road/Washington Boulevard intersection as part of the WSX Alternative with Optional Irvington Station. Pedestrian access to the station concourse would be accommodated by an elevated pedestrian walkway with access to and from the east and west sides of the station. The proposed pedestrian walkway would cross over Osgood Road from the east side of the station and over the UP tracks from the west side of the optional Irvington Station. Pedestrian facilities would be provided throughout the station, including benches, stairs, escalators, and adequate waiting areas. Special pedestrian lighting along walkways and in entry plazas would be provided. Any city plans affecting pedestrian amenities in the vicinity of the optional Irvington Station will be taken into account in the provision of pedestrian access facilities during the station design process.

Railroad Lines

At present, UP freight-rail lines intersect Washington Boulevard at grade. These rail crossings are each equipped with crossing signals and automatic gates. Currently, freight-rail movements disrupt vehicle movements on Washington Boulevard, Driscoll Road, and Osgood Road. As part of the city's grade separations project, Washington Boulevard will be raised to pass over the railroad. At present, the tracks are used only for freight rail. Following completion of the city's grade separation project, prior to implementation of the WSX Alternative, the UP railroad alignment will be set in its final configuration. UP will continue to run freight trains along the western railroad alignment, while BART will conduct separate and independent transit operations on the eastern alignment.

BART will not have any impacts on the UP operations. BART construction is scheduled to occur in coordination with relocation of the UP alignment. Construction activity will be closely coordinated with UPRR and the City of Fremont, so that UPRR operations will not be affected as the rail alignment moves from the interim to the final alignment. When BART operations begin, BART and UP will operate on separate tracks with no interaction.

Public Transit Service

AC Transit bus service is proposed to and from the optional Irvington Station. Five bus layover bays would be provided within the station according to conceptual plans for this station. Buses would access the station to and from the Osgood Road via the secondary signalized intersection on Osgood Road.

Paratransit and Shuttle Service

Paratransit and shuttle services currently operate at the Fremont BART station. It is standard professional practice in transportation modeling to assume that these services would be provided by private companies and local employment centers at a new station. The paratransit and shuttle service stop would be integrated with the bus intermodal accessed from Osgood Road.

Paratransit services are those services provided to people with disabilities who are unable to use fixed-route transit service. These services often require the patron to call ahead of time and will result in the patron being picked up at the door (for example at home) and then dropped off at the door at the other end of the trip (for example the doctor). Station design will provide access according to the most current version of ADA requirements. BART coordinates with a disability task force that provides design guidance on making BART facilities more accessible for the disabled community.

Shuttle services are those services that normally operate on a fixed route between two destinations with no intermediate stops along the route. Potential shuttles would connect with educational and civic centers accessible from Irvington.

Taxi Service

Similar to the provision of shuttle and paratransit services, taxis are currently provided by local taxi operators at the Fremont BART station. It is standard professional practice in transportation modeling to assume similar services would be provided at any new station. Taxi service would be provided by local taxi operators, to and from the optional Irvington Station via Osgood Road and Main Street. It is anticipated that taxis would drop off and pick up passengers via the right-in, right-out driveway northbound on Osgood Road and exit on Osgood Road. Taxis would also have a designated staging area on the west entrance via Main Street.

Kiss-and-Ride

Kiss-and-ride traffic would have access to the optional Irvington Station from the right-in, right-out driveway located along the east side of Osgood Road and via the one-way driveway from the west side of Osgood Road based on conceptual plans. A kiss-and-ride zone would also be provided on the west side of the station with access from Main Street.

Emergency and Maintenance Vehicle Access

Emergency and maintenance vehicles would have access to the proposed optional Irvington Station from the signalized intersection at Osgood Road and the proposed BART driveway, the two right-in and right-out intersections (one on both sides of Osgood Road), Roberts Avenue, and the proposed extension from High Street (on the other side of Washington Boulevard). The conceptual plans for the optional Irvington Station do not have the emergency access parking areas clearly defined, but they would ideally be located directly adjacent to the platforms and under the elevated pedestrian walkways.

Transit Operations

2010 Transit Services

For purposes of modeling future transportation conditions in the study area, it was assumed, based on current transit services and existing transit plans, that the following transit services would be provided in the Fremont area in 2010. Those services that are unique to a particular scenario are also identified.

- There would be two BART lines serving the existing Fremont Station under the 2010 No-Build condition. Combined, they would provide a headway averaging 7.5 minutes for service into downtown Oakland; with all-day service provided (each set of lines would operate on 15-minute headways). One line would provide direct service to Richmond and the other would provide service to San Francisco (Daly City Station). Connections would then need to be made in downtown San Francisco for service into San Francisco International Airport (SFO). Under the WSX Alternative, these lines would be extended south to the proposed Warm Springs Station (with or without stopping at the optional Irvington Station).

- During the morning and evening peak hour, the San Francisco line would be supplemented by a single train operating between Fremont and the Daly City Station in San Francisco.
- Under the No-Build condition, VTA express buses would operate from Santa Clara County to the Fremont BART Station using the existing route. This includes Routes 140, 180, and 520. Route 140 would operate during the peak periods on a 15-minute headway. Route 180 would operate all day, with 15-minute headways, and Route 520 would operate during the a.m. and p.m. peak periods with a 20-minute headway. Under either the WSX Alternative or the WSX Alternative with optional Irvington Station, the VTA buses would transfer operations from the Fremont BART Station to the Warm Springs Station.
- AC Transit would maintain transit service along Warm Springs Boulevard. Route 215 would operate with 15-minute headways during the peak periods and 30-minute headways during the off-peak period. Route 253 would operate with 60-minute headways during the peak period.
- A new ACE/Capitol Corridor train station would be provided at the Pacific Commons Development (west of I-880).
- Union City would become an intermodal transit facility with Capitol Corridor trains and BART trains providing service to the station.

Some of the other transit assumptions that have been made in the model that affect the broader Bay Area are listed below.

- The BART extension to Millbrae would be open and operational with 15-minute headways between SFO and Millbrae, between Millbrae and Pittsburg/Bay Point (without stopping at SFO), and between SFO and Dublin/Pleasanton BART Stations.[4]
- The Dublin/Pleasanton BART Station would have service headways of 15 minutes between Dublin/Pleasanton and SFO.
- The Oakland International Airport Connector would operate between the Coliseum BART Station and the Oakland International Airport with 15-minute headways.
- Caltrain would extend service to the Transbay Terminal.
- The Caltrain Baby Bullet service would operate along the Peninsula with 60-minute headways.
- ACE headways would be increased to 30-minute peak service inbound in the a.m. and outbound in the p.m. peak periods.
- Capitol Corridor service would be increased to 60-minute headways all day in both directions.

2025 Transit Services

In 2025, it was assumed that only the following two changes would be made to the transit services described above.

- There would be two pairs of daily BART lines in each direction serving the existing Fremont Station under the 2025 No-Build condition. Combined, they would provide a headway averaging 6 minutes for service into downtown Oakland, with all-day service provided (each set of lines

[4] The BART extension to Millbrae is now open and operational.

would operate on 12-minute headways). One pair of lines would provide direct service to Richmond, and the other would provide service to San Francisco (Daly City Station). Connections would then need to be made in downtown San Francisco for service into SFO. Under the WSX Alternative these lines would be extended south to the proposed Warm Springs Station (with or without stopping at the optional Irvington Station).

- All BART lines would experience an improvement in headways from 15 minutes to 12 minutes. These increased headways throughout the existing BART network would be made possible through the implementation of Advanced Automatic Train Control (AATC).

4.2.4 Regulatory Setting

The following local policies and regulations pertain to traffic in the study area.

4.2.4.1 City of Fremont

The City of Fremont LOS policy states:

> Maintain a Level of Service "LOS D," with a target Volume-to-Capacity ratio of 0.85 at major intersections, except where the achievement of such LOS can be demonstrated to conflict with environmental, historic or aesthetic objectives or where regional traffic is a significant cause of congestion or where substantial transportation improvements have been required and further mitigation is not feasible because of identified constraints. (*City of Fremont General Plan* 1991 as amended, Policy T 1.2.1.)

A number of the transportation study intersections are on roads of regional significance and consequently regional traffic will contribute to congestion levels. These include intersections along Mission Boulevard and Fremont Boulevard. City of Fremont staff have concurred that, for purposes of this study, mitigation for the WSX Alternative's contribution to intersection impacts would be considered appropriate at intersections where service is not maintained at LOS D or, when an intersection is already operating at LOS E or F, where the V/C ratio is substantially increased (by 0.05 or greater).

4.2.4.2 Alameda County Congestion Management Agency

The Alameda County Congestion Management Agency (ACCMA) Land Use Analysis Program requires an LOS analysis for roadway segments within the study area if 100 p.m. peak-hour vehicle trips are generated by the WSX Alternative. Accordingly, roadway segments identified as being within the Metropolitan Transportation System (MTS) have been analyzed. The MTS is a regionally designated system that includes the entire roadway network that is designated in the county's congestion management program, together with major arterials, transit services, rail, maritime ports, airports, and transfer hubs that are critical to the region's movement of people and freight.

4.2.5 Environmental Consequences and Mitigation Measures

4.2.5.1 Methodology for Analysis of Environmental Consequences

Travel Demand Model

Traffic projections and ridership forecasts were developed for this transportation study using a travel demand model. A travel demand model is one of the most common methods of forecasting future travel demand in a given area. The model is based on input such as projections of population, employment, and anticipated changes to the transportation network. The transportation analysis for the WSX Alternative is based on a travel demand model developed by the Metropolitan Transportation Commission (MTC) and modified by VTA (referred to as the "VTA-modified MTC model" in this document). Factors and assumptions used to develop the VTA-modified MTC model are explained in detail in the transportation technical report.

The VTA-modified MTC model is an enhanced version of the MTC regional model. The MTC model, BAYCAST – 90 (BAYCAST) was used to develop the 2002 Regional Transportation Plan and to prepare travel forecasts for major regional corridor studies. BAYCAST has recently been re-calibrated to 1998 traffic counts by MTC. This model was chosen as a base to the VTA-modified MTC model as it encompasses all nine Bay Area counties. The regional coverage is important for analysis of the WSX Alternative (and cumulative analysis of the WSX Alternative plus SVRTC) because many of the trips are long distance, county-to-county commutes. The BAYCAST model includes the standard four model steps: trip generation, trip distribution, mode choice and trip assignment. It also includes three extra main models: workers in household, auto-ownership choice and time of day choice models. BAYCAST is designed as an advanced state-of-the practice trip-based travel forecasting system. It is designed to be tractable, sophisticated, and user friendly.

VTA staff made a number of enhancements to the BAYCAST model. They are described below.

- Addition of a lower-level nest to the MTC home-based work mode choice models. This was done to model transit submode choices (heavy rail, commuter rail, light rail, express bus and local buses), walk-access to transit and park-and-ride/kiss-and-ride choice for the drive to transit access.
- Addition of a multinomial logit choice model to predict the auto and transit access for interregional commuters traveling between the Central Valley and the Bay Area. Previously, BAYCAST only included an estimate of interregional auto trips.
- Addition of a number of traffic analysis zones (TAZ) within the project corridor (southern Alameda County and Santa Clara County). This was done to allow more detailed estimation of station ridership by mode of access.
- Addition of a transit station park-and-ride constraint in the home-based work mode choice models.
- Estimation of air-passenger trips to the San Jose International Airport.

- Recalibration and validation of the models to the base year 2000 observed travel conditions in the project corridor.

4.2.5.2 Alternative-Specific Environmental Analysis

This section presents an analysis of the traffic-related impacts of the WSX Alternative and the No-Build Alternative. This discussion of impacts is divided into the following categories: rail ridership, local bus ridership, station area entries and exits, mode of access/egress, new transit ridership, travel time, bicycle and pedestrian impacts, intersection operation, metropolitan roadway segments, parking demand, and construction-related impacts.

Rail Ridership

The anticipated daily ridership by segment for heavy rail is listed in Table 4.2-5 for 2010 and in Table 4.2-6 for 2025. These tables provide the bidirectional ridership (rounded to the nearest hundred) between stations in the BART network. These tables also provide the ridership at the county line for the ACE trains and the Capitol Corridor trains.

Table 4.2-5. 2010 Estimated Daily Rail Ridership Summary

Station A (From)	Station B (To)	Mode	2010 No Build	2010 WSX Alternative	2010 WSX Alternative with Irvington Station
Union City	Fremont	BART	13,500	16,900	16,900
Fremont	Irvington	BART	N/A	11,800*	12,800
Irvington	Warm Springs	BART	N/A	N/A	11,100
Alameda County/Santa Clara County Line (approx)		ACE	8,000	7,900	7,900
Alameda County/Santa Clara County Line (approx)		Capitol Corridor	2,300	1,900	1,900

Notes:

* Ridership shown between Fremont and Warm Springs Stations.

Source: DKS Associates 2002 from VTA-modified MTC Model

Table 4.2-6. 2025 Rail Ridership Summary

Station A (From)	Station B (To)	Mode	2025 No Build	2025 WSX Alternative	2025 WSX with Irvington Station
Union City	Fremont	BART	18,100	22,800	23,400
Fremont	Irvington	BART	N/A	16,300*	18,200
Irvington	Warm Springs	BART	N/A	N/A	15,900
Alameda County/Santa Clara County Line (approx)		ACE	11,700	11,100	10,900
Alameda County/Santa Clara County Line (approx)		Capitol Corridor	2,800	2,100	2,100

* Ridership shown between Fremont and Warm Springs Station.

Source: DKS Associates 2002 VTA-modified MTC Model

In 2010, the ridership levels for the WSX Alternative between the Union City and Fremont BART Stations would stay constant with or without Irvington Station. With the construction of the WSX Alternative, there would be an increase in the overall forecasted ridership levels by approximately 3,400 passengers along this segment, compared to the No-Build Alternative. Ridership levels on both the ACE trains and the Capitol Corridor would decline slightly with implementation of the WSX Alternative (with or without the optional Irvington Station). Although the BART system serves a different ridership market than the ACE and Capitol Corridor systems, the relative decline in ridership for ACE and Capitol Corridor could result, in part, from their relatively low frequency of service compared to other transit systems, such as the BART system.

In 2025, the forecasted ridership increases by approximately 4,700 on the segment between the Union City and the Fremont BART Stations. With implementation of the WSX Alternative, there would be nearly a 30% increase in the ridership for this segment and a further 3% increase in ridership for the WSX Alternative with optional Irvington Station.

Local Bus Ridership

With implementation of the WSX Alternative (with and without the optional Irvington Station), ridership levels on local AC Transit bus services would decrease along the corridor between the Fremont BART Station and the proposed Warm Springs Station. Ridership on buses, especially the VTA express buses, would increase south of the proposed Warm Springs Station. It is likely that a number of passengers on the local bus routes would transfer to BART for their trip with implementation of the WSX Alternative (with or without the optional Irvington Station).

Station Entries and Exits

Tables 4.2-7 and 4.2-8 list the daily station entries and exits and the system boardings for both the existing and proposed stations in southern Alameda County for the 2010 and 2025 conditions. Both tables provide a comparison between the WSX Alternative and the No-Build conditions. As expected, there would be fewer entries and exits at the Fremont BART Station because it would no longer be the terminus. Transfers that were using the Fremont Station would be relocated to either the Warm Springs Station or, with implementation of SVRTC, the stations in Santa Clara County.

Table 4.2-7. Daily Station Entries and Exits – 2010[a]

Station	Entries and Exits		
	No Build	WSX Alternative	WSX Alternative with Irvington Station
Southern Alameda County Existing Stations			
Union City	9,200	10,300	10,400
Fremont	13,200	9,700	8,200
Southern Alameda County Existing Stations Subtotal	22,500	19,900	18,500
WSX Alternative Stations			
Irvington	—	—	4,500
Warm Springs	—	11,600	11,000
WSX Alternative Stations Subtotal	—	11,600	15,600
Southern Alameda County Proposed and Existing Stations Subtotal	22,500	31,500	34,100
BART Systemwide Total[b] Entries and Exits	775,600	787,600	790,400
BART Systemwide Total[b] Boardings	387,800	393,800	395,200

Notes:
[a] Station-level and subtotal values are for station entries and exits (i.e., total persons entering and leaving station areas). Systemwide total boardings were calculated by dividing entries and exits by two.
[b] Systemwide totals include all existing BART stations and may include WSX Alternative station(s) (depending on column).

All numbers have been independently rounded to the nearest hundred; totals may not sum up to displayed value.

Source: DKS Associates, 2002 from VTA-modified MTC model

Table 4.2-8. Daily Station Entries and Exits – 2025[a]

Station	No Build	WSX Alternative	WSX Alternative with Irvington Station
Southern Alameda County Existing Stations			
Union City	11,400	12,100	12,500
Fremont	17,100	12,200	10,500
Southern Alameda County Existing Stations Subtotal	28,500	24,300	23,000
WSX Alternative Stations			
Irvington	—	—	6,200
Warm Springs	—	16,300	15,700
WSX Alternative Stations Subtotal	—	16,300	21,900
Southern Alameda County Proposed and Existing Stations Subtotal	28,500	40,600	44,900
BART Systemwide Total[b] Entries and Exits	972,800	989,200	994,400
BART Systemwide Total[b] Boardings	486,400	494,600	497,200

Notes:
[a] Station-level and subtotal values are for station entries and exits (i.e. total persons entering and leaving station areas). Systemwide total boardings were calculated by dividing entries and exits by two.

[b] Systemwide totals include all existing BART stations and may include WSX Alternative and proposed SVRTC BART stations (depending on column).

All numbers have been independently rounded to the nearest hundred; totals may not sum up to displayed value.

Source: DKS Associates, 2002 from VTA-modified MTC model

Tables 4.2-7 and 4.2-8 indicate the entries and exits at selected stations for the years 2010 and 2025, respectively. Another important ridership result can be gained through simple division and subtraction. The number of new trips on BART can be estimated by dividing the BART systemwide total entries and exits in half. This step is necessary to convert the entries and exits into and out of the system into the number of trips; otherwise each trip would be counted twice. Subtracting the number of trips under No Build from the trips under the WSX Alternative yields the number of new trips on BART resulting from the WSX Alternative. For example, in 2010 the number of trips under No Build would be 387,800 and the number under the WSX Alternative would be 393,800. The number of new BART trips under the WSX Alternative would be 6,000. Doing the same calculation for the WSX Alternative with the optional Irvington Station in 2010 yields 7,400 new BART trips. In 2025 the number of new BART trips under the WSX Alternative would be 8,200 and the number under the WSX Alternative with the optional Irvington Station would be 10,800.

In summary, the following observations can be made from the two previous tables.

- The total number of entries and exits would increase at the Union City BART Station when any scenario is compared to the No-Build condition (during both 2010 and 2025).
- In 2010, the total entries and exits at the Fremont BART Station would decrease because the station would no longer be the terminus. When the WSX Alternative is compared to the 2010

No-Build condition, there would be a decrease of 3,500 entries and exits. With implementation of the WSX Alternative with optional Irvington Station, there would be a further 1,500 decrease in entries and exits (a 5,000 total difference when compared to the 2010 No-Build condition) at the Fremont BART Station.

- In 2010, the total entries and exits on the WSX Alternative at the Warm Springs Station would be 11,600. Implementing the WSX Alternative with the optional Irvington Station would add another 4,000 entries and exits for both stations, for a total of 15,600 in the year 2010.
- In 2010, there would be an increase in entries and exits for all southern Alameda County stations, which can be attributed to the new stations in the area. Under the 2010 WSX Alternative condition, there would be an increase of 9,000 entries and exits when compared to the 2010 No-Build condition. When the WSX Alternative with optional Irvington Station condition is compared to the 2010 No-Build condition, there would be an increase of 11,600 entries and exits in the southern Alameda County BART stations.
- In 2010, there would also be a systemwide increase in BART station entries and exits. Systemwide entries and exits increase by 12,000 under the WSX Alternative and 14,800 under the WSX Alternative with optional Irvington Station condition.
- At the Fremont BART Station under all 2025 conditions, station entries and exits would decrease when compared to the 2025 No-Build Alternative. Entries and exits would decrease by 4,900 under the WSX Alternative, and by 6,600 under the WSX Alternative with optional Irvington Station condition.
- In 2025, there would be 16,300 entries and exits at the Warm Springs Station and a further 5,600 increase for the WSX Alternative with implementation of the optional Irvington Station.
- Similar to the 2010 conditions, there would be increases in the entries and exits when all the southern Alameda County stations are combined under the 2025 conditions. There would be an increase of 12,100 under the WSX Alternative condition and an increase of 16,400 under the WSX Alternative with optional Irvington Station condition.
- In 2025, under the WSX Alternative and the WSX Alternative with optional Irvington Station conditions, there would be a 16,400 and a 21,600 increase in the systemwide entries and exits.

Mode of Access/Egress

A mode of access analysis provides the potential demands for parking, kiss-and-ride, and pedestrian access facilities, and the need for transit facilities for transfers between BART and buses at each of the stations. Tables 4.2-9 and 4.2-10 list the mode of access/egress at each of the southern Alameda stations. The proposed Montague/Capitol Station (the first station south of Warm Springs) is also listed for the two SVRTC scenarios for comparison.

Table 4.2-9. 2010 Mode of Access/Egress to BART Stations

	Mode of Access/Egress				
Station	PNR[a]	KNR[b]	Walk/Bike	Transit XFER[c]	Total Entries and Exits
2010 No Build					
Union City	3,600	1,300	500	3,700	9,200
Fremont	5,000	1,500	1,600	5,100	13,200
Irvington	0	0	0	0	0
Warm Springs	0	0	0	0	0
Southern Alameda total	8,600	2,800	2,100	8,800	22,500
2010 WSX Alternative					
Union City	4,700	1,100	600	3,900	10,300
Fremont	3,900	800	2,200	2,800	9,700
Irvington	0	0	0	0	0
Warm Springs	3,000	600	1,100	6,800	11,600
Southern Alameda total	11,600	2,500	3,900	13,500	31,500
2010 WSX Alternative with Optional Irvington Station					
Union City	4,800	1,000	600	3,900	10,400
Fremont	3,100	600	2,200	2,100	8,200
Irvington	1,900	400	1,100	1,200	4,500
Warm Springs	2,300	500	1,300	7,100	11,000
Southern Alameda total	12,100	2,500	5,200	14,300	34,100

Notes:

[a] PNR = Park-and-ride
[b] KNR = Kiss-and-ride
[c] XFER = Transfer
All numbers have been independently rounded to the nearest hundred; totals may not sum up to displayed value.

Source: DKS Associates, 2002 from VTA-modified MTC model

Table 4.2-10. 2025 Mode of Access/Egress to BART Stations

Station	Mode of Access/Egress				
	PNR[a]	KNR[b]	Walk/Bike	Transit XFER[c]	Total Entries and Exits
2025 No Build					
Union City	3,600	2,100	900	4,700	11,400
Fremont	5,100	2,600	1,800	7,500	17,100
Irvington	0	0	0	0	0
Warm Springs	0	0	0	0	0
Southern Alameda total	8,700	4,700	2,700	12,200	28,500
2025 WSX Alternative					
Union City	3,700	2,400	1,000	5,000	12,100
Fremont	4,900	1,000	2,500	3,800	12,200
Irvington	0	0	0	0	0
Warm Springs	4,600	1,000	2,500	8,000	16,300
Southern Alameda total	13,200	4,400	6,000	16,800	40,600
2025 WSX Alternative with Optional Irvington Station					
Union City	4,600	2,000	1,000	5,000	12,500
Fremont	4,100	800	2,600	2,900	10,500
Irvington	2,500	500	1,600	1,700	6,200
Warm Springs	3,600	800	2,500	8,900	15,700
Southern Alameda total	14,800	4,100	7,700	18,500	44,900

Notes:
[a] PNR = Park-and-ride
[b] KNR = Kiss-and-ride
[c] XFER = Transfer
All numbers have been independently rounded to the nearest hundred; totals may not sum up to displayed value.

Source: DKS Associates, 2002 from VTA-modified MTC model

The previous tables can be summarized as follows.

- 2010 WSX Alternative and 2025 WSX Alternative – More parking would be built in the area, and kiss-and-ride levels would decline as a result. As the VTA express buses move from the Fremont BART Station to the Warm Springs Station, there would be a corresponding change in the transit transfers. Any loss in transfers at the Fremont BART Station would be more than accounted for at the Warm Springs Station.
- 2010 WSX Alternative with optional Irvington Station and 2025 WSX Alternative with optional Irvington Station – For the 2010 WSX Alternative, more parking would be built in the southern Alameda County area, and kiss-and-ride volumes would decline. The loss in the existing transfers at the Fremont Station would be accounted for at Warm Springs.

New Transit Ridership

An examination of changes to linked transit trips indicates the number of new patrons attracted to a new transit service. A linked trip consists of all modes used from the beginning of the trip to the end of the trip. For example a person leaves home, walks to their car, drives to the BART station, catches BART, and then walks from the BART station to work. As transit is involved in this example, it is considered a linked transit trip. Similarly, if the trip involved walking to the local bus stop, catching a bus, transferring onto BART at a BART station and then walking to the final destination, this would also be considered a linked transit trip. However, if the trip involved the person simply driving to work, it is still a linked trip (due to the walk connections at either end of the trip), but is not considered a linked transit trip.

Table 4.2-11 lists the number of projected linked transit trips (rounded to the nearest hundred) from areas that would logically use the service in 2010. Table 4.2-12 lists the number of projected transit trips for 2025. These tables show the linked transit trips for four broad areas within the network: those people who stay within the Fremont/Newark/Union City area; those people traveling to Union City, Newark and Fremont; those people traveling from Newark, Fremont and Union City to other areas; and those people that travel through the Fremont/Newark/Union City area. Those people that travel through the area would include patrons traveling between the East Bay and Santa Clara County.

Table 4.2-11. 2010 Linked Transit Trips

Trips	No Build	WSX Alternative	WSX Alternative with Irvington Station
Intra[a]	9,800	10,300	10,600
To[a]	7,700	8,900	9,000
From[a]	21,400	23,600	24,100
Through[a]	9,600	10,500	10,400
Total WSX Alternative Corridor Transit Trips	48,600	53,300	54,200
Change from No Build	—	4,700	5,700
Intra Santa Clara Transit Trips	214,700	216,000	216,000

Notes:

[a] Intra: Trips solely within Southern Alameda County (MTC Super District 16: Fremont, Union City and Newark).

[b] To: Trip attractions to SD 16.

[c] From: Trip productions from SD 16.

[d] Through: Trips passing through SD 16 (e.g., Hayward to San Jose).
All numbers have been independently rounded to the nearest hundred; totals may not sum up to displayed value.

Source: DKS Associates 2002 from VTA-modified MTC model

Table 4.2-12. 2025 Linked Transit Trips

Trips:	No Build	WSX Alternative	WSX Alternative with Irvington Station
Intra[a]	11,100	11,800	12,300
To[b]	8,600	10,700	11,000
From[c]	25,300	28,000	29,100
Through[d]	11,800	13,300	13,400
Total WSX Alternative Corridor Transit Trips	56,700	63,900	65,800
Change from No Build	—	7,200	9,100
Intra Santa Clara Transit Trips	243,000	246,900	246,800

Notes:
[a] Intra: Trips solely within Southern Alameda County (MTC Super District 16: Fremont, Union City and Newark).
[b] To: Trip attractions to SD 16.
[c] From: Trip productions from SD 16.
[d] Through: Trips passing through SD 16 (e.g., Hayward to San Jose).
All numbers have been independently rounded to the nearest hundred; totals may not sum up to displayed value.

Source: DKS Associates, 2002 from VTA-modified MTC model

The following information summarizes the information presented in the previous tables.

- In 2010, with implementation of the WSX Alternative, there would be a 10% increase in transit riders. The largest increase for linked transit trips would be for those people that travel into the Fremont/Newark/Union City area from other Bay Area locations (an increase of 15% over the 2010 No-Build condition).
- In 2010, with implementation of the WSX Alternative with optional Irvington Station, there would be a 12% increase in transit riders in the WSX Alternative corridor. Similar to the 2010 WSX Alternative, the largest increase in the linked transit trips would be in transit trips to the Fremont/Newark/Union City area (an increase of 17% over the 2010 No-Build condition).
- In 2025, with implementation of the WSX Alternative, there would be an increase of 13% in linked transit trips. Again the largest increase would be for those transit riders coming into the Fremont/Newark/Union City area (a 24% increase in the linked transit riders over the 2025 No-Build condition).
- In 2025, with implementation of the WSX Alternative with optional Irvington Station, there would be an increase of 16% in new transit riders when compared to the 2025 No-Build condition. The linked transit trips to the Fremont/Newark/Union City area would experience an increase of 28% over the 2025 No-Build condition.

Impact TRN-1—Increase in new transit trips.

WSX Alternative. As shown above in Tables 4.2-11 and 4.2-12, the WSX Alternative would result in an increase in new transit trips. Regional transit ridership, particularly for trips destined for, originating in, or passing through southern Alameda County would increase. Tables 4.2-11 and 4.2-12 indicate that transit person trips would increase by 7,200 trips in 2025 with implementation of the WSX Alternative compared to the No-Build Alternative. These tables indicate a shift from automobile to transit. As discussed in the MTS analysis below, increased transit usage would reduce auto congestion. In addition, as discussed in Section 4.14, *Air Quality*, increased transit usage would reduce air pollution, and, as discussed in Section 4.15, *Energy*, increased transit usage would also lower overall energy consumption. This is a beneficial effect of the WSX Alternative.

No-Build Alternative. Under the No-Build Alternative, a smaller number of regional destinations would be served, and this limited accessibility would limit the growth of transit trips. Air quality benefits realized by the shift from automobile to transit ridership and the reduction in auto congestion resulting from increased accessibility would not be realized.

Travel Time Comparison

This section consists of sets of travel time comparisons between selected residential locations (northwest Milpitas, Irvington, Fremont, Union City, and Hayward) and selected Bay Area employment centers (downtown San Francisco; downtown San Jose, 1st Street and the Diridon Caltrain Depot; Lockheed Martin Corporation facilities in Sunnyvale; and the Pacific Commons development in Fremont). The locations have been selected as representative examples. The small set of times is not intended to characterize all travel patterns changed by the WSX Alternative. Transit riders' destinations in the Fremont-Warm Springs area are varied, with no single area dominating. Transit ridership from MTC Super District 16 (Fremont-Union City and Newark) to other parts of the Bay Area is projected to be roughly similarly split among San Francisco, the South Bay (including San Mateo County), and the rest of the East Bay. Therefore, the list of travel time comparisons is intended to capture the essence of area-wide changes associated with the BART extension alternatives.

In some cases, transit is competitive with highway times in all alternatives (for example, northwest Milpitas to downtown San Francisco). In other cases, transit travel times improve substantially for one or more of the build alternatives (for example Irvington to NUMMI). However, there is also one case (Milpitas to Pacific Commons) where transit is not competitive with auto travel, even with improved transit times, because of the need to transfer and the absence of traffic congestion for this specific origin–destination pair.

Table 4.2-13 provides a comparison of a.m. peak hour travel time (in minutes) between the 2010 conditions, and Table 4.2-14 provides a similar comparison for 2025. Auto travel times would remain roughly constant among the various alternatives analyzed due to the peak spreading function built into the VTA-modified MTC model. When demand during the peak hour exceeds capacity, the excess vehicles are shifted to either earlier or later than the peak hour. The shifting of trips from auto to transit would result in less peak spreading but would not affect auto travel times during the peak hour.

Table 4.2-13. 2010 Transit Travel Times (minutes)[a]

			Transit		
Sample Trip (Origin-Destination)[b]	Drive Alone	Carpool	2010 No Build	2010 WSX Alternative	2010 WSX Alternative with Irvington Station
Northwest Milpitas-Northwest Downtown San Francisco	101	81	74	74	75
Northwest Milpitas-Northwest Pacific Commons	16	23	84	65	66
Irvington-NUMMI	11	18	37	26	18
Irvington-Downtown San Jose	35	35	80	70	63
Fremont-Lockheed	44	36	89	66	67
Fremont-Pacific Commons	12	19	43	43	43
Union City-Diridon Caltrain Depot	53	46	69	69	69
Union City-Downtown San Jose	52	44	78	81	82
Hayward-Lockheed	66	48	75	80	81

Notes:

[a] Travel times include all modes, including walking, driving, waiting, in-vehicle travel, and other times as appropriate.

[b] Fremont location is approximately the Stevenson Boulevard/Paseo Padre Parkway intersection. Union City location is approximately the Dyer/Alvarado-Niles Parkway intersection (west of I-880). Hayward location is assumed to be at the city center.

Source: DKS Associates, 2002 from VTA-modified MTC model

Table 4.2-14. 2025 Transit Travel Times (minutes)[a]

			Transit		
Sample Trip (Origin-Destination)[b]	Drive Alone	Carpool	2025 No Build	2025 WSX Alternative	2025 WSX Alt. with Irvington Station
Northwest Milpitas-Northwest Downtown San Francisco	110	85	71	71	72
Northwest Milpitas-Northwest Pacific Commons	20	26	86	66	67
Irvington-NUMMI	11	18	40	25	18
Irvington-Downtown San Jose	40	47	82	72	65
Fremont-Lockheed	52	49	98	67	68
Fremont-Pacific Commons	14	21	45	45	45
Union City-Diridon Caltrain Depot	60	60	69	69	69
Union City-Downtown San Jose	58	58	79	82	83
Hayward-Lockheed	72	60	75	80	81

Notes:
[a] Travel times include all modes, including walking, driving, waiting, in-vehicle travel, and other times as appropriate.
[b] Fremont location is approximately the Stevenson Boulevard/Paseo Padre Parkway intersection. Union City location is approximately the Dyer/Alvarado-Niles Parkway intersection (west of I-880). Hayward location is assumed to be at the city center.

Source: DKS Associates, 2002 from VTA-modified MTC model

The addition of the optional Irvington Station would add 1 minute of additional travel time on BART. This is seen in a number of the transit time comparisons such as Fremont to Lockheed and Union City to downtown San Jose.

In a few select cases, transit travel times would increase under the WSX Alternative compared to the No-Build Alternative. An example of this difference is the trip from Union City to downtown San Jose. Under the No-Build Alternative, the traveler would use relatively infrequent Capitol Corridor service to travel to the Diridon Station in San Jose and transfer to bus. Under the WSX Alternative, the traveler would use more frequent BART service to travel to Warm Springs and transfer to bus for the trip to downtown San Jose, which is a few minutes longer compared to the No-Build Alternative.

It should be noted that BART park-and-ride lots are reserved for BART patrons only. This helps explain some of the travel time differences between alternatives. For example, travel times from Irvington to downtown San Jose decrease substantially when the optional Irvington BART Station is added. Under the WSX Alternative, Irvington riders would drive to Fremont and ride one station to Warm Springs before transferring to the VTA Route 180. Consideration was given to the effect of sell out events at the Oakland Coliseum and how those events may affect traffic in the Warm Springs or Irvington station areas. However, events at the Oakland Coliseum typically attract afternoon and evening crowds, where the patrons would be traveling counter to the prevailing commute direction or during the evening hours when traffic volumes are low. Coliseum patrons are assumed to be included in the traffic conditions described in this analysis. The optional Irvington Station would greatly increase convenience for these riders as they would have a shorter park-and-ride access time, and a shorter BART ride to Warm Springs.

The other viable option would be to ride a local bus from Irvington to Warm Springs to access the VTA 180 to downtown San Jose (the path chosen in the No-Build Alternative). However, overall travel times indicate that it would be shorter to “backtrack” to Fremont BART than to use the local bus option. BART is much faster than local bus routes and operates much more frequently. In addition, the actual drive access time to the Fremont BART station is nearly equal to the actual walk time to the local bus stop.

Finally, the travel time calculations do not factor in trip reliability. Highway travel times, for example, can vary greatly depending on weather, special events, accidents, and traffic volumes. Rail systems with exclusive rights-of-way can enhance transit reliability, although severe disruptions can occur. Ridership models typically do not capture how day-to-day trip time reliability affects mode choice.

Bicycle and Pedestrian Impacts

Bicycle and Pedestrian Impacts Related to Warm Springs Extension

Impact TRN-2—Obstruction of existing bicycle circulation facilities in the vicinity of the proposed station site.

WSX Alternative. As shown previously in Figure 3-6a, (Conceptual Site Plan, Warm Springs Station), the Warm Springs Station design would meet and enhance the bicycle facilities illustrated in the City’s Existing Bicycle Commuter Map (City of Fremont 2004b). A 6-foot Class II bicycle lane will be maintained along the portion of South Grimmer Road adjacent to the station, which coincides with the existing Class II facility. A 6-foot Class II bicycle lane would also be constructed along the Warm Springs Boulevard adjacent to the WSX Station; the City of Fremont’s Existing Bicycle Commuter Map indicates that this area does not currently include a designated, marked bicycle lane. In addition, the station design includes a 6-foot Class II bicycle lane along the North Access Road and Central Access Road. The WSX Alternative would not create any bicycle hazards or eliminate any access compared to existing and No-Build conditions and would result in no impact.

No-Build Alternative. The No-Build Alternative would result in no obstruction of existing bicycle circulation facilities in the vicinity of the proposed station site.

Impact TRN-3—Obstruction of existing pedestrian circulation facilities in the vicinity of the proposed station site.

WSX Alternative. As described above under Affected Environment, the access roads to the proposed Warm Springs Station are generally not pedestrian-oriented. Construction of the Warm Springs Station would provide new sidewalks along the currently undeveloped station frontage on Warm Springs Boulevard, improving local pedestrian circulation and access. In addition, crosswalks would be provided adjacent to the station on Warm Springs Boulevard at both the north and central station entrances, which would have traffic signals. The WSX Alternative would not create any pedestrian hazards or eliminate any access compared to existing and No-Build conditions and would result in no impact.

No-Build Alternative. The No-Build Alternative would result in no obstruction of pedestrian circulation facilities in the vicinity of the proposed station site.

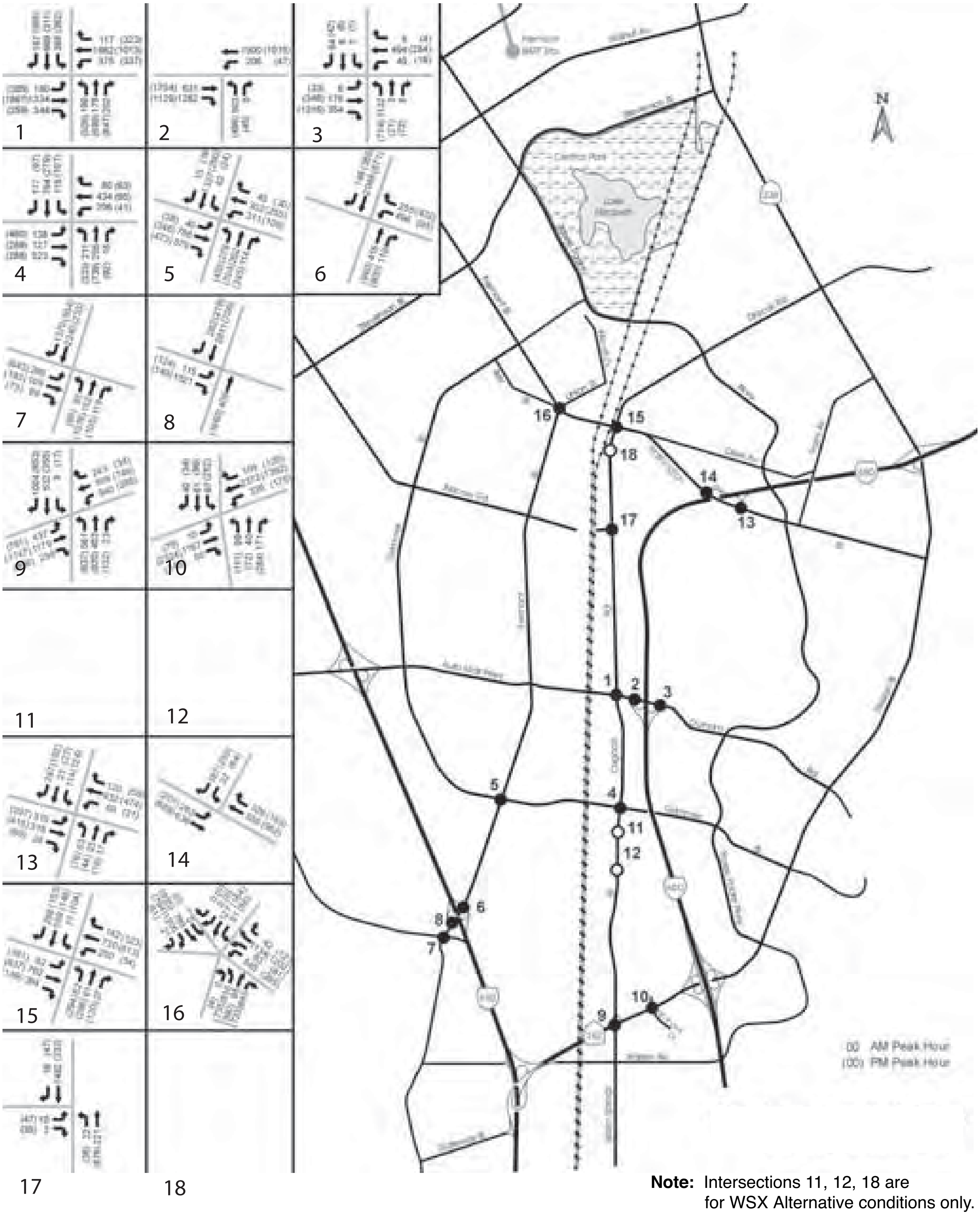
Bicycle and Pedestrian Impacts Related to Optional Irvington Station

The bicycle and pedestrian impacts related to the optional Irvington Station generally would be similar to those at the Warm Springs Station with the WSX Alternative. Currently, the Irvington Station area is not bicycle- or pedestrian-oriented. Construction of the optional Irvington Station would provide sidewalks on both sides of Osgood Road, a pedestrian overpass from the east side of Osgood road directly into the BART station, and a crosswalk at the signalized entrance to the BART parking area. These facilities would improve local circulation and access for bicyclists and pedestrians.

Intersection Operations

To evaluate the existing traffic conditions and provide a basis for comparison of conditions before and after project-generated traffic is added to the street system, the intersection LOS was evaluated at 18 study intersections. Because construction of the optional Irvington Station would redistribute trips that would have gone to either the Fremont or Warm Springs Station, all of the study intersections were evaluated both with and without the optional Irvington Station. Consideration was given to the effect of sellout events at the Oakland Coliseum and how those events may affect traffic in the Warm Springs or Irvington station areas. However, events at the Oakland Coliseum typically attract afternoon and evening crowds, where the patrons would be traveling counter to the prevailing commute direction or during the evening hours when traffic volumes are low. Oakland Coliseum patrons are assumed to be included in the traffic conditions described in this analysis. Figures 4.2-8 to 4.2-15 illustrate the turning movements for each study intersection under each scenario.

The intersections and their corresponding levels of service are presented in Table 4.2-15 for the year 2010 and Table 4.2-16 for the year 2025.



04071.04 (8-05)

Source: DKS Associates 2002.

Figure 4.2-8
2010 No Build Peak Hour Turning Movements

Note: Intersections 11, 12, 18 are for WSX Alternative conditions only.

04071.04 (8-05)

Source: DKS Associates 2002.

Figure 4.2-9
2025 No Build Peak Hour Turning Movements

Note: Intersections 11, 12, 18 are for WSX Alternative conditions only.

04071.04 (8-05)

Source: DKS Associates 2002.

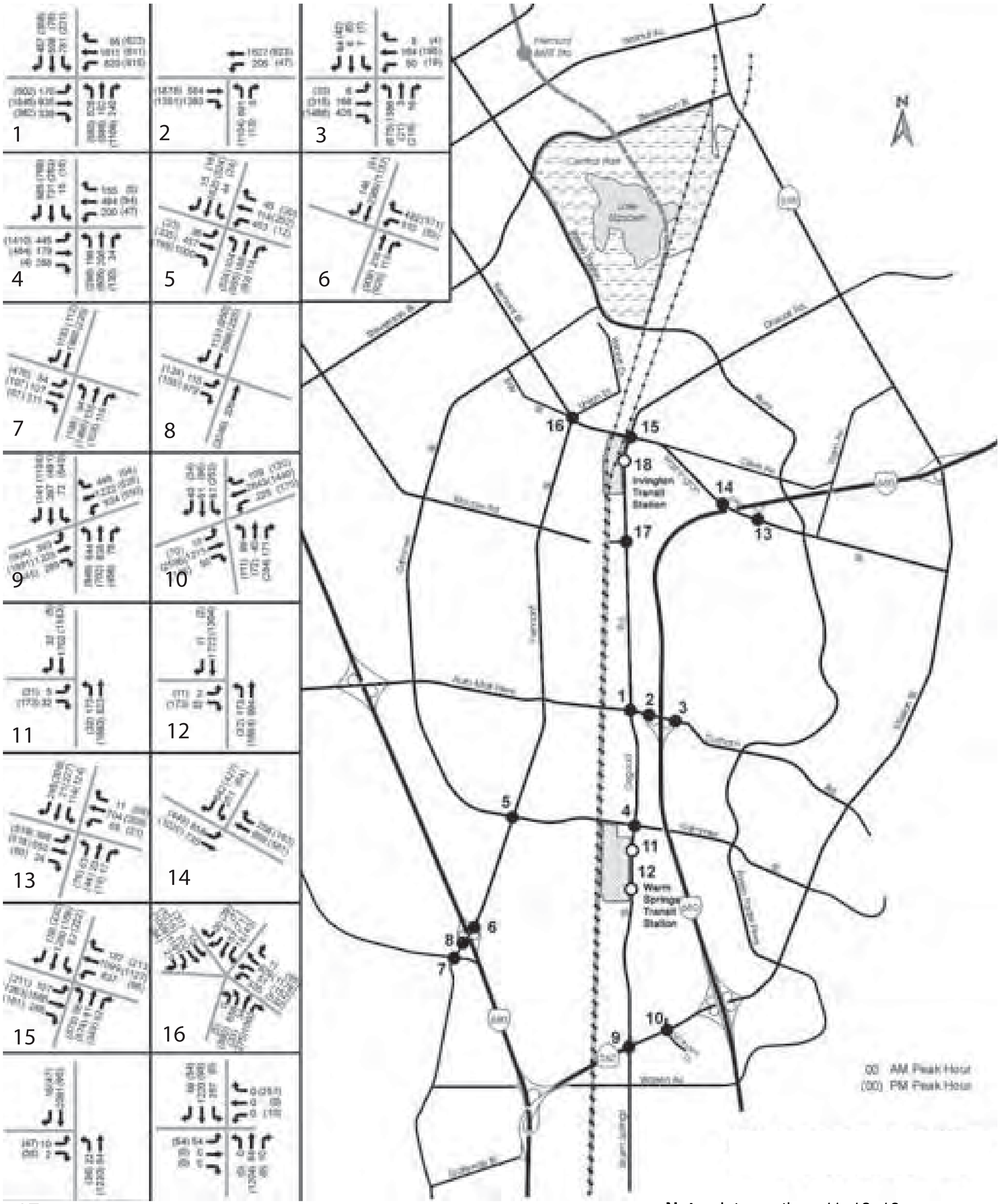
Figure 4.2-10
2010 WSX Alternative
Peak Hour Turning Movements

Note: Intersections 11, 12, 18 are for WSX Alternative conditions only.

04071.04 (8-05)

Source: DKS Associates 2002.

Figure 4.2-11
2025 WSX Alternative
Peak Hour Turning Movements

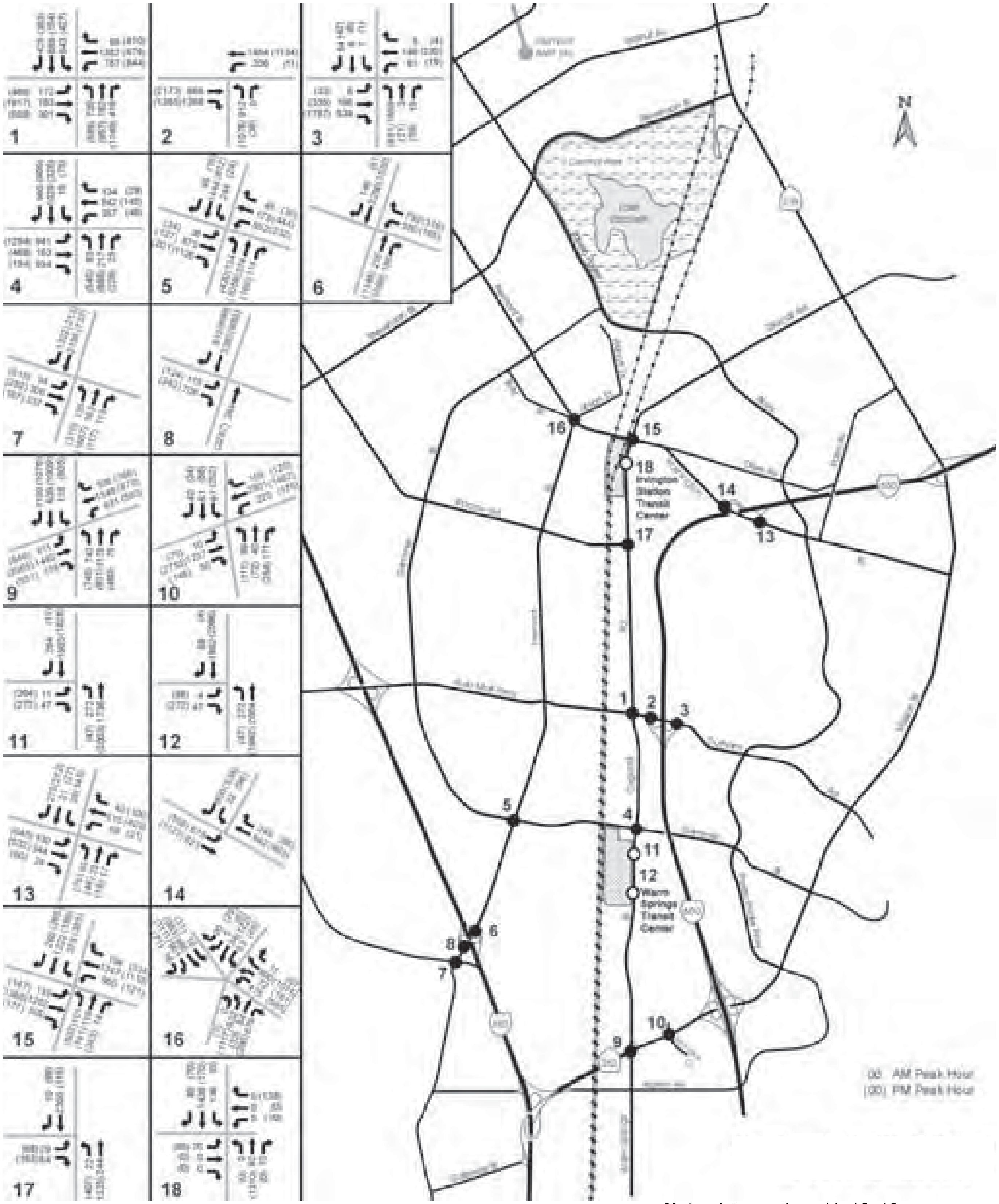


Note: Intersections 11, 12, 18 are for WSX Alternative conditions only.

04071.04 (8-05)

Source: DKS Associates 2003.

Figure 4.2-12
2010 WSX Alternative with Optional Irvington Station Peak Hour Turning Movements

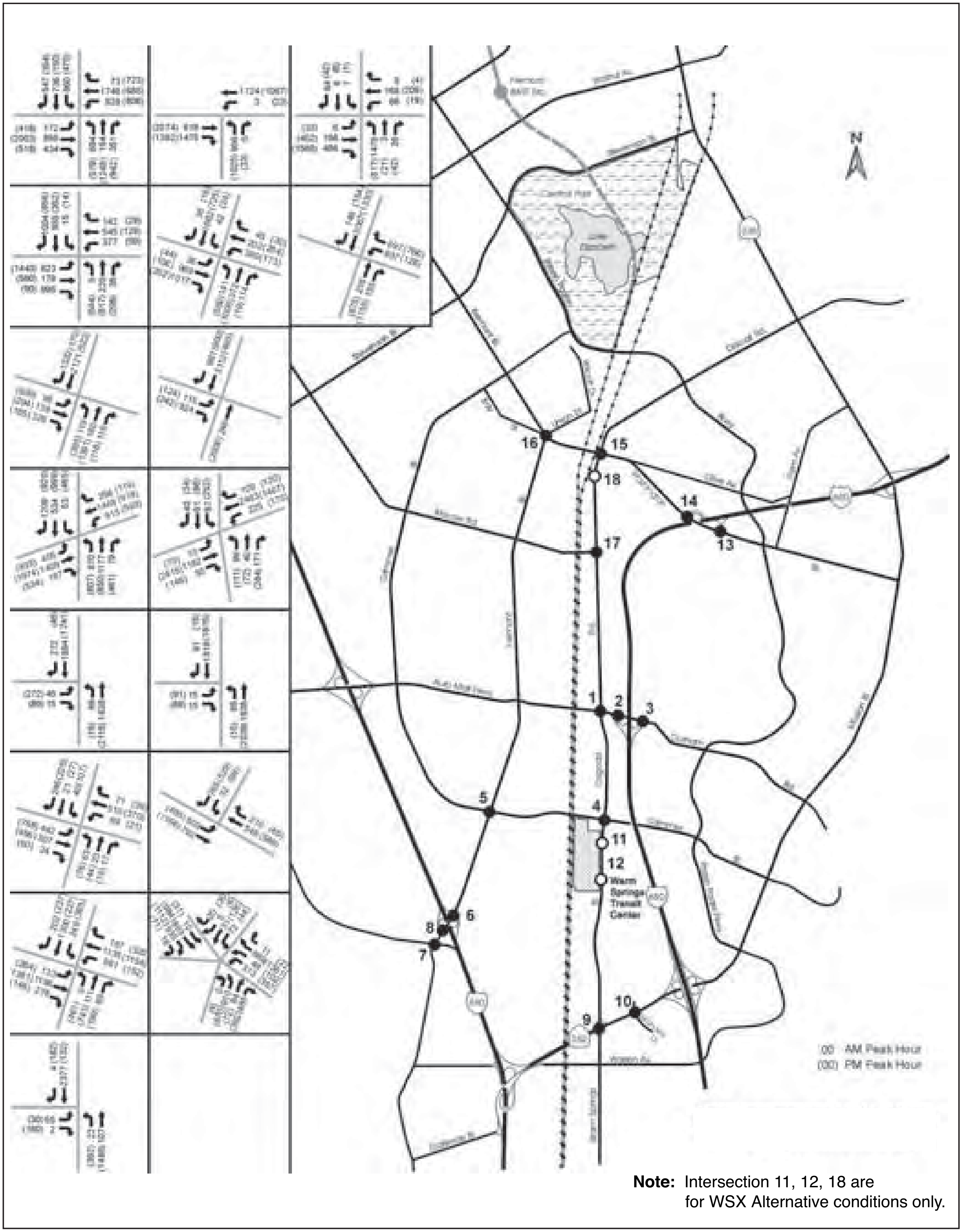


Note: Intersections 11, 12, 18 are for WSX Alternative conditions only.

04071.04 (8-05)

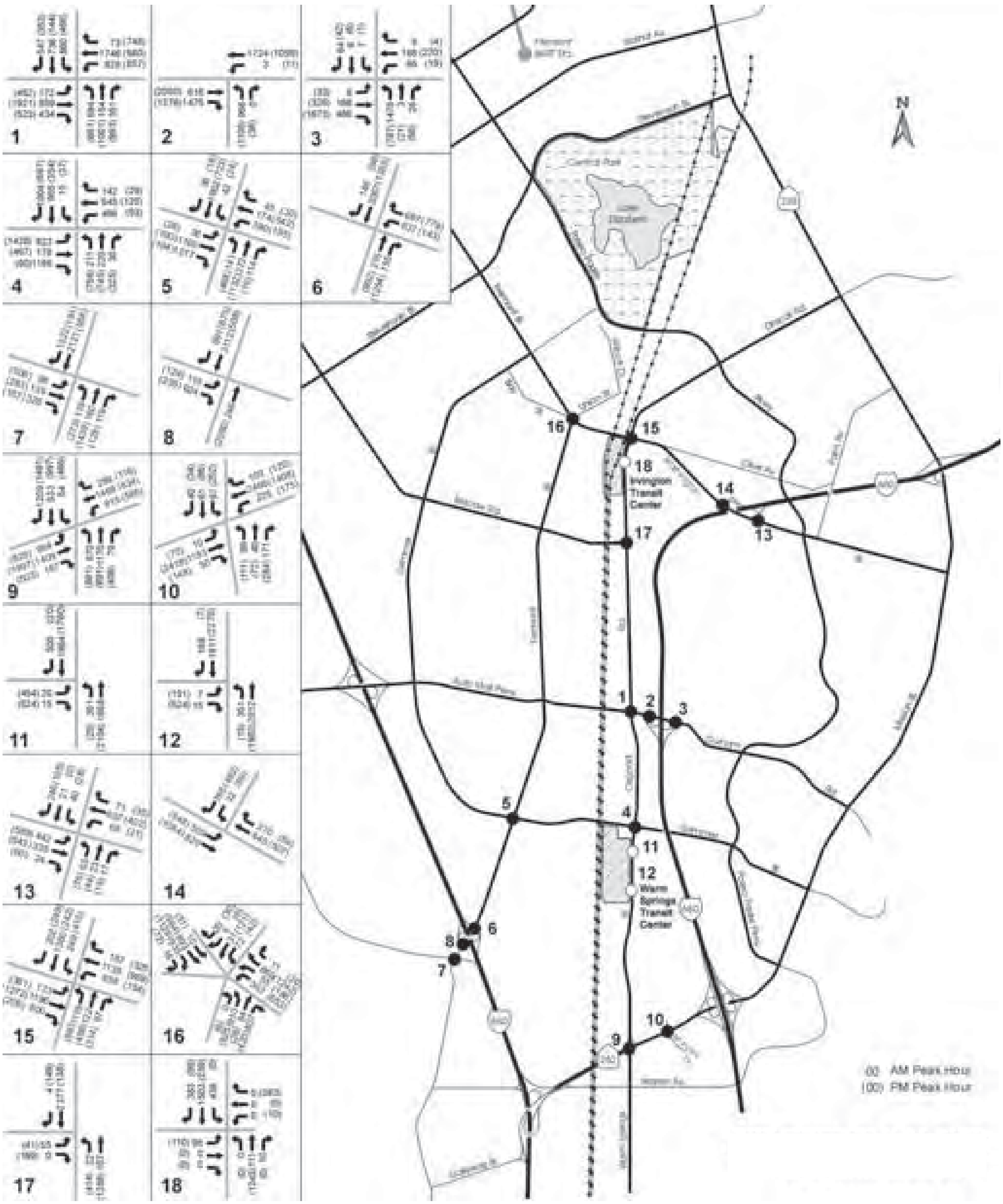
Source: DKS Associates 2002.

Figure 4.2-13
2025 WSX Alternative with Optional Irvington Station Peak Hour Turning Movements



Source: DKS Associates 2002.

Figure 4.2-14
2025 WSX Alternative with SVRTC
Peak Hour Turning Movements



Note: Intersections 11, 12, 18 are for WSX Alternative conditions only.

04071.04 (8-05)

Source: DKS Associates 2002.

Figure 4.2-15
2025 WSX Alternative with SVRTC Optional Irvington Station Peak Hour Turning Movements

Table 4.2-15. Results of Intersection Analysis for Existing Conditions and 2010 Scenarios

		Existing Conditions				2010 No-Build				2010 WSX Alternative				2010 WSX Alternative with Irvington Station			
		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour	
#	Intersection	LOS[a]	V/C[b]	LOS	V/C	LOS[a]	V/C[b]	LOS	V/C	LOS[a]	V/C[b]	LOS	V/C	LOS[a]	V/C[b]	LOS	V/C
1	Osgood Road/Durham Road/Auto Mall Parkway	D	0.84	D	0.87	D	0.84	D	0.89	D	0.90	F	1.06	E	0.92	F	1.05
2	I-680 SB Ramps/Durham Road/Auto Mall Parkway	D	0.88	C	0.75	D	0.89	C	0.78	E	0.99	E	0.91	E	0.97	E	0.91
3	I-680 NB Ramps/Durham Road/Auto Mall Parkway	A	0.54	A	0.39	A	0.56	A	0.40	A	0.53	A	0.41	A	0.56	A	0.38
4	Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard	B	0.62	C	0.74	D	0.88	D	0.86	E	0.91	F	1.29	D	0.90	F	1.23
5	Fremont Boulevard/South Grimmer Boulevard	D	0.85	A	0.44	E	0.91	A	0.58	D	0.86	A	0.57	D	0.90	B	0.62
6	Fremont Boulevard/I-880 NB Ramps	A	0.57	A	0.33	A	0.60	A	0.37	C	0.79	A	0.35	C	0.77	A	0.36
7	Fremont Boulevard/I-880 SB On-ramp/Cushing Parkway	C	0.76	A	0.42	D	0.86	A	0.47	C	0.79	A	0.48	D	0.84	A	0.49
8	Fremont Boulevard/I-880 SB Off-ramp	D	0.90	A	0.39	E	0.91	A	0.43	D	0.88	A	0.48	D	0.85	A	0.49
9	Warm Springs Boulevard/Mission Boulevard	D	0.87	D	0.81	F	1.08	E	0.94	F	1.22	F	1.16	F	1.19	F	1.19
10	Mohave Drive/Mission Boulevard	B	0.66	D	0.81	B	0.61	C	0.74	B	0.70	D	0.85	C	0.71	D	0.85
11	Warm Springs Boulevard/Northern Warm Springs Station Entrance									B	0.66	B	0.66	B	0.65	B	0.63
12	Warm Springs Boulevard/Southern Warm Springs Station Entrance									B	0.65	B	0.62	B	0.65	B	0.64
13	I-680 NB Ramps/Washington Boulevard	A	0.60	A	0.56	A	0.60	A	0.56	B	0.64	C	0.78	B	0.63	B	0.66

#	Intersection	Existing Conditions				2010 No-Build				2010 WSX Alternative				2010 WSX Alternative with Irvington Station			
		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour	
		LOS[a]	V/C[b]	LOS	V/C	LOS[a]	V/C[b]	LOS	V/C	LOS[a]	V/C[b]	LOS	V/C	LOS[a]	V/C[b]	LOS	V/C
14	I-680 SB Ramps/Washington Boulevard	A	0.41	A	0.40	A	0.41	A	0.40	C	0.73	A	0.53	D	0.87	A	0.54
15	Osgood Road/Washington Boulevard	D	0.86	C	0.72	A	0.51	A	0.58	D	0.85	B	0.70	E	0.91	C	0.74
16	Fremont Boulevard/Washington Boulevard/Bay St	A	0.60	C	0.74	F	1.27	F	1.13	F	1.05	F	1.06	F	1.27	F	1.05
17	Osgood Road/Blacow Road	[c]	[c]	[c]	[c]	A	0.51	A	0.36	B	0.68	A	0.45	B	0.67	A	0.45
18	Osgood Road/Optional Irvington Station Entrance													A	0.45	A	0.59

Notes:
[a] LOS = level of service.
[b] V/C = volume-to-capacity ratio.
[c] Not included in existing conditions due to low traffic volumes and future signalization of the intersection.
NB = northbound; SB = southbound

Source: DKS Associates 2002

Table 4.2-16. Results of Intersection Analysis for 2025 Scenarios

		2025 No-Build				2025 WSX Alternative				2025 WSX Alternative with Irvington Station			
		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour	
#	Intersection	LOS[a]	V/C[b]	LOS	V/C	LOS[a]	V/C[b]	LOS	V/C	LOS[a]	V/C[b]	LOS	V/C
1	Osgood Road/Durham Road/Auto Mall Parkway	E	1.00	F	1.06	E	1.00	F	1.11	F	1.02	F	1.09
2	I-680 SB Ramps/Durham Road/Auto Mall Parkway	E	0.98	D	0.90	E	0.98	E	0.91	E	0.97	E	0.91
3	I-680 NB Ramps/Durham Road/Auto Mall Parkway	B	0.61	A	0.42	B	0.63	A	0.44	B	0.64	A	0.44
4	Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard	F	1.14	F	1.31	F	1.33	F	1.41	F	1.25	F	1.42
5	Fremont Boulevard/South Grimmer Boulevard	F	1.07	D	0.84	F	1.05	C	0.80	E	0.99	C	0.71
6	Fremont Boulevard/I-880 NB Ramps	D	0.83	A	0.42	D	0.82	A	0.47	D	0.82	A	0.45
7	Fremont Boulevard/I-880 SB On-ramp/Cushing Parkway	D	0.87	A	0.49	D	0.89	A	0.54	D	0.89	A	0.54
8	Fremont Boulevard/I-880 SB Off-ramp	D	0.86	A	0.51	B	0.85	A	0.55	D	0.85	A	0.55
9	Warm Springs Boulevard/Mission Boulevard	F	1.42	F	1.09	F	1.13	F	1.15	F	1.20	F	1.17
10	Mohave Drive/Mission Boulevard	B	0.66	D	0.81	C	0.73	D	0.86	C	0.73	D	0.86
11	Warm Springs Boulevard/Northern Warm Springs Station Entrance					C	0.75	C	0.75	C	0.73	C	0.77
12	Warm Springs Boulevard/Southern Warm Springs Station Entrance					C	0.73	C	0.75	C	0.76	C	0.77

#	Intersection	2025 No-Build				2025 WSX Alternative				2025 WSX Alternative with Irvington Station			
		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour	
		LOS[a]	V/C[b]	LOS	V/C	LOS[a]	V/C[b]	LOS	V/C	LOS[a]	V/C[b]	LOS	V/C
13	I-680 NB Ramps/Washington Boulevard	A	0.58	D	0.81	A	0.56	D	0.85	B	0.69	C	0.76
14	I-680 SB Ramps/Washington Boulevard	C	0.71	D	0.86	A	0.60	B	0.63	B	0.66	B	0.62
15	Osgood Road/Washington Boulevard	D	0.89	D	0.85	D	0.82	D	0.82	D	0.86	C	0.78
16	Fremont Boulevard/Washington Boulevard/Bay St	E	0.98	F	1.13	E	0.91	F	1.09	E	0.92	F	1.13
17	Osgood Road/Blacow Road	C	0.77	A	0.46	C	0.74	A	0.52	C	0.73	A	0.49
18	Osgood Road/Opt. Irvington Station Entrance									A	0.52	B	0.68

Notes:
[a] LOS = level of service.
[b] V/C = volume-to-capacity ratio.
NB = northbound; SB = southbound

Source: DKS Associates 2002

Intersection Impacts Related to Warm Springs Extension

Operational Impacts and Mitigation Measures, 2010

Impact TRN-4—2010 change in V/C and LOS at the intersection of Osgood Road/Durham Road/Auto Mall Parkway.

WSX Alternative. Under 2010 WSX Alternative conditions, the intersection of Osgood Road/Durham Road/Auto Mall Parkway would operate at a V/C ratio of 0.90 and LOS D in the a.m. peak hour, and at a V/C ratio of 1.06 and LOS F in the p.m. peak hour. Adding capacity to this intersection would require right-of-way acquisition and relocation of utilities. Signal timing and phasing changes would not reduce the V/C ratio enough to achieve an acceptable LOS. The intersection would require additional widening on both Auto Mall Parkway and Osgood Road, which would entail removal of sidewalks on the south side of Auto Mall Parkway and property takes from existing businesses. Widening Auto Mall Parkway would be hindered by the roadway grade changes at this intersection and the proximity of the intersection to the I-680 southbound on-ramp to the east and the railroad overpass bridge structure to the west. For these reasons, no feasible mitigation measures are available to mitigate this impact.

No-Build Alternative. The No-Build Alternative would not result in project-related V/C or LOS changes in 2010 at the intersection of Osgood Road/Durham Road/Auto Mall Parkway.

Impact TRN-5—2010 change in V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.

WSX Alternative. Under 2010 WSX Alternative conditions, the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway would operate at a V/C ratio of 0.99 and LOS E in the a.m. peak hour, and a V/C ratio of 0.91 and LOS E in the p.m. peak hour. The following mitigation measure would reduce this impact.

> **Mitigation Measure TRN-5—Improve V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.** The intersection operations could be improved to a V/C ratio of 0.75 and LOS C in the a.m. peak hour, and a V/C ratio of 0.89 and LOS D in the p.m. peak hour with the conversion of an eastbound through lane to a shared right-turn/through lane (to create another right-turn lane). This measure could be accommodated within the existing right-of-way, although the southernmost eastbound through lane would need to be restriped to accommodate the measure. Although not achieving the goal of a V/C ratio of 0.85, the measure would result in LOS D operations, which reduce the impact.

No-Build Alternative. The No-Build Alternative would not result in project-related V/C or LOS changes in 2010 at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.

Impact TRN-6—2010 change in V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.

WSX Alternative. Under 2010 WSX Alternative conditions, the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard would operate at a V/C ratio of 0.91 and LOS E in the a.m. peak hour, and a V/C ratio of 1.29 and LOS F in the p.m. peak hour. The following mitigation measure would reduce this impact.

Mitigation Measure TRN-6—Improve V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard. The intersection operations could be improved to a V/C ratio of 0.84 and LOS D in the a.m. peak hour, and a V/C ratio of 0.79 and LOS C in the p.m. peak hour with the addition of a second northbound left-turn lane, a second eastbound left-turn lane, and an exclusive eastbound right-turn lane, and conversion of the northbound right-turn lane to a shared right-turn/through lane. The mitigation for the northbound approach could be accommodated within the existing right-of-way. With the conversion of the northbound right-turn lane to a shared right-turn/through lane, a second left-turn lane could be accommodated. The northbound approach would need to be restriped. To accommodate the mitigation for the eastbound approach, right-of-way would need to be acquired on the south side of Grimmer Boulevard. The west leg of the intersection would need to be restriped to accommodate the second eastbound left-turn lane and the exclusive eastbound right-turn lane.

No-Build Alternative. Under the No-Build Alternative, the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard would undergo no project-related changes in 2010 in V/C and LOS.

Impact TRN-7—2010 change in V/C and LOS at the intersection of Mission Boulevard/Warm Springs Boulevard.

WSX Alternative. Under 2010 WSX Alternative conditions, the intersection of Mission Boulevard/Warm Springs Boulevard would operate at a V/C ratio of 1.22 and LOS F in the a.m. peak hour, and a V/C ratio of 1.16 and LOS F in the p.m. peak hour. This intersection is built out along each approach; there are commercial properties on each of the four corners of this intersection. Widening or adding turn lanes is not feasible.

The existing and projected congestion is related largely to regional traffic traveling between I-680 and I-880. For this reason, no feasible mitigation measures are available to mitigate this impact.

No-Build Alternative. Under the No-Build Alternative, the intersection of Mission Boulevard/Warm Springs Boulevard would undergo no project-related changes in 2010 in V/C and LOS.

Operational Impacts and Mitigation Measures, 2025

Impact TRN-8—2025 change in V/C and LOS at the intersection of Osgood Road/Durham Road/Auto Mall Parkway.

WSX Alternative. Under 2025 WSX Alternative conditions, the intersection of Osgood Road/Durham Road/Auto Mall Parkway would operate at a V/C ratio of 1.11 and LOS F in the p.m. peak hour. Adding capacity to this intersection would require right-of-way acquisition and relocation of utilities. Signal timing and phasing changes would not reduce the V/C ratio enough to achieve an acceptable LOS. The intersection would require additional widening on both Auto Mall Parkway and Osgood Road, which would entail removal of sidewalks on the south side of Auto Mall Parkway and property acquisitions from existing businesses. Widening Auto Mall Parkway would be hindered by the roadway grade changes at this intersection and the proximity of the intersection to the I-680 southbound on-ramp to the east and the railroad overpass bridge structure to the west. For these reasons, no feasible mitigation measures are available to mitigate this impact.

No-Build Alternative. Under the No-Build Alternative, the intersection of Osgood Road/Durham Road/Auto Mall Parkway would undergo no project-related changes in 2025 in V/C and LOS.

Impact TRN-9—2025 change in V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.

WSX Alternative. Under 2025 WSX Alternative conditions, the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway would operate at a V/C ratio of 0.91 and LOS E in the p.m. peak hour. Implementation of Mitigation Measure TRN-5 would reduce this impact.

> **Mitigation Measure TRN-5—Improve V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.** The intersection operations for 2025 could be improved to a V/C ratio of 0.84 and LOS D in the a.m. peak hour, and a V/C ratio of 0.90 and LOS D in the p.m. peak hour with implementation of Mitigation Measure TRN-5 as described above.

No-Build Alternative. Under the No-Build Alternative, the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway would undergo no project-related change in 2025 in V/C and LOS.

Impact TRN-10—2025 change in V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.

WSX Alternative. Under 2025 WSX Alternative conditions, the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard would operate at a V/C ratio of 1.33 and LOS F in the a.m. peak hour, and a V/C ratio of 1.41 and LOS F in the p.m. peak hour. Implementation of Mitigation Measure TRN-6 would reduce this impact.

> **Mitigation Measure TRN-6—Improve V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.** The intersection operations could be improved to a V/C ratio of 0.83 and LOS D in the a.m. peak hour, and a V/C ratio of 0.86 and LOS D in the p.m. peak hour with implementation of Mitigation Measure TRN-6 as described above.

No-Build Alternative. Under the No-Build Alternative, the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard would undergo no project-related change in 2025 in V/C and LOS.

Intersection Impacts Related to Optional Irvington Station

Operational Impacts and Mitigation Measures, 2010

This scenario (2010 WSX Alternative with optional Irvington Station) assumes implementation of the WSX Alternative with the optional Irvington Station.

Impact TRN-11—2010 change in V/C and LOS at the intersection of Osgood Road/Durham Road/Auto Mall Parkway.

WSX Alternative. The intersection of Osgood Road/Durham Road/Auto Mall Parkway would operate at a V/C ratio of 0.92 and LOS E in the a.m. peak hour, and a V/C ratio of 1.05 and LOS F in the p.m. peak hour. Adding capacity to this intersection would require right-of-way acquisition and relocation of utilities. Signal timing and phasing changes would not reduce the V/C ratio enough to achieve an acceptable LOS. The intersection would require additional widening on both Auto Mall Parkway and Osgood Road, which would entail removal of sidewalks on the south side of Auto Mall Parkway and property acquisitions from existing businesses. Widening Auto Mall Parkway would be hindered by the roadway grade changes at this intersection and the proximity of the intersection to the I-680 southbound on-ramp to the east and the railroad overpass bridge structure to the west. For these reasons, no feasible mitigation measures are available to mitigate this impact.

No-Build Alternative. Under the No-Build Alternative, the intersection of Osgood Road/Durham Road/Auto Mall Parkway would undergo no project-related change in 2010 in V/C and LOS.

Impact TRN-12—2010 change in V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.

WSX Alternative. The intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway would operate at a V/C ratio of 0.97 and LOS E in the a.m. peak hour, and a V/C ratio of 0.91 and LOS E in the p.m. peak hour. Implementation of Mitigation Measure TRN-5 would reduce this impact.

> **Mitigation Measure TRN-5—Improve V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.** The intersection operations could be improved to a V/C ratio of 0.75 and LOS C in the a.m. peak hour, and a V/C ratio of 0.89 and LOS D in the p.m. peak hour with implementation of Mitigation Measure TRN-5 as described above.

No-Build Alternative. Under the No-Build Alternative, the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway would undergo no project-related change in 2010 in V/C and LOS.

Impact TRN-13—2010 change in V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.

WSX Alternative. The intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard would operate at a V/C ratio of 0.90 and LOS D in the a.m. peak hour, and a V/C ratio of 1.23 and LOS F in the p.m. peak hour. Implementation of Mitigation Measure TRN-6 would reduce this impact.

> **Mitigation Measure TRN-6—Improve V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.** The intersection operations could be improved to a V/C ratio of 0.84 and LOS D in the a.m. and p.m. peak hours with implementation of Mitigation Measure TRN-6 as described above.

No-Build Alternative. Under the No-Build Alternative, the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard would undergo no project-related change in 2010 in V/C and LOS.

Impact TRN-14—2010 change in V/C and LOS at the intersection of Mission Boulevard/Warm Springs Boulevard.

WSX Alternative. The intersection of Mission Boulevard/Warm Springs Boulevard would operate at a V/C ratio of 1.19 and LOS F in the a.m. peak hour, and a V/C ratio of 1.19 and LOS F in the p.m. peak hour. This intersection is built out along each approach; there are commercial properties on each of the four corners of this intersection. Widening or adding turn lanes is not feasible. The existing and projected congestion is related largely to regional traffic traveling between I-680 and I-880. For these reasons, no feasible mitigation measures are available to mitigate this impact.

No-Build Alternative. Under the No-Build Alternative, the intersection of Mission Boulevard/Warm Springs Boulevard would undergo no project-related change in 2010 in V/C and LOS.

Impact TRN-15—2010 change in V/C and LOS at the intersection of Osgood Road/Driscoll Road/Washington Boulevard.

WSX Alternative. The intersection of Osgood Road/Driscoll Road/Washington Boulevard would operate at a V/C ratio of 0.91 and LOS E in the a.m. peak hour. The proposed changes to the southbound and westbound approaches can be accommodated within the existing right-of-way. The approaches would need to be restriped. The mitigation measure proposed below, which requires widening the west side of Osgood Road along the BART frontage to accommodate four southbound receiving lanes, would reduce this impact.

> **Mitigation Measure TRN-15—Improve V/C and LOS at the intersection of Osgood Road/Driscoll Road/Washington Boulevard.** The intersection operations could be improved to a V/C ratio of 0.83 and LOS D in the a.m. peak hour with the conversion of the second southbound left lane to a third through lane, conversion of the southbound right-turn lane to a shared through/right-turn lane (to create four southbound through lanes), and conversion of a westbound left-turn lane to a shared left-turn/through lane (creating two westbound left turn lanes). The proposed changes to the southbound and westbound approaches could be accommodated within the existing right-of-way, although the approaches would need to be restriped. This measure would require widening the west side of Osgood Road along the BART frontage to accommodate four southbound receiving lanes.

No-Build Alternative. Under the No-Build Alternative, the intersection of Osgood Road/Driscoll Road/Washington Boulevard would undergo no project-related change in 2010 in V/C and LOS.

Operational Impacts and Mitigation Measures, 2025

This scenario (2025 WSX Alternative with optional Irvington Station) assumes implementation of the WSX Alternative with the optional Irvington Station.

Impact TRN-16—2025 change in V/C and LOS at the intersection of Osgood Road/Durham Road/Auto Mall Parkway.

WSX Alternative. Under 2025 WSX Alternative with optional Irvington Station conditions, the intersection of Osgood Road/Durham Road/Auto Mall Parkway would operate at a V/C ratio of 1.02 and LOS F in the a.m. peak hour compared to a V/C ratio of 1.00 and LOS E in the a.m. peak hour under 2025 No-Build conditions. Though the LOS would degrade from LOS E to LOS F, the V/C ratio increase would be less than 0.05. The increase in V/C would be minimal, and the impact would be negligible.

No-Build Alternative. Under the No-Build Alternative, the intersection of Osgood Road/Durham Road/Auto Mall Parkway would undergo no project-related change in 2025 in V/C and LOS.

Impact TRN-17—2025 change in V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.

WSX Alternative. Under 2025 WSX Alternative with optional Irvington Station conditions, the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway would operate at a V/C ratio of 0.91 and LOS E in the p.m. peak hour. Mitigation Measure TRN-5 would reduce this impact.

> **Mitigation Measure TRN-5—Improve V/C and LOS at the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway.** The intersection operations could be improved to a V/C ratio of 0.90 and LOS D in the p.m. peak hour with implementation of Mitigation Measure TRN-5 as described above.

No-Build Alternative. Under the No-Build Alternative, the intersection of I-680 southbound ramps/Durham Road/Auto Mall Parkway would undergo no project-related change in 2025 in V/C and LOS.

Impact TRN-18—2025 change in V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.

WSX Alternative. Under 2025 WSX Alternative with optional Irvington Station conditions, the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard would operate at a V/C ratio of 1.25 and LOS F in the a.m. peak hour, and a V/C ratio of 1.42 and LOS F in the p.m. peak hour. Mitigation Measure TRN-6 would reduce this impact.

> **Mitigation Measure TRN-6—Improve V/C and LOS at the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard.** The intersection operations could be improved to a V/C ratio of 0.86 and LOS D in the a.m. peak hour and a V/C ratio of 0.84 and LOS D in the p.m. peak hour with implementation of Mitigation Measure TRN-6 as described above.

No-Build Alternative. Under the No-Build Alternative, the intersection of Osgood Road/Warm Springs Boulevard/South Grimmer Boulevard would undergo no project-related change in 2025 in V/C and LOS.

Impact TRN-19—2025 change in V/C and LOS at the intersection of Mission Boulevard/Warm Springs Boulevard. Under 2025 WSX Alternative with optional Irvington Station conditions, the intersection of Mission Boulevard/Warm Springs Boulevard would operate at a V/C ratio of 1.17 and LOS F in the p.m. peak hour. This intersection is built out along each approach; there are commercial properties on each of the four corners of this intersection. Widening or adding turn lanes is not feasible. The existing and projected congestion is related largely to regional traffic traveling between I-680 and I-880. To reduce congestion and alleviate impacts at this intersection would require substantial right-of-way acquisition and utility relocation. For these reasons, no feasible mitigation measures are available to mitigate this adverse impact.

No-Build Alternative. Under the No-Build Alternative, the intersection of Mission Boulevard/Warm Springs Boulevard would undergo no project-related change in 2025 in V/C and LOS.

Metropolitan Transportation System Roadways

The Alameda County Congestion Management Agency (ACCMA) requires an analysis of roadways included in the Metropolitan Transportation System (MTS) only for the p.m. peak hour. MTS roadway segments in the transportation study area are listed below. For the MTS roadway analysis, project traffic was assigned to the roadways using the trip distributions from the VTA-modified MTC model. The analysis was completed for the p.m. peak hour using the travel forecasts from the VTA-modified MTC model for 2010 and 2025. The capacities per lane used in the analysis were obtained from the City of Fremont. The number of lanes for each roadway segment was also obtained from the City of Fremont and confirmed in a field review.

Some roadway segments are expected to exhibit decreases in traffic volumes as a result of project conditions, while other segments are expected to exhibit increases. For informational purposes only, the number of roadway segments that would operate at LOS E or F are identified in Table 4.2-17. A change in to a roadway segment is considered an impact if project trips cause that segment to deteriorate to LOS F. In addition, for informational purposes, Table 4.2-17 identifies the quantity of roadway segments that would experience small volume changes (2% to 4%) or large volume changes (5% or more).

Based on the ACCMA requirements, p.m. peak hour volumes on each of the MTS roadway segments were taken from the appropriate version of the VTA-modified MTC model. Park-and-ride and kiss-and-ride trips were added into each set of volumes to provide p.m. peak hour volumes for the links.

The following is a list of MTS roadways analyzed.

- I-580 between west of San Ramon Road and east of Tassajara Road.
- I-680 between south of Mission Boulevard (SR 262) and north of Mission Boulevard (SR 238).
- I-880 between south of Mission Boulevard and north of Decoto Road/SR 84.
- Alvarado-Niles Road between Mission Boulevard and I-880.
- Auto Mall Parkway between Grimmer Boulevard and Mission Boulevard.
- Decoto Road between Fremont Boulevard and Mission Boulevard.
- Dougherty Road north of Dublin Boulevard.
- Dublin Boulevard between San Ramon Road and Dougherty Road.
- Fremont Boulevard between I-880 and SR 84.
- Mission Boulevard between I-680 and Decoto Road.
- Mowry Avenue between I-880 and Mission Boulevard.
- Osgood Road between Grimmer Boulevard and Washington Boulevard.
- Paseo Padre Parkway between Mission Boulevard and Thornton Avenue.
- Peralta Boulevard between Fremont Boulevard and Mowry Avenue.
- SR 84 (Dumbarton Bridge) just east of the tollbooths.

- Stevenson Boulevard between I-880 and Fremont Boulevard.
- Thornton Avenue between I-880 and Fremont Boulevard.
- Warm Springs Boulevard between Mission Boulevard and Grimmer Boulevard.
- Washington Boulevard between Mission Boulevard and Fremont Boulevard.

To evaluate the existing traffic conditions and provide a basis for comparison of conditions before and after project-generated traffic is added to the street system, roadway segment service levels and traffic volume changes were evaluated along 154 MTS roadway segments. Table 4.2-17 indicates the quantity of segments that would have volume changes of plus or minus 2%, and plus or minus 5%, as well as changes in the LOS.

Table 4.2-17. MTS Roadway Analysis Summary

	Roadway Volume Change				LOS Improvements		LOS Degradation	
Scenario	-5% or greater	-2% to -4%	+2 to +4%	+5% or greater	State Hwy	Local Roadway	State Hwy	Local Roadway
2010 No Build	13 state highway segments and one local roadway segment operating at LOS E or F							
2010 WSX Alternative[a]	40	23	18	20	2	8	1	1
2010 WSX Alternative with Irvington Station[a]	43	20	41	15	2	8	—	1
2025 No Build	31 state highway segments operating at LOS E or F							
2025 No Build[a]	8	2	7	134	—	3	39	7
2025 WSX Alternative[b]	35	29	10	14	6	3	—	7
2025 WSX Alternative with Irvington Station[b]	40	38	7	12	4	5	4	2

Notes:
[a] Compared to 2010 No Build.
[b] Compared to 2025 No Build.

Source: DKS Associates 2002 from VTA-modified MTC Model, San Francisco Bay Area Rapid Transit District

2010 WSX Alternative

Compared to the 2010 No-Build conditions, the 2010 WSX Alternative would result in the following changes during the p.m. peak hour.

- One of the MTS state highway segments would show deterioration in LOS.
- One of the MTS local roadway segments would show deterioration in LOS.
- Two of the MTS state highway segments would show an improvement in LOS.
- Eight of the MTS roadway segments would show an improvement in LOS.

The remaining 142 MTS roadway segments would continue to operate with similar LOS.

2010 WSX Alternative with Optional Irvington Station

Compared to the 2010 No-Build conditions, the 2010 WSX Alternative with optional Irvington Station would result in the following changes during the p.m. peak hour.

- One of the MTS local roadway segments would show deterioration in LOS.
- Two of the MTS state highway segments would show an improvement in LOS.
- Eight of the MTS local roadway segments would show an improvement in LOS.

The remaining 143 MTS roadway segments would continue to operate with similar LOS.

2025 WSX Alternative

Compared to the 2025 No-Build conditions, the 2025 WSX Alternative would result in the following changes during the p.m. peak hour.

- Seven of the MTS local roadway segments would show deterioration in LOS.
- Six of the MTS state highway segments would show an improvement in LOS.
- Three of the MTS local roadway segments would show an improvement in LOS.

The other 138 MTS roadway segments would continue to operate with similar LOS.

Impact TRN-20—2025 change in V/C and LOS on northbound I-880 just south of Mission Boulevard.

WSX Alternative. Under 2025 WSX Alternative conditions, northbound I-880 just south of Mission Boulevard would operate at LOS F, compared to LOS E under the 2025 No-Build conditions. Adding capacity to the mainline freeway system is not feasible, however. Adding capacity to this segment would require substantial regional coordination, costs, and political and public approval. All freeway projects affecting I-880 that are currently programmed (effectively, projects in progress, planned, or anticipated) were included in this analysis. For these reasons, no feasible mitigation measures are available to address this impact.

No-Build Alternative. Under the No-Build Alternative, northbound I-880 just south of Mission Boulevard would undergo no project-related change in 2025 in V/C and LOS.

2025 WSX Alternative with Optional Irvington Station

Compared to 2025 No-Build condition, the 2025 WSX Alternative with optional Irvington Station would result in the following changes during the p.m. peak hour.

- Four of the MTS state highway segments would show deterioration in LOS.
- Two of the MTS local roadway segments would show deterioration in LOS.
- Four of the MTS state highway segments would show an improvement in LOS.
- Five of the MTS local roadway segments would show an improvement in LOS.

The other 139 MTS roadway segments would continue to operate with similar LOS.

Impact TRN-21—2025 change in V/C and LOS on northbound I-880 just south of Mission Boulevard.

WSX Alternative. Under 2025 WSX Alternative with optional Irvington Station conditions, northbound I-880 just south of Mission Boulevard would operate at LOS F, compared to LOS E under the 2025 No-Build conditions. Adding capacity to the mainline freeway system is not feasible, however. Adding capacity to this segment would require substantial regional coordination, costs, and political and public approval. All freeway projects affecting I-880 that are currently programmed (effectively, projects in progress, planned, or anticipated) were included in this analysis. For these reasons, no feasible mitigation measures are available to address this impact.

No-Build Alternative. Under the No-Build Alternative, northbound I-880 just south of Mission Boulevard would undergo no project-related change in 2025 in V/C and LOS.

Impact TRN-22—Reduction in traffic congestion overall on state highways.

WSX Alternative. In 2010, the WSX Alternative would result in LOS improvements on two state highway segments, and a reduction on one segment. Also, 63 of the analyzed roadway segments would experience reductions in traffic volumes in 2010 as a result of the WSX Alternative, compared to 38 that would have an increase and 53 that would have no change. In 2025, the WSX Alternative would result in LOS improvements on six state highway segments, and degradation on no segments. Also, 64 of the analyzed roadway segments would experience reductions in traffic volumes in 2025 as a result of the WSX Alternative, compared to 24 that would have an increase and 66 that would have no change. This would be a beneficial effect of the WSX Alternative.

No-Build Alternative. Under the No-Build Alternative, no reduction in traffic congestion on state highways would occur.

Parking Demand

The parking demand was estimated by using the VTA-modified MTC model forecasts of auto spaces, divided by the auto occupancy factor for peak period auto access to park-and-ride, which is 1.06 (from existing occupancy surveys conducted at the Fremont BART Station, *BART Station Access Improvements Study*).

Table 4.2-18 shows the estimated parking demand for each scenario, along with the number of parking spaces currently proposed. These demand figures include the demand generated by other transit services, such as buses.

Table 4.2-18. Parking Demand Summary[a]

Scenario	Fremont Station		Warm Springs Station		Optional Irvington Station	
	Supply	Demand	Supply	Demand	Supply	Demand
2010 No Build	2,030	2,360	—	—	—	—
2010 WSX Alternative	1,880	1,840	2,040	1,415	—	—
2010 WSX Alternative with Optional Irvington Station	1,880	1,480	2,040	1,060	925	910
2025 No Build	2,030	2,420	—	—	—	—
2025 WSX Alternative	1,880	2,310	2,040	2,170	—	—
2025 WSX Alternative with Irvington Station	1,880	1,940	2,040	1,710	925	1,175

Notes:
[a] Parking demand is based on unconstrained travel demand forecasts, without consideration of the number of actual proposed parking spaces. The local intersection traffic analysis, however, does consider the potential limitations of proposed parking supply at each of the three Fremont area stations analyzed, and assumes that BART patrons would travel to BART stations where parking is perceived to be available.

Source: DKS Associates 2002 from VTA-modified MTC Model, San Francisco Bay Area Rapid Transit District

Parking Impacts Related to Warm Springs Extension

Operational Impacts and Mitigation Measures, 2025

Impact TRN-23—Reduced parking supply at Fremont and Warm Springs Stations resulting in spillover into residential or commercial areas.

WSX Alternative. Under 2025 No-Build conditions, there would be a parking shortfall of 390 spaces at the Fremont BART Station. Under 2025 WSX Alternative conditions, there would be a parking shortfall of 430 spaces at the Fremont BART Station and 130 spaces at the proposed Warm Springs Station. The WSX Alternative would therefore add 40 spaces to the anticipated shortfall at the Fremont Station in 2025, and result in a parking shortfall of 130 spaces at the proposed Warm Springs Station in 2025. These parking shortfalls would be considered an impact of the WSX Alternative in 2025.

The following mitigation measure, which provides for 170 additional spaces at the Warm Springs Station, would compensate for this impact. It is assumed that BART patrons would travel to stations where parking is perceived to be available. Therefore, with this mitigation, spillover parking is not expected to occur, because the parking supply would be adequate to meet the anticipated demand.

Although spillover parking is not expected to be considerable, a monitoring program would be implemented to assess whether spillover parking from the BART stations becomes a sizeable problem due to unanticipated events. Accordingly, BART would provide a parking monitoring program and, if necessary to ensure that spillover remains at a negligible level, assistance with parking management as described below. With the redistribution of traffic towards the Warm Spring

Station from the Fremont Station, there would be minimal change to study intersection service levels compared to the analysis presented above.

Mitigation Measure TRN-23—Provide additional parking and implement parking monitoring program.

(A) If neither the Irvington Station nor SVRTC has commenced construction by 2010, BART will provide an additional 170 parking spaces at the Warm Springs Station.

(B) To determine whether substantial spillover parking occurs, BART will institute a monitoring program on streets adjacent to the Fremont and Warm Springs Stations. A baseline survey of parking conditions in the vicinity of the station will be conducted prior to commencement of the WSX Alternative. The baseline survey will establish parking conditions in the vicinity of the station during weekday morning hours. Monitoring will be conducted during the first six months of operation of the WSX Alternative to verify if spillover parking is occurring. Such monitoring will be based on field surveys and any complaints received by BART and local parking authorities. After the first six months of operation of the station, BART Community Relations staff will respond to parking complaints and BART will investigate such complaints to verify parking concerns.

If a parking spillover problem is confirmed by this monitoring, BART staff will assist the City of Fremont in implementing a parking management program. The program will incorporate appropriate parking control measures based on BART's Parking Management Toolkit (see the transportation technical report). The Toolkit identifies a detailed process for understanding local parking issues, evaluating parking conflicts, and implementing specific parking control measures. These measures could include time limits and time-based restrictions, increased enforcement, or parking fees. The parking management program would be implemented by the City of Fremont. BART staff will assist the city to ensure that the parking control measures, adapted as appropriate for site-specific conditions, are implemented and are achieving the necessary effect. BART staff would also continue discussions as necessary with the city to help adjust any parking control measures in response to issues that may arise during implementation of such measures.

No-Build Alternative. The No-Build Alternative would maintain the existing parking supply at Fremont Station. As a result, increased parking demand in 2025 would result in a parking shortfall of 390 spaces. This could result in parking spillover into residential and commercial areas.

Parking Impacts Related to Optional Irvington Station

Operational Impacts and Mitigation Measures, 2025

Impact TRN-24—Reduced parking supply at Fremont and Irvington Stations resulting in spillover into residential or commercial areas.

WSX Alternative. Under 2025 WSX Alternative with optional Irvington Station conditions, there would be a parking shortfall of 60 spaces at the Fremont BART Station and 250 spaces at the optional Irvington Station. However, the proposed Warm Springs Station would have a projected excess of 330 spaces, which is 20 spaces greater than the combined shortfall at the Fremont and optional Irvington Stations. It is assumed that BART patrons would travel to stations where parking is perceived to be available (e.g., the Warm Springs Station). Accordingly, the parking supply across stations would be adequate to meet the demand, and spillover parking is not anticipated to occur. With the redistribution of traffic towards the Warm Springs Station from the Fremont and Irvington

Stations, there would be minimal change to study intersection service levels compared to the analysis presented above.

Although spillover parking is not expected to be considerable, a monitoring program would be implemented to assess whether unanticipated events would cause spillover parking from the BART stations to become a substantial problem. BART would provide a parking monitoring program and, if necessary to ensure that spillover remains at a negligible level, assistance with parking management as described below.

> **Mitigation Measure TRN-24—Implement parking monitoring program.** To determine whether substantial spillover parking occurs if the optional Irvington Station has commenced construction by 2010, BART will institute a monitoring program on streets adjacent to the Fremont and Irvington Stations and, if necessary, provide parking management assistance as described above in Mitigation Measure TRN-23(B).

No-Build Alternative. The No-Build Alternative would maintain the existing parking supply at Fremont Station. As a result, increased parking demand in 2025 would result in a parking shortfall of 390 spaces. This could result in parking spillover into residential and commercial areas.

Impacts Related to Construction of the WSX Alternative

The construction scenario described in Chapter 3 (*Preferred Alternative and Other Alternatives Considered*), would introduce temporary, construction-related traffic impacts. Construction vehicles and equipment would use local roadways to access construction zones along the WSX Alternative alignment. Trucks and equipment traffic could temporarily disrupt existing local traffic patterns during the 4-year construction of the WSX Alternative. Construction traffic would include heavy equipment such as bulldozers, dump trucks, loaders, backhoes, and graders. Construction of retaining walls, embankments, and rails would also require cranes, concrete mixers, delivery trucks, compactors, and specialized track-laying equipment. Ballast would be hauled in from offsite. Workers driving to the construction site would also represent added traffic to the local and regional network.

As described in Chapter 3, public roadways within the WSX Alternative would not be blocked during construction, although temporary traffic rerouting and lane closures would be necessary in some cases. Depending on the locations and times of day of reroutings and lane closures, disruption to local traffic circulation could potentially be substantial. Contractor laydown locations could also disrupt local circulation, depending on the locations available.

Potential impacts on businesses and residences from alterations in access and parking are described in Section 4.10 (*Population, Economics, and Housing*) under Impact POP-7 (Substantial diminishment in access to and parking at businesses and residences).

In addition to the general impacts of construction traffic and staging on existing traffic operations, the following potential impacts are anticipated in specific areas.

Fremont BART Station

The WSX Alternative would require construction of an approximately 20-foot-high and 150-foot-wide embankment in the Fremont BART Station–Stevenson Boulevard area. Vehicular access and bus service at the Fremont Station could be affected during construction of the embankment. Current patterns of pedestrian and bicycle access could also be affected by construction. In addition, construction activity, including the potential use of a portion of the parking lot as a contractor laydown area, would require the temporary removal of approximately 200 existing parking spaces in the Fremont Station parking lot.

Walnut Boulevard

The WSX Alternative would require construction of an overcrossing over Walnut Boulevard. Two lanes on Walnut Boulevard would be closed during construction of the center pier in the median. There would also be a temporary reduction in vehicle clearance height while temporary structural supports (falsework) are in place during construction of the bridge deck.

Stevenson Boulevard and Fremont Central Park

The WSX Alternative would require construction of a tunnel under Stevenson Boulevard and Fremont Central Park. Portions of Stevenson Boulevard would be closed during construction of the tunnel. Traffic lanes would be temporarily diverted from Stevenson Boulevard to Fremont Central Park property, south of the existing alignment of Stevenson Boulevard, to minimize traffic disruption during tunnel construction. Parking at Fremont Central Park could be temporarily reduced because of tunnel-related construction. In addition, a potential contractor laydown area would be located on a vacant parcel adjacent to the WSX Alternative alignment, north of Stevenson Boulevard.

Paseo Padre Parkway

The WSX Alternative would require construction of a grade-separated overpass over Paseo Padre Parkway. It may be possible to coordinate construction of the BART overpass with the City of Fremont's construction of an underpass at Paseo Padre Parkway, as part of the city's grade separations project. If the WSX Alternative were constructed after completion of the city's grade separations project, the two center lanes on Paseo Padre Parkway would need to be closed during construction of the center pier for the BART bridge structure, which would be located in the parkway median.

South Grimmer Boulevard

The WSX Alternative would require construction of two BART bridge structures over South Grimmer Boulevard to replace the current grade-separated bridge used by UP. Lanes on Grimmer Boulevard would be narrowed during construction of the bridges. Work that affects the UP tracks would be coordinated with UP and subject to railroad work restrictions.

Auto Mall Parkway

Should the WSX Alternative require seismic retrofitting of the Auto Mall Parkway overpass structure (see Chapter 3 (Alternatives Considered)), retrofit work could likely be performed from beneath the structure with little or no disruption to traffic on the deck above. Work that may affect the UP tracks beneath the overpass would be subject to railroad work restrictions.

Warm Springs BART Station

Construction of the Warm Springs Station would add construction equipment and worker traffic to the local and regional network as discussed above. In addition, the station site would be used as a storage and contractor laydown site during project construction. Construction of the new station access roadway would involve removing the existing curb at Warm Springs Court and grading 200 feet for the new roadway.

Impact TRN-25—Construction-period traffic impacts.

<u>WSX Alternative</u>. Construction of the WSX Alternative would potentially result in impacts as described above on local streets and at the Warm Springs Station site. The following mitigation measure and Mitigation Measure POP-7 (from Section 4.10, *Population, Economics, and Housing*) would minimize this impact.

Mitigation Measure TRN-25—Develop and implement a construction phasing and traffic management plan.

(A) BART will prepare and implement a construction phasing and traffic management plan that defines how traffic operations (including construction equipment and worker traffic) are managed and maintained during each phase of construction. The plan will be developed in consultation with the City of Fremont, Caltrans, AC Transit, and VTA, and will be coordinated with the plan to maintain access and parking for businesses and residences described in Mitigation Measure POP-7. To the maximum practical extent, the plan will include the following measures.

- Plan, schedule, and coordinate construction activities to reduce impacts on AC Transit and VTA bus lines, so that additional buses or larger buses are not required on any route to maintain on-time performance.
- Specify predetermined haul routes from staging areas to construction sites and disposal areas by agreement with the City of Fremont prior to construction. The routes will follow streets and highways that provide the safest route and have the least feasible effect on traffic.
- Identify construction activities that, because of concerns regarding traffic safety or congestion, must take place during off-peak traffic hours. Any road closures will be done at night under ordinary circumstances. If unforeseen circumstances require road closure during the day, the City of Fremont will be consulted.
- Provide a detour plan for lane closures and for the diversions of Walnut Avenue, Stevenson Boulevard, and South Grimmer Boulevard, and require information be provided to the public on lane closures and detours using signs, press releases, and other media tools.
- Identify a telephone number that the public can call for information on construction scheduling, phasing, and duration, as well as for complaints. Such information will also be posted on BART's website.
- Provide safe access and circulation routes for vehicles, bicycles, and pedestrians during construction at the Fremont BART Station.
- Provide parking replacement where construction results in temporary displacement of parking in Fremont Central Park.
- Coordinate, to the extent feasible, with the city's grade separations project to reduce traffic disruption.

(B) To reduce to the greatest extent possible the total duration of construction where the BART alignment crosses Paseo Padre Parkway and the corresponding potential for traffic disruption, elements of the BART bridge structure should be constructed at the same time as the city's grade separations project.

Mitigation Measure POP-7—Maintain access, traffic control, and parking supply during construction. BART will develop and implement a traffic and access control plan in consultation with the City of Fremont, local business associations, and local neighborhood and homeowners' associations. Before construction begins, BART and its contractors will verify that the traffic and access control plan avoids restriction of access and that flaggers are used to direct traffic in potentially congested zones such as the Washington Boulevard and Osgood Road area. Construction workers and contractors will be advised to carpool and park onsite when feasible to reduce temporary impacts on parking for adjacent residences and businesses. Movement of heavy equipment and supplies to and from construction sites will be scheduled during non-peak travel times. Similarly, temporary lane closures due to work on aerial or below-grade structures will be scheduled for non-peak travel times. Access to businesses and residences will be maintained throughout construction phases, and existing parking supply will not be reduced.

Impacts Related to Station Construction

Impact TRN-26—Construction-period traffic impacts in the vicinity of the optional Irvington Station.

WSX Alternative. The construction-related impacts and mitigation measures for the optional Irvington Station would be similar to those of the WSX Alternative. Impacts would be mitigated through utilization of Mitigation Measures TRN-25 and POP-7 as described above.

Mitigation Measure TRN-25—Develop and implement a construction phasing and traffic management plan. This mitigation measure is described above.

Mitigation Measure POP-7—Maintain access, traffic control, and parking supply during construction. This mitigation measure is described above.

Section 4.3
Soils, Geology, and Seismicity

4.3.1 Introduction

This section of the EIS describes the potential effects of the WSX Alternative with regard to soils, geology, seismicity, and paleontological resources within the study area. Specifically, it describes the existing geologic, seismic, and soil conditions in the project area, discusses the area's potential to contain paleontological resources in the project area, summarizes relevant laws and policies, identifies the potential impacts that may result from implementation of the proposed action, and prescribes mitigation measures where necessary to mitigate potential adverse effects.

4.3.2 Affected Environment

4.3.2.1 Methodology for Assessment of Existing Conditions

The description of existing conditions and subsequent impact analysis presented in this chapter are based on a review of maps and information published by the U.S. Geological Survey (USGS), the California Geological Survey (CGS) (formerly the California Division of Mines and Geology), the County of Alameda, the Natural Resources Conservation Service (NRCS), previously published reports and other information on paleontological sites in the project area, and site-specific geologic and geotechnical reports (including logs of exploratory soil borings) prepared for the WSX Alternative.

4.3.2.2 Existing Conditions

Regional Geology

The dominant structural feature within the region is the San Andreas fault system. This system includes several major fault zones, including the San Andreas, Hayward, and Calaveras fault zones. The San Andreas fault system is the seismically active crustal boundary, along which northwestward movement of the Pacific plate west of the fault is taking place relative to the North American plate (located east of the fault).

Local Geology

The alignment of the WSX Alternative is located near the eastern edge of the San Francisco Bay. The San Francisco Bay Area is located within the Coast Range Geomorphic Province of California, a region where deformation of the earth's crust has resulted from the interaction of mobile crustal plates, or *tectonics*. Faulting, folding, and erosion have produced the northwest-trending ridges and valleys that characterize the Coast Ranges. The San Francisco Bay occupies a structural depression that formed between the uplifted Diablo Range and Berkeley Hills (along the east side of the depression) and the hills of the San Francisco Peninsula (along the west side of the down-dropped block). The structural depression has been partially filled in with sediment and inundated by seawater to form San Francisco Bay.

The alignment of the WSX Alternative is located near the eastern edge of the San Francisco Bay Plain. A break in slope to the east of the alignment forms the base of the foothills of the Diablo Range.

Several published geologic maps (Helley, Lajoie, and Burke 1972; Helley, Lajoie, Spangle, and Blair 1979) have been prepared and numerous geotechnical investigations have been completed in the study area. A geologic map showing the distribution of surficial deposits is presented in Figure 4.3-1.

The deposits generally underlying the study area are older and younger alluvium, determined on the basis of geomorphic position and physical characteristics of the sediments. The northern portion of the WSX Alternative crosses Latest Holocene Alluvial Fan Deposits (Qhfy)[1], Holocene Basin Deposits (Qhb), and Holocene Alluvial Fan Deposits, fine facies (Qhff). The Latest Holocene Alluvial Fan Deposits (Qhfy) are less than 1,000 years old and are composed of unconsolidated gravel, sand, silt, and clay. The older Holocene Alluvial Fan Deposits (Qhff) are generally less than 10,000 years old and are rich in clay deposits. In general, both of these geologic units are highly susceptible to liquefaction.

The sediments around Lake Elizabeth have been mapped as Holocene Basin Deposits (Qhb), (Knudsen et al. 2000). Based on work by Knudsen et al., these sediments consist of stratified, fine-grained alluvium that can be interbedded with lobes of coarser alluvium. Interbed of peat may also be present. Groundwater is high, often at the ground surface. These deposits may also contain irregular and discontinuous sand and silt layers/lenses; thus, layers of liquefiable material may be present within this area. Localized deposition of marsh deposits has occurred in shallow depressions along the Hayward fault. Such features are commonly known as *sag ponds* (natural depressions formed along a fault as the result of surface deformation caused by movement along the fault). The marsh deposits consist of soft to firm clay, organic clay, and peat. Due to poor consolidation and high organic content, these deposits are highly compressible.

Marsh deposits have been identified within and on the margins of Tule Pond located north and south of Walnut Avenue and east of the Fremont BART Station. Previous subsurface investigations for the Fremont BART Station indicate that the marsh deposits extend to depths of 20 to 30 feet beneath the pond (Coffman et al. 1982).

A similar sag pond, Stivers Lagoon, was modified during construction of Lake Elizabeth. The identification of organic sediments in subsurface investigations (California Division of Mines and Geology 1980) indicates that marsh deposits associated with this feature may be present in the area southeast of Lake Elizabeth to just south of Paseo Padre Parkway. These materials have a relatively high susceptibility to groundshaking. Although these materials are considered to have a low

[1] Parenthetical notations refer to the alluvium deposits and are used on the maps to identify deposit locations.

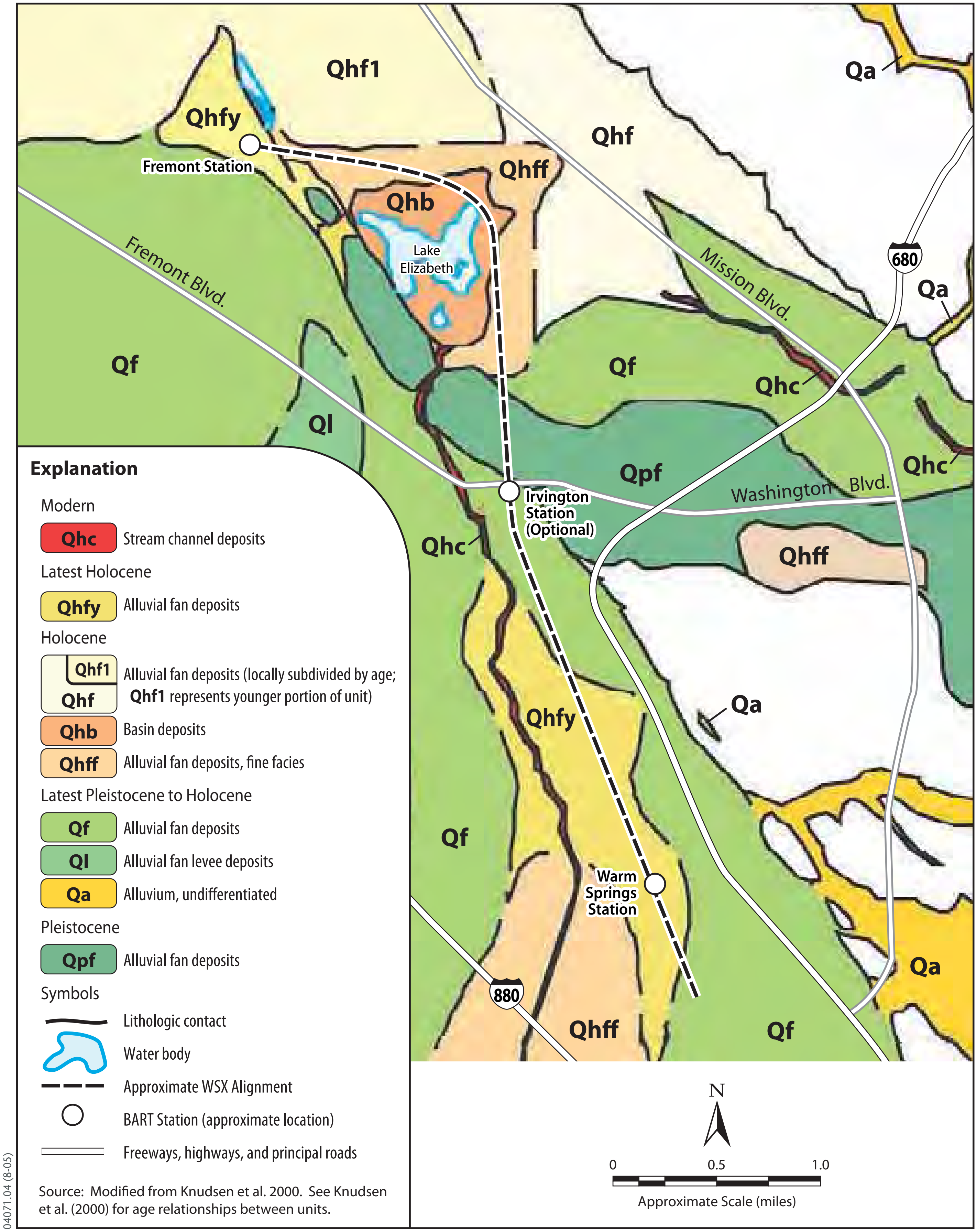


Figure 4.3-1
Generalized Geologic Map of Quaternary Deposits in the Fremont Area

liquefaction potential, localized conditions that are conducive to liquefaction (including high groundwater levels) may be present within some marsh deposits (Bay Area Transit Consultants 1989). Evidence of previous occurrence of liquefaction has been identified in the marsh deposits north of Tule (Toppozada, Real, and Parke 1981).

Proceeding southward, the proposed alignment again crosses Holocene Alluvial Fan Deposits, fine facies (Qhff) in the vicinity of Paseo Padre Parkway. From the area just south of Paseo Padre Parkway to the location of the proposed optional Irvington Station, the alignment traverses some Latest Pleistocene Alluvial Fan Deposits (Qpf). These alluvial sediments consist of interbedded deposits of very stiff to hard clays and silts, and medium dense to very dense sands and gravels, which are typically at least 150 feet thick. These deposits are interpreted as being sediments deposited during the latest Pleistocene (10,000 to 30,000 years old). The distribution of the older alluvium (Qpf) is shown in Figure 4.3-1. In general, the older alluvium is more well-consolidated and contains a higher percentage of sand and gravel than the younger alluvium in the area. The older alluvium has relatively higher density and lower plasticity, and is considered to have a low susceptibility to liquefaction.

Southward from the location of the optional Irvington Station to the southern terminus of the WSX Alternative, the alignment alternates between Latest Pleistocene to Holocene Alluvial Fan Deposits (Qf) and Latest Holocene Alluvial Fan Deposits (Qhfy). The Latest Pleistocene to Holocene Alluvial Fan Deposits (Qf) are less than 30,000 years old and comprise unconsolidated sand, gravel, silt, and clay that is moderately to poorly sorted and moderately to poorly bedded. These deposits typically have a low susceptibility to liquefaction. Poorly drained areas with marsh deposits have not been identified along this portion of the alignment. However, during subsurface investigation for the Grimmer Boulevard overcrossing, layers of loose, granular sediments were encountered to a depth of approximately 30 feet.

Soils

The surface soils along the WSX Alternative alignment, mapped in detail by the United States Department of Agriculture Soil Conservation Service, reflect the properties and age of the underlying alluvial deposits. Soils that generally occur along the WSX Alternative alignment consist of cohesive clays and silty clays that have moderately low to very low permeability, low strength, moderate to slight erosion hazard, and moderate to high shrink-swell (expansion) potential.

The northernmost portion of the proposed alignment, including the area of the Fremont BART Station and northern Central Park, is mantled by the soils of the Batella and Yolo series soils. These soils, developed on Latest Holocene Alluvium are silt loams with moderate permeability and moderate to high shrink-swell potential. Because of the gentle topography of the area (0% to 2% slopes), runoff is slow and the hazard of erosion is slight. The soils surrounding Lake Elizabeth are more clayey and include Willows and Clear Lake mapping units. The mapped extent of these soils coincides well with the mapped location of Holocene Basin Deposits and Holocene Alluvial Fan Deposits. These fine-grained soils have very low permeability, low strength, and are considered highly expansive. Slopes range between 0% and 9%.

The soils developed from the Latest Pleistocene Alluvium along the north central portion of the alignment between Paseo Padre Parkway and Washington Boulevard are mapped as Tierra loam (0% to 5% slopes) and Azule clay loam (9% to 30% slopes). These soils are typically deep and moderately well drained with moderate to high shrink-swell potential and low to very low permeability. The hazard of erosion is low within the Tierra loam map unit, but can be substantial on manufactured cut slopes and in the Azule clay loam map unit, which is characterized by steeper slope gradients.

Soils of Danville and Marvin series are mapped along the WSX Alternative alignment from the area south of Washington Boulevard to the area just north of Grimmer Boulevard. These soils typically consist of silty clay loams with low permeability, low strength, and moderate to high shrink-swell potential. The hazard of erosion within these map units is typically low to moderate.

From the area just north of Grimmer Road to the area at the south end of the WSX Alternative alignment, most soils are mapped as Clear Lake clay (Toppozada et al. 1981). The Clear Lake clay soil typically consists of low permeability clays and clay loams that have a high shrink-swell potential. Runoff from the Clear Lake clay soil is typically slow, and the hazard of erosion is typically slight (Toppozada et al. 1981).

Slope Stability

Slope stability is controlled by several complex interrelated factors, including the type and strength of geologic materials, slope gradients, and hydrologic conditions. Within the San Francisco Bay region, the majority of landslide activity occurs on slopes steeper than 15% underlain by unstable rock or sediments and where there is evidence of previous slope failures (Nason 1971). Landsliding hazards are increased during sustained periods of high precipitation and by strong groundshaking during earthquakes. Human activities such as grading can also contribute to the occurrence of landslides.

The WSX Alternative alignment is located in an area of gentle slopes and relatively stable alluvial deposits. Accordingly, slopes located along the WSX Alternative alignment are generally considered stable. To the east of the proposed alignment in the area south of Washington Boulevard, the topography of the Mission Uplands is considerably steeper. The slopes developed on the relatively older alluvial deposits in this area are generally considered stable or marginally stable.

Seismicity

The seismicity of a region is defined by distribution, recurrence, and intensity of earthquakes over a period of time in that region. The rupture surface along which the earth is displaced, one side relative to the other, is called a *fault*. Earthquakes are the result of the sudden release of energy stored as accumulated strain in rock masses on both sides of a fault. In addition, gradual release of the stored strain can occur as slow slippage along the fault, or *fault creep*. The *fault trace* is the linear zone where the fault plane intersects the ground surface. Surface rupture can occur along the fault trace during a moderate to large earthquake. Gradual deformation occurs where fault creep takes place.

The linearity of distinctively offset terrain features caused by past fault displacement are the primary source of evidence used by geologists to identify the location of faults. However, many historically damaging earthquakes have not produced recognized ground surface rupture. The time sequence of moderate to strong historic earthquakes (Richter magnitude equal to or greater than 5.5) within the San Francisco Bay Area since the early 19th century is shown in Figure 4.3-2 (Woodward-Clyde and Associates 1970).

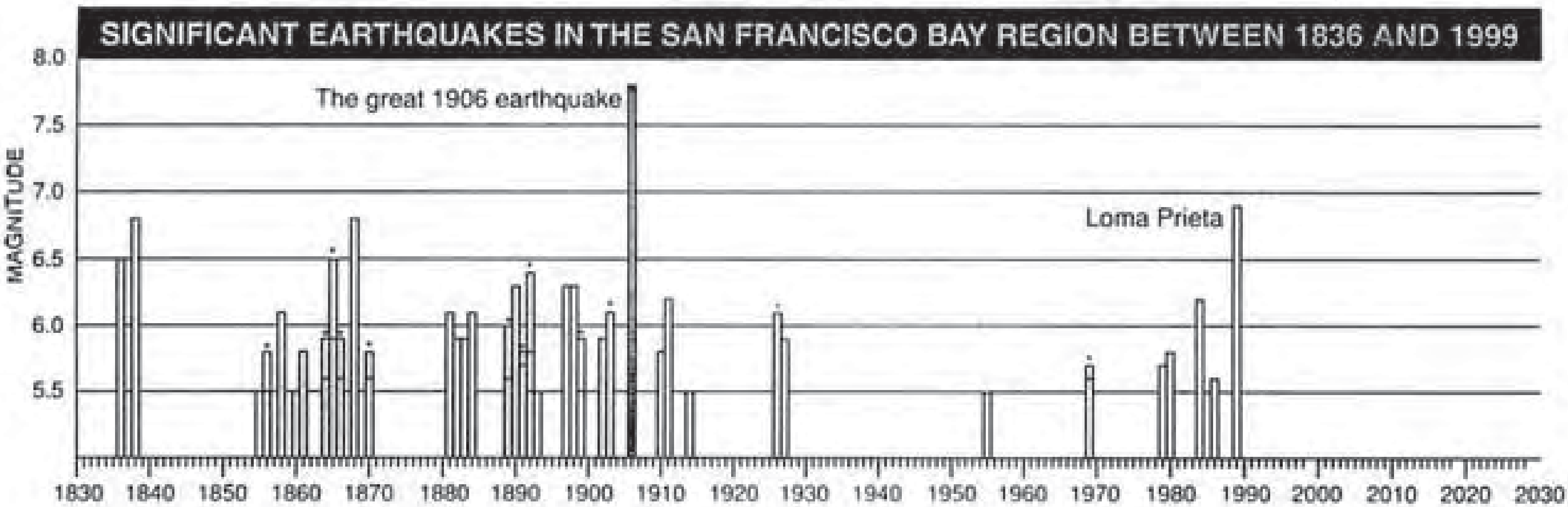


Figure 6. Time sequence of earthquakes M >= 5.5 in the SFBR since the early 19th century, from the catalog of Bakun (1999) The catalog is believed to be complete for such magnitude earthquakes since 1850. A high rate of earthquake activity in the late 1800's was followed by relatively little activity after 1906. Asterisk indicates more than one earthquake occurred that year.

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Source: Working Group on California Earthquake Probabilities, Open-File report 99-517, 1999

Figure 4.3-2
Regional Seismicity

The occurrence of an earthquake produces seismic waves, which radiate in all directions from the origin of the earthquake, or *epicenter*. The seismic waves cause groundshaking, which is typically strongest at the epicenter and diminishes (attenuates) as the waves move through the earth away from the source of the quake. The severity of groundshaking at any particular point is referred to as *intensity* and is a subjective measure of the effects of groundshaking on people, structures, and earth materials. Intensity is typically expressed by a Roman numeral in the Modified Mercalli Scale. A description of the observable effects in each of the Modified Mercalli Intensities (MMI) is presented in Table 4.3-1. The effects of groundshaking on structures depends on the design, quality of construction, and foundation materials of the structures, as well as distance from the source and shaking characteristics of the site soils.

Table 4.3-1. Modified Mercalli Intensity Scale* (After Housner, 1970)

Intensity	Description of Observable Effects
I	Detected only by sensitive instruments
II	Felt by few persons at rest, especially on upper floors; delicate suspended objects may swing
III	Felt noticeably indoors, but not always recognizes as an earthquake; standing cars rock slightly, vibration like passing truck
IV	Felt indoors by many, outdoors by a few; at night some awaken; dishes, windows, doors disturbed; cars rock noticeably
V	Felt by most people; some breakage of dishes, windows and plaster; disturbance of tall objects
VI	Felt by all; many are frightened and run outdoors; falling plaster and chimneys; damage small
VII	Everybody runs outdoors; damage to buildings varies, depending on quality of construction; noticed by drivers of cars
VIII	Panel walls thrown out of frames; falls of walls, monuments, chimneys; sand and mud ejected; drivers of cars disturbed
IX	Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked, underground pipes broken; serious damage to reservoirs and embankments
X	Most masonry and frame structures destroyed; ground cracked, rail bent slightly; landslides
XI	Few structures remain standing; bridges destroyed; fissures in ground; pipes broken; landslides, rails bent
XII	Damage total; waves seen on ground surface; lines of sight and level distorted; objects thrown into the air; large rock masses displaces

* The intensity is a subjective measure of the effect of the ground shaking, and is not an engineering measure of the ground acceleration.

Seismic waves and associated ground motion generated by earthquakes can also be detected and measured by instruments called seismographs and accelerometers. The measurement of the energy released at any point of origin, or epicenter, of an earthquake is referred to as the *magnitude,* which is generally expressed by a number on the Richter Magnitude Scale. The Richter Scale is logarithmic; each successively higher integer step in Richter magnitude reflects an increase of about 31.5 times the amount of energy released by an earthquake of the lesser integer. As such, the Richter magnitude is a specific measurement of the power of an earthquake as it occurs. The record of measurement of Richter magnitudes began in the late 1930s after seismographs were invented.

Estimates of the magnitude of earthquakes occurring prior to the development of seismographs and the Richter Magnitude Scale are made on the basis of historical accounts of the intensity of seismic events. The extent of damage and description of effects near and away from the source of an earthquake provide a basis of comparison with the effects of seismic events that have been more accurately measured in recent times.

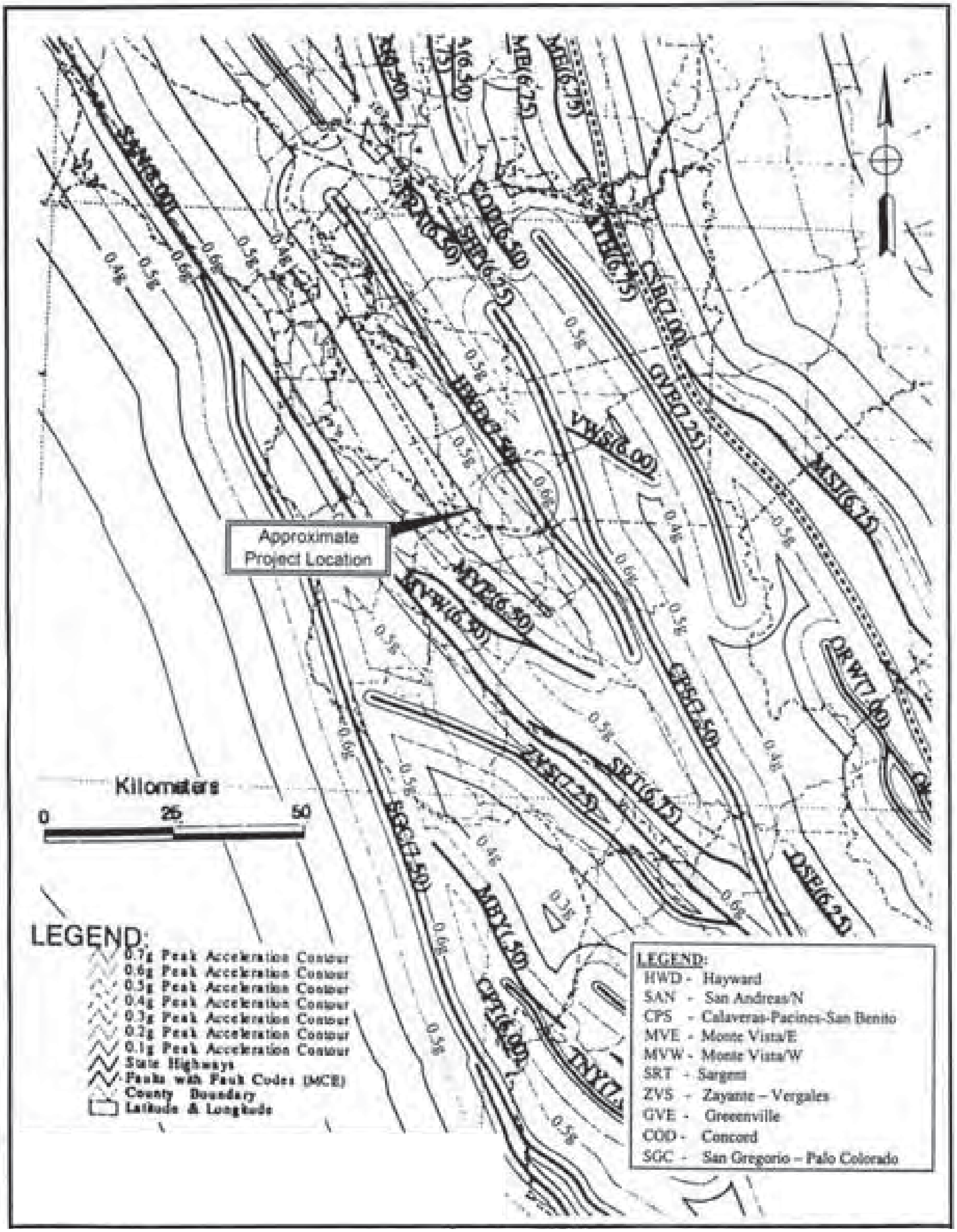
Many faults considered capable of generating damaging earthquakes did not produce seismic events during historic time. The time intervals between recurrences of individual earthquakes originating on many faults in California exceed the relatively short record of human history in the region. Estimates of the potential magnitude of future earthquakes on recognized faults are made by calculations based on the mapped distribution of earth materials in the area of the fault, measurement or estimation of the length of the fault and previous displacements along the fault (measured or inferred).

The WSX Alternative alignment would be located within the seismically active San Francisco Bay Area. The seismicity of the San Francisco Bay Area is primarily related to the San Andreas fault system (SAFS), which forms the boundary between the North American and Pacific plates. The SAFS includes several major faults and fault zones including the San Andreas fault zone (SAFZ) the San Gregorio-Hosgri fault zone to west of San Francisco Bay, and the Hayward, Calaveras, Concord, and Greenville faults in the East Bay Hills and the Diablo Range. The rate of relative motion between the North American and Pacific Plates is estimated to be approximately 1.3 inches per year (Oppenheimer and MacGregor-Scott 1991).

A portion of this motion is accommodated by movement along active faults in the region, expressed as earthquakes and fault creep. The remainder of the motion is stored as accumulated strain, which will eventually be released in future earthquakes. The major active and potentially active faults located in the study area are shown in Figure 4.3-3. These faults and their seismic potential are listed in Table 4.3-2 (California Department of Transportation 2001, Knudsen et al. 2000, Lawson 1908). The table presents estimates of the moment magnitude[2] of the largest earthquakes expected to be released by each of the faults. The maximum earthquake that can be reasonably expected to occur within the present geologic framework along a fault is typically referred to as the maximum credible earthquake (MCE). The probability of an earthquake occurring along a fault is a function of the estimated time interval between earthquakes and the known or estimated date of the last major earthquake released by that fault.

For many faults, accurate determinations of the date of the last major earthquake have not been made. The following section describes the characteristics of each of the recognized or suspected active and potentially active faults that could be the source of any earthquake that may affect the WSX Alternative.

[2] *Moment* is a physical quantity proportional to the slip on the fault times the area of the fault surface that slips; it is related to the total energy released. The moment can be estimated from seismograms (and also from geodetic measurements). The moment is then converted into a number similar to other earthquake magnitudes by a standard formula. The result is called the moment magnitude.



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Source: Modified from "California Seismic Hazard Map 1996", by L. Mualchin, based on Maximum Credible Earthquakes, Approximate Scale 1:1,000,000

Figure 4.3-3
Fault Map

Table 4.3-2. Major Faults Potentially Affecting BART Extension to Warm Springs

Fault	Distance from Project (miles)	Maximum Credible Earthquake	Years of Occurrence of Historic Damaging Earthquake	Expected Peak Bedrock Acceleration along WSX Alignment during MCE (g)	Expected Ground Acceleration along WSX Alignment during MCE (g)
Hayward	0	7.5	1868	0.7	0.7
San Andreas	18	8.0	1836,* 1838, 1906, 1989	0.25	0.32
Calaveras	5	7.5	1897, 1911, 1979, 1984	0.48	0.48
Concord	25	6.5	1955	0.07	0.11
Greenville	19	7.25	1980	0.16	0.23
Sargent-Castro	25	6.75	2002	0.08	0.14
San Gregorio-Palo Colorado	28	7.5	None known	0.12	0.18
Monte Vista East	12.5	6.5	None known	0.17	0.24
Monte Vista West	14	6.5	None known	0.14	0.21

Notes:
Distances and MCE based on California Seismic Hazard Map by Maulchin (1996).
Peak bedrock acceleration as per Sadigh et al. (1997).
Peak ground acceleration as per Caltrans Seismic Design Criteria, Version 1.2 (2001).
* Previously attributed to Hayward fault; recently attributed to San Andreas fault.

Active Faults

The Alquist-Priolo Special Studies Zones Act of 1972 (the Alquist-Priolo Act) was passed by the California legislature to address the hazards of surface rupture along seismically active faults within the state. Renamed in 1994 as the Alquist-Priolo Earthquake Fault Zoning Act, the Act charges the State Geologist with identifying active faults within the state and delineating earthquake fault zones around such faults to indicate where surface fault rupture is most likely to occur. The State of California defines an active fault as one that shows evidence of surface displacement within the last 11,000 years (Hart 1990). Most of the recognized active faults within the San Francisco Bay Area are associated with the SAFS. The SAFS includes several well-studied faults and fault zones and some less well-understood subsidiary faults. Each of the major regional active faults described below is considered capable of generating earthquakes that could produce moderate to strong groundshaking in the WSX Alternative corridor.

Hayward Fault Zone

The Hayward fault zone (HFZ), which extends approximately 55 miles from San Jose northwestward to Point Pinole, is a right-lateral strike slip fault zone within the SAFS. The fault zone is expressed by active seismicity, including large historic earthquakes, active fault creep, and abundant geomorphic evidence of fault rupture. In 1868, a major historic earthquake with an estimated Richter magnitude of 6.8 occurred along the HFZ (Steinbrugge et al. 1987).

Observation of offset cultural features and geodetic measurements across the HFZ document constant slippage (creep) occurring along the fault. Relatively high slip rates (0.31 to 0.39 inch per year) characterize a 2.5-mile stretch of the fault in southern Fremont, including the southern portion of the WSX Alternative alignment (Bonilla 1966, Borchardt 1990, Mualchin 1996). In Fremont Central Park area, the creep rate is estimated to be about 0.24 inch per year, consistent with local geodetic measurements and longer-term geologic and slip rates.

The WSX Alternative is located near the center of the southern segment of the HFZ. The fault zone trends northwest-southeast, crossing the northern portion of the WSX Alternative alignment just south of Walnut Avenue and again just north of Washington Boulevard. The rate of fault creep in the vicinity of the Walnut Avenue and Washington Boulevard crossings was recently estimated to be 0.21 ±0.01 inch/year and 0.32 ± 0.04 inch/year, respectively (William Lettis & Associates 2003). Southward from Washington Boulevard, the orientation of the fault and the WSX Alternative alignment diverge, separated by a distance of approximately 3,000 feet at the southern end of the alignment.

The HFZ is considered capable of producing the next major earthquake in the San Francisco Bay Area. Considering that the distance of the WSX Alternative from the HFZ is essentially zero, the estimated peak ground acceleration (PGA) produced at the site during the expected magnitude 7.5 MCE should be 0.7g, assuming soil type D[3] for the entire action alignment (California Department of Transportation 2001, Knudsen et al. 2000). The estimated probability for earthquakes of magnitude equal to or greater than 6.7 in the 30 years between 2000 and 2030 on Hayward fault system is 32% (Woodward-Clyde and Associates 1970). The amount of total surface displacement

[3] Soil type D includes some Quaternary muds, sands, gravels, silts and mud. Significant amplification of shaking by these soils is generally expected.

that would occur along the southern Hayward fault at the Washington Boulevard crossing as a result of a magnitude 7.0 earthquake would be about 0.7 feet, with a range of possible displacements of between 0 and 2.0 feet (William Lettis & Associates 2003). The total amount of surface displacement that would occur along the southern Hayward fault at the Walnut Avenue crossing during a similar magnitude earthquake would be about 2.3 feet, with possible displacements ranging from 1.0 to 4.6 feet (William Lettis & Associates 2003).

San Andreas Fault Zone

The SAFZ, a complex right-lateral strike slip fault zone, extends over more than 600 miles from the Gulf of California in Mexico to Cape Mendocino in northern California. The SAFZ is located approximately 18 miles southwest of the WSX Alternative area (Lawson 1908).

In the Bay Area, the SAFZ has produced earthquakes in 1836 (Richter magnitude 6.4), 1838 (Richter magnitude 7.4), and the 1906 San Francisco Earthquake (Richter magnitude 8.3 and MMI VII to X) (Sadigh et al. 1997). In addition, the Loma Prieta Earthquake in 1989 occurred along the SAFZ. It had a measured Richter magnitude of 7.1 and produced MMI VI in the area of the WSX Alternative alignment (U.S. Department of Agriculture 1981).

The San Francisco segment of the SAFZ is expected to produce an earthquake of Richter magnitude 6.7 or greater, with a probability of 21%, between now and the year 2030 (Woodward-Clyde and Associates 1970). According to the California Seismic Hazard Map by Mualchin (1996), the Maximum Credible Earthquake (MCE) for SAFZ is on the order of Magnitude 8.0 (Lawson 1908). Based on distance from the SAFZ, the estimated PGA produced at the WSX Alternative alignment during the expected Magnitude 8.0 MCE would be 0.32g (California Department of Transportation 2001, Knudsen 2000).

Calaveras Fault Zone

The Calaveras fault zone (CFZ) is located east of the HFZ, approximately 5 miles east of the WSX Alternative alignment (Lawson 1908). Recorded seismicity in the vicinity of the fault includes more than 50 earthquakes with MMI of V or greater in the period 1930 to 1972. Historic earthquakes of Richter magnitude 6 or greater originated from the CFZ include events in 1897, 1911, 1979, and 1984. The CFZ is expected to produce an earthquake event of Richter magnitude 6.7 or greater, with a probability of 18%, between now and the year 2030 (Woodward-Clyde and Associates 1970).

Seal Cove-San Gregorio-Hosgri Fault Zone

The Seal Cove-San Gregorio-Hosgri fault zone (SC-SG-HFZ), alternatively referred to as San Gregorio-Palo Colorado fault zone, forms a belt of faulting and seismicity located west of and unparallel to the SAFZ. Although the majority of the fault zone’s nearly 240-mile length lies offshore, the San Gregorio segment of the zone offsets late Quaternary deposits in the Pigeon Point area north of Santa Cruz. An MCE of Richter magnitude 7 has been estimated for the San Gregorio segment (Greensfelder 1974). Rupture of the entire length of the SC-SG-HFZ could potentially generate an earthquake of Magnitude 8.5 (Coppersmith and Griggs 1978). The fault zone lies approximately 28 miles west of the WSX Alternative alignment (Lawson 1908). An MCE could produce MMI intensity VIII shaking and 0.18g PGA along the WSX Alternative alignment (California Department of Transportation 2001, Knudsen et al. 2000). The San Gregorio segment of the fault is expected to produce an earthquake of Richter magnitude 6.7 or greater, with a probability of 10%, between now and the year 2030 (Woodward-Clyde and Associates 1970).

Sargent Fault

The Sargent fault forms the southwest boundary of a broad belt of southwest-dipping thrust and high-angle reverse faults on the eastern flank of the southern Santa Cruz Mountains, east of the SAFZ. The 4.9 Magnitude Gilroy Earthquake of May 13, 2002 originated on the Castro fault, a strand of the Sargent fault. The MCE on the Sargent fault is estimated to be Moment Magnitude 7.1 on the basis of fault length and estimated slip rate (San Francisco Bay Area Rapid Transit District 1991). The recognized active portion of the fault is located approximately 25 miles southwest of the WSX Alternative alignment (Lawson 1908). The estimated groundshaking along the WSX Alternative alignment associated with an MCE of the Sargent fault is expected to be equivalent to a PGA of approximately 0.14g (California Department of Transportation 2001, Knudsen et al. 2000).

Greenville Fault Zone

The Greenville fault zone (GFZ) has been interpreted as being the easternmost of the major branches of the SAFS. The GFZ is a 90-mile-long system of northwest trending fault segments including the Clayton, Marsh Creek, Greenville, and Arroyo Mocho segments. Historic seismicity within the GFZ includes a swarm of earthquakes in January 1980. Estimates of the MCE for the GFZ range from Moment Magnitude 6.8 to 7.25. The occurrence of a Magnitude 7.25 earthquake on this fault, which is approximately 19 miles east of the WSX Alternative alignment, would generate a PGA of approximately 0.23g (California Department of Transportation 2001, Knudsen et al. 2000). The associated MMI could be as high as VIII. There is a 6% probability that this fault will produce an earthquake event of Richter magnitude 6.7 or greater between now and 2030 (Woodward-Clyde and Associates 1970).

Green Valley-Concord Fault Zone

The Green Valley and Concord faults are the primary faults of a 2-mile-wide complex fault zone located approximately 25 miles northeast of the WSX Alternative alignment. Active seismicity and fault creep (noted in Concord) have been observed along the zone (Ellsworth et al. 1982). Historic seismicity in the fault zone includes a Richter magnitude 5.4 event in 1955. A swarm of earthquakes in 1989, centered near Alamo, appears to have occurred on a fault between the Concord and Calaveras faults, suggesting a link between the two major fault zones (Nilsen et al. 1979). The estimated MCE for the Concord fault is estimated to be 6.5 (Lawson 1908), and the associated PGA is expected to be 0.11g along the WSX Alternative alignment (California Department of Transportation 2001, Knudsen et al. 2000). There is a probability of 6% for Green Valley and Concord faults to produce an earthquake event of Richter magnitude 6.7 or greater between now and the year 2030 (Woodward-Clyde and Associates 1970).

Monte Vista East-Monte Vista West Fault Zone

The Monte Vista East/West (MVE/MVW) faults compose a system of reverse faults located on the southwest side of the Santa Clara Valley, just east of the SAFZ. The California Seismic Hazard Map (1996) indicates that the MCE for the MVE/MVW faults is expected to be Magnitude 6.5. The recognized active portions of MVE/MVW faults are located approximately 12.5 and 14 miles respectively southwest of the WSX Alternative alignment (Lawson 1908). The estimated groundshaking along the WSX Alternative alignment associated with an MCE occurring on these faults should be equivalent to a PGA of approximately 0.24g and 0.21g, for the east and west segments, respectively (California Department of Transportation 2001, Knudsen et al. 2000).

Other Potentially Active Faults

Numerous potentially active faults have been identified in the San Francisco Bay Area. The potentially active faults significant to the assessment of seismic risks in the Fremont area include the Silver Creek, Mission, and Shannon faults. These potentially active faults may be the source of moderate to large earthquakes at some time in the future. However, there is currently insufficient data to specify MCEs for these faults.

Paleontological Resources

Paleontological resources are defined as fossilized remains of prehistoric vertebrate and invertebrate organisms; fossil tracks and trackways; and plant fossils. Fossils are important scientific and educational resources because of their use in

- Documenting the presence and evolutionary history of particular groups of organisms, some of which are now extinct;
- Reconstructing the environments in which these organisms lived; and
- Determining the relative ages of the strata in which they occur and the timing of past geologic events.

In many cases, the decision on how to manage paleontological resources must be based on the potential or likelihood that such resources are present at a specific site, because the actual situation cannot be known until construction excavation is underway. The Society of Vertebrate Paleontology (SVP) describes the likelihood that a particular geologic unit or a particular area supports significant paleontological resources as its *sensitivity* for paleontological resources. Sensitivity is evaluated as high, low, or undetermined, and SVP's recommended treatment to ensure adequate and appropriate protection of paleontological resources depends on the identified level of sensitivity, as summarized in Table 4.3-3.

Table 4.3-3 Recommended Treatment of Paleontological Resources Based on Paleontological Sensitivity

Sensitivity Category	Definition	Recommended Treatment
High potential (High sensitivity)	Areas underlain by rock units from which vertebrate or significant invertebrate fossils or suites of plant fossils have been recovered.	■ Preliminary survey and surface salvage before construction begins. ■ Monitoring and salvage during construction. ■ Specimen preparation; identification, cataloging, curation, and storage of materials recovered. ■ Preparation of final report describing finds and discussing their significance. *All work should be supervised by a professional paleontologist who maintains the necessary collecting permits and repository agreements.*

Sensitivity Category	Definition	Recommended Treatment
Undetermined potential (Undetermined sensitivity)	Areas underlain by sedimentary rock units for which little information is available.	■ Preliminary field surveys by a qualified vertebrate paleontologist to assess project area's sensitivity. ■ Design and implementation of mitigation if needed, based on results of field survey.
Low potential (Low sensitivity)	Areas underlain by deposits that are not known to have produced a substantial body of significant paleontologic material.	Protection and salvage are generally not required. However, a qualified paleontologist should be contacted if fossils are discovered during construction, in order to salvage finds and assess the need for further mitigation.

Source: Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee, 1995

As discussed previously, Figure 4.3-1 presents a generalized geologic map of Quaternary deposits in the Fremont area. As shown, the proposed WSX alignment and new station locations are situated primarily on alluvial deposits ranging in age from Pleistocene (approximately 1.8 million to 11,500 years old) to Holocene (younger than 11,500 years).

The following sections describe the geologic units exposed along the WSX alignment, and their known and inferred paleontological resources. The paleontological sensitivity of each geologic unit is also evaluated. Consistent with SVP's guidelines Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995, note that all vertebrate fossils are categorized as being of significant scientific value and all stratigraphic units in which vertebrate fossils have previously been found, or are likely to be found, are considered highly sensitive for paleontological resources.

Pleistocene Units

Various systems of formal and informal nomenclature have been used for the Pleistocene units of the Fremont area, and one of the challenges in evaluating paleontological sensitivity is to establish the relationship between the various systems.

The name Irvington Gravels (Savage 1951) has been applied to a sequence of poorly consolidated, clast-supported conglomerates with minor fine-grained material (Holland and Allen 2000) that is locally exposed along the Hayward fault trend in Fremont. The Irvington Gravels are likely equivalent to Pleistocene portions of the alluvial aquifer sequence in the regionally important Niles Cone groundwater subbasin (see California Department of Water Resources 2004), implying that they or equivalent strata are extensive in the subsurface. The unit is believed to record deposition in a braided stream environment between about 1.5 and 0.15 million years ago (Albert 1999, Graymer and Lienkaemper 2002).

The Irvington Gravels have yielded a diverse vertebrate fossil assemblage that includes mammoths, musk oxen, horses, camels, ground sloths, ground squirrels, deer, dire wolves, elk, and saber-toothed cats. Of 18 different mammals identified from the deposits, 50% are extinct (Savage 1951). Savage (1951) named the assemblage the Irvington fauna and suggested that it represented one of the best examples of early Pleistocene terrestrial life in the western United States. The Irvington Gravels are the type section for the Irvingtonian Stage of the widely applied North American Land Mammal Chronology (Savage 1951, Graymer 1995).

Vertebrate fossils have been recovered from the Irvington Gravels at several sites near what is now the Irvington District in the City of Fremont (e.g., Savage 1951, Blueford and Belasky 2005). Figure 4.3-4 shows the vicinity of three sites that have yielded materials now housed at the University of California Museum of Paleontology in Berkeley. Additional fossil materials from the Irvington Gravels are on display at the Math/Science Nucleus in Fremont.

The paleontological sensitivity of the Irvington Gravels is considered high, because of the diversity and richness of the fossils recovered from the unit to date. There is an additional degree of sensitivity associated with the unit (and its fossil contents) because of its role as the stratotype for the Irvingtonian Stage, and thus as a resource of concern to paleontologists nationwide, if not worldwide. The paleontological sensitivity of other units in the project area believed to be equivalent or partially equivalent to the Irvington Gravels is also considered high; this includes all Pleistocene materials in the project area. The Latest Pleistocene alluvial fan deposits (Qpf) as mapped by Knudsen et al. 2000 are considered especially likely to contain significant paleontological resources in the project area.

Latest Pleistocene to Holocene Units

Latest Pleistocene to Holocene alluvial fan deposits (Qf) as mapped by Knudsen et al. consist of moderately to poorly sorted and bedded sand, gravel, silt, and clay deposited on gently inclined fan surfaces (Knudsen et al. 2000). This unit is considered likely to contain vertebrate fossils, because California's Pleistocene alluvium commonly contains vertebrate materials. For instance, vertebrate fossils—including mammoth, bison, ground sloth, and the horse *Equus*—have been recovered from Late Pleistocene alluvium near Las Positas College, approximately 4 miles northwest of the City of Livermore (Savage 1951, Barlock 1988). Because of its potential to contain vertebrate fossils, Knudsen et al.'s Qf unit is considered to have high sensitivity for paleontological resources.

Holocene Units

As discussed previously and shown in Figure 4.3-1, Knudsen et al. (2000) have mapped the following units of Holocene age (younger than about 11,500 years) in the project area:

- Alluvial fan deposits, fine facies (Qhff),
- Holocene basin deposits (Qhb), and
- Alluvial fan deposits of latest Holocene age (younger than 1,000 years) (Qhfy).

Many paleontologists consider Holocene biologic remains too young to qualify as fossils in the strict sense (e.g., Doyle 1996). Using this definition, the Holocene units of the project area are too young to contain fossils *sensu stricto*, and no "fossil" (*sensu lato*) materials have been reported from them. Consequently, the paleontological sensitivity of these units is considered low in the project area.

4.3.3 Regulatory Setting

The following federal and state laws, regulations, ordinances, and rules are related to geologic hazards and the construction and operation of the WSX Alternative.

4.3.3.1 Federal

Section 402 of the Clean Water Act

Amendments in 1987 to the federal Clean Water Act (CWA) added Section 402, which establishes a framework for regulating municipal and industrial stormwater discharges under the National Pollutant Discharge Elimination System (NPDES) program. Under the CWA and implementing regulations, any construction activity, including earthwork, that disturbs 1 acre or more must obtain coverage under the state's General Permit for Storm Water Discharges Associated with Construction Activity (General Permit). See Section 4.5, *Hydrology*, for a more detailed description of Section 402 of the CWA.

Federal Antiquities Act of 1906

The federal Antiquities Act of 1906 was enacted with the primary goal of protecting cultural resources in the United States. As such, it explicitly prohibits appropriation, excavation, injury, and destruction of "any historic or prehistoric ruin or monument, or any object of antiquity" located on lands owned or controlled by the federal government, without permission of the secretary of the federal department with jurisdiction. It also establishes criminal penalties, including fines and/or imprisonment, for these acts. Neither the Antiquities Act itself nor its implementing regulations (Title 43, Code of Federal Regulations [CFR], Part 3) specifically mentions paleontological resources. However, several federal agencies—including the National Park Service, the Bureau of Land Management, and the U.S. Forest Service—have interpreted *objects of antiquity* as including fossils. Consequently, the Antiquities Act represents an early cornerstone for efforts to protect the nation's paleontological resources.

Paleontological Resources Preservation Act

The federal Paleontological Resources Preservation Act of 2002 (PRPA) was specifically intended to codify the generally accepted practice of limiting collection of vertebrate fossils and other rare and scientifically significant fossils to qualified researchers who obtain a permit from the appropriate state or federal agency and agree to donate any materials recovered to recognized public institutions where they will remain accessible to the public and to other researchers. The PRPA incorporates the following key findings of a recent report issued by the Secretary of the Interior with input from staff of the Smithsonian Institution, USGS, various federal land management agencies, paleontological experts, and the public (Society of Vertebrate Paleontology 2003).

- Most vertebrate fossils, and some fossils of other types (invertebrates, plants) represent a rare resource.
- Illegal collection and theft of fossil materials from public lands is a serious problem; penalties for fossil theft should be strengthened.
- Effective stewardship requires accurate information; federal fossil collections should be preserved and made available for research and educational use.
- Federal management of fossil resources should emphasize opportunities for public involvement.

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Figure 4.3-4
Location of Pleistocene Vertebrate Fossil Finds Relative to BART WSX Alignment

4.3.3.2 State

Alquist-Priolo Earthquake Fault Zoning Act

California's Alquist-Priolo Earthquake Fault Zoning Act (P.R.C. Sec. 2621 et seq.), originally enacted in 1972 as the Alquist-Priolo Special Studies Zones Act, is intended to reduce the risk to life and property from surface fault rupture during earthquakes. The Alquist-Priolo Act prohibits the location of most types of structures intended for human occupancy across the traces of active faults and strictly regulates construction in the corridors along active faults (Earthquake Fault Zones). It also defines criteria for identifying active faults, giving legal weight to terms such as active, and establishes a process for reviewing building proposals in and adjacent to Earthquake Fault Zones.

Under the Alquist-Priolo Act, faults are zoned and construction along or across them is strictly regulated if they are "sufficiently active" and "well-defined." A fault is considered sufficiently active if one or more of its segments or strands shows evidence of surface displacement during Holocene time (defined for purposes of the Alquist-Priolo Act as referring to approximately the last 11,000 years). A fault is considered well defined if its trace can be clearly identified by a trained geologist at the ground surface or in the shallow subsurface, using standard professional techniques, criteria, and judgment (Hart and Bryant 1997).

Seismic Hazards Mapping Act

Like the Alquist-Priolo Act, the Seismic Hazards Mapping Act of 1990 (PRC Sections 2690–2699.6) is intended to reduce damage resulting from earthquakes. While the Alquist-Priolo Act addresses surface fault rupture, the Seismic Hazards Mapping Act addresses other earthquake-related hazards, including strong groundshaking, liquefaction, and seismically induced landslides. Its provisions are similar in concept to those of the Alquist-Priolo Act: the state is charged with identifying and mapping areas at risk of strong groundshaking, liquefaction, landslides, and other corollary hazards; and cities and counties are required to regulate development within mapped Seismic Hazard Zones.

Under the Seismic Hazards Mapping Act, permit review is the primary mechanism for local regulation of development. Specifically, cities and counties are prohibited from issuing development permits for sites within Seismic Hazard Zones until appropriate site-specific geologic or geotechnical investigations have been carried out and measures to reduce potential damage have been incorporated into the development plans.

California Building Standards Code

The State of California's minimum standards for structural design and construction are given in the California Building Standards Code (CBSC) (24 CCR). The CBSC is based on the UBC (International Code Council 1997), which is used widely throughout United States (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed, or more stringent regulations. CBSC requires that "classification of the soil at each building site shall be determined when required by the building official" and that "the classification shall be based on observation and any necessary test of the materials disclosed by borings or excavations." In addition, the CBSC states that "the soil classification and design-bearing capacity shall be shown on the (building) plans, unless the foundation conforms to specified requirements." The CBSC provides standards for various aspects of construction, including but not limited to excavation, grading, and earthwork construction; fills and embankments; expansive soils;

foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, certain aspects of the action would be required to comply with all provisions of the CBSC.

California Public Resources Codes and Regulations

Several sections of the California Public Resources Code protect paleontological resources. Section 5097.5 prohibits "knowing and willful" excavation, removal, destruction, injury, and defacement of any paleontologic feature on public lands (lands under state, county, city, district, or public authority jurisdiction, or the jurisdiction of a public corporation), except where the agency with jurisdiction has granted express permission. The sections of the Code relating to the State Division of Beaches and Parks afford protection to geologic features and "paleontological materials" but grant the director of the state park system authority to issue permits for specific activities that may result in damage to such resources, if the activities are in the interest of the state park system and for state park purposes (14 California Code of Regulations Sections 4307–4309).

4.3.3.3 Local Regulations and Plans

City of Fremont

The Fremont General Plan (City of Fremont 1991) does not contain a heritage or cultural resources element. However, Appendix I of the General Plan, which lists Primary Historic Resources recognized by Fremont Council Resolution 5463, includes the Irvington "fossil beds" along the I-680 corridor between Sabercat Road and Middlefield Avenue. Thus, the General Plan indirectly recognizes the importance of the Irvington Gravels to the City's civic identity.

4.3.4 Environmental Consequences and Mitigation Measures

4.3.4.1 Methodology for Analysis of Environmental Consequences

Effects related to geology, soils, and associated hazards were analyzed qualitatively, based on professional judgment and a review of best available geologic, seismic, and soil information for the action area and vicinity. Analysis focused on the potential of the various alternatives to increase the risk of personal injury, loss of life, and damage to property as a result of existing and reasonably foreseeable geologic, seismic, and soil conditions in the study area.

4.3.4.2 Alternative-Specific Environmental Analysis

Impact Related to Operation of the WSX Alternative

Impact G-1—Potential impacts resulting from earthquake-induced ground shaking and ground rupture.

WSX Alternative. The WSX Alternative alignment crosses the active HFZ at two separate locations, once directly southeast of Walnut Avenue and once northwest of Washington Boulevard (Figures 4.3-5a and 4.3-5b).

The HFZ is considered capable of producing the next major earthquake in the San Francisco Bay Area. The estimated probability for earthquakes of magnitude 6.7 or greater on the Hayward fault system in the 30 years between 2000 and 2030 is 32% (Woodward-Clyde and Associates 1970). Considering that the distance of the WSX Alternative from the HFZ is essentially zero, the estimated peak ground acceleration (PGA) produced at the site during the expected magnitude 7.5 MCE should be 0.7g, assuming soil type D for the entire action alignment (California Department of Transportation 2001, Knudsen et al. 2000). The results of recent, project-specific fault investigations indicate that a magnitude 7.0 earthquake along the southern segment of the HFZ could cause surface displacement of up to 4.6 feet at the Walnut Avenue crossing, and surface displacement of up to 2.1 feet at the Washington Boulevard crossing (William Lettis & Associates 2003).

Ground shaking and surface displacement of this magnitude could cause substantial damage to the WSX rails at the proposed fault crossings and could damage any other structures built on top of or in the vicinity of an active fault trace of the Hayward fault. In addition, existing underground utility pipes and cables extending across active traces of the Hayward fault could be deformed and rupture. Secondary rupture of nearby utilities should also be expected. The following mitigation measures would help minimize these impacts.

> **Mitigation Measure G-1—Conduct geotechnical surveys to accurately locate the primary and secondary traces of the HFZ.** BART will conduct geotechnical and geological surveys to accurately locate the primary and secondary traces of the Hayward fault relative to the WSX Alternative alignment.
>
> **Mitigation Measure G-2—Design and construct BART tracks on engineered embankments.** In general, engineered earthen embankments are more tolerant of the differential fault movement than are rigid structures that could otherwise be used to support elevated BART tracks. Accordingly, segments of the proposed BART tracks that cross known traces of the HFZ will be constructed on engineered earthen embankments instead of rigid structures. The embankment design will be prepared in accordance with the BART Extensions Program Design Criteria, Volume II, 1990, and specific recommendations developed for the fault crossing near Walnut Avenue (Bay Area Transit Consultants 1989). The design criteria established for the Walnut Avenue crossing will include adequate crest width to accommodate track realignment that could become necessary due to fault rupture and/or fault creep, 2:1 side slopes, and removal of unstable foundation materials.
>
> **Mitigation Measure G-3—Design and construct proposed alignment excavations to accommodate future track repair and realignment.** Where the WSX Alternative alignment crosses the fault approximately 300 feet north of Washington Boulevard, it would

be located within an excavation approximately 4 to 6 feet below the existing ground surface. The excavation will be designed and constructed with sufficient width to accommodate track repair and realignment that would be necessary if the tracks were deformed by fault rupture and/or fault creep. The embankments of the excavation will be constructed in accordance with BART seismic design criteria. These design criteria will minimize damage and facilitate repair in the event of seismic shaking.

Mitigation Measure G-4—Implement redundant emergency response measures from the BART Emergency Plan. In the event of an earthquake, BART will implement redundant emergency response measures of the BART Emergency Plan to reduce the potential for train derailment following an earthquake. Strong motion sensors currently in use throughout the BART system are proposed for each passenger station included as part of the WSX Alternative. In the event of an earthquake, the strong motion sensors would trigger an emergency operation procedure, which would require that all trains proceed in manual operation at a maximum speed of 25 miles per hour to the nearest station. The trains would be held at the stations until the tracks and structures throughout the area affected by the earthquake have been inspected by the BART engineering staff and subcontractors. If fault rupture or seismically induced ground failures result in the deformation of the tracks, power to trains in the affected area would be automatically cut off, further reducing the potential for derailment.

No-Build Alternative. Under the No-Build Alternative, no new elements associated with the WSX Alternative would be introduced and therefore no adverse effects would occur on project-related facilities from earthquake-induced ground shaking and ground rupture.

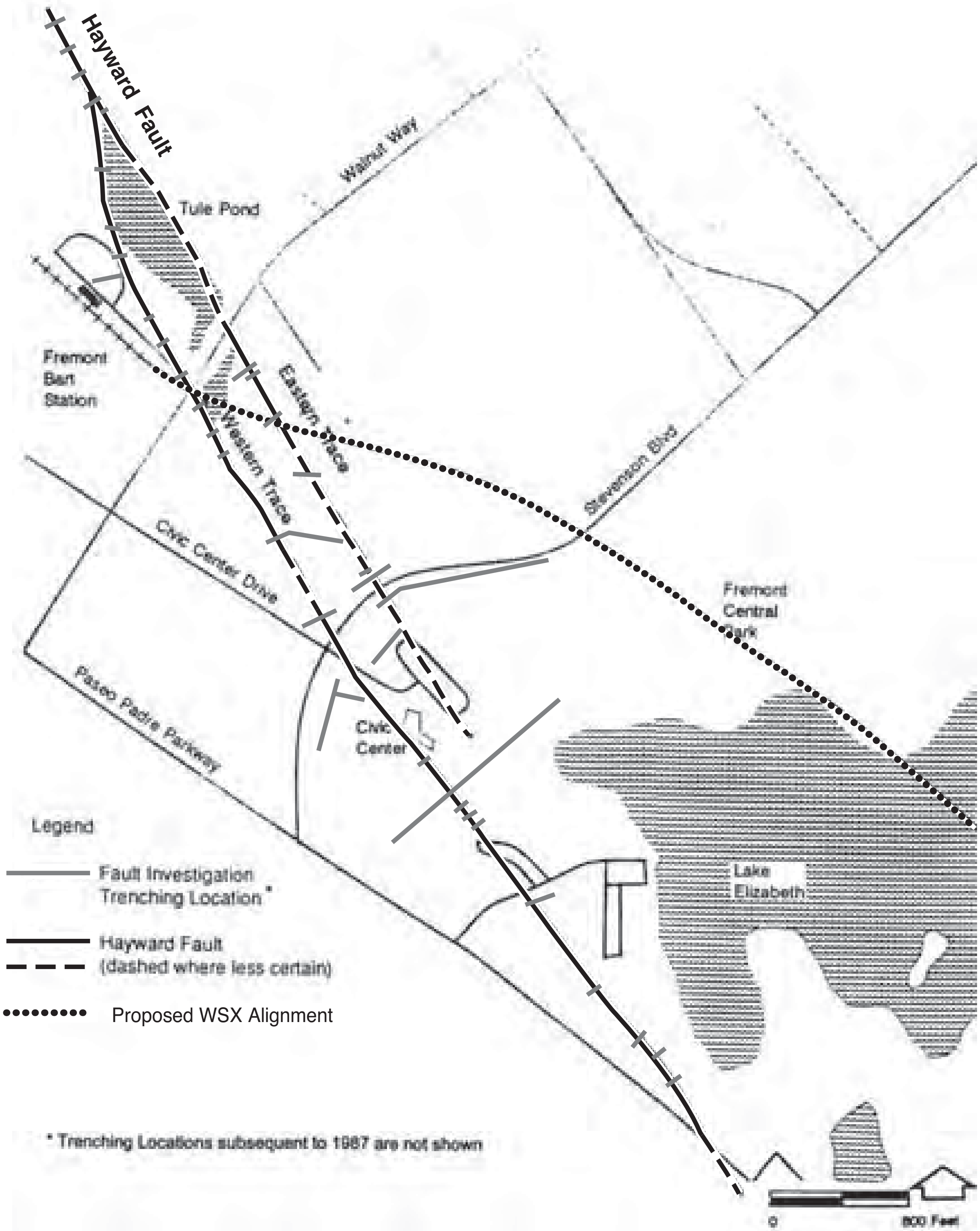
Impact G-2—Potential impacts resulting from fault creep within the Hayward fault zone.

WSX Alternative. The WSX Alternative alignment crosses the active HFZ at two separate locations, once directly southeast of Walnut Avenue and once northwest of Washington Boulevard (Figures 4.3-5a and 4.3-5b). The rate of fault creep in the vicinity of the Walnut Avenue and Washington Boulevard crossings was recently estimated to be 0.21 ±0.01 inch/year and 0.32 ± 0.04 inch/year, respectively (William Lettis & Associates 2003).

Fault creep can be expected to continue throughout the operational life of the WSX Alternative. Active creep and/or subsidence on the western and eastern traces of the HFZ could result in incremental displacement and deformation of the proposed trackway where the proposed alignment crosses the HFZ. The cumulative deformation of the tracks could present safety hazards, particularly for trains operating at high speeds. Train derailment could result if track deformation caused by fault creep is not corrected by realignment. The following mitigation measures would reduce the impact of fault creep.

Mitigation Measure G-5—Perform periodic track and structure inspection, track alignment surveys, and reports of adverse track conditions by train operators. BART will implement a track maintenance program during operation of the WSX Alternative. The track maintenance program includes periodic inspection of tracks and associated structures, track alignment surveys, and reports of adverse track conditions by train operators.

Track inspections are currently conducted throughout the BART system on a weekly basis by a professional maintenance staff. Track alignment surveys will be conducted semiannually



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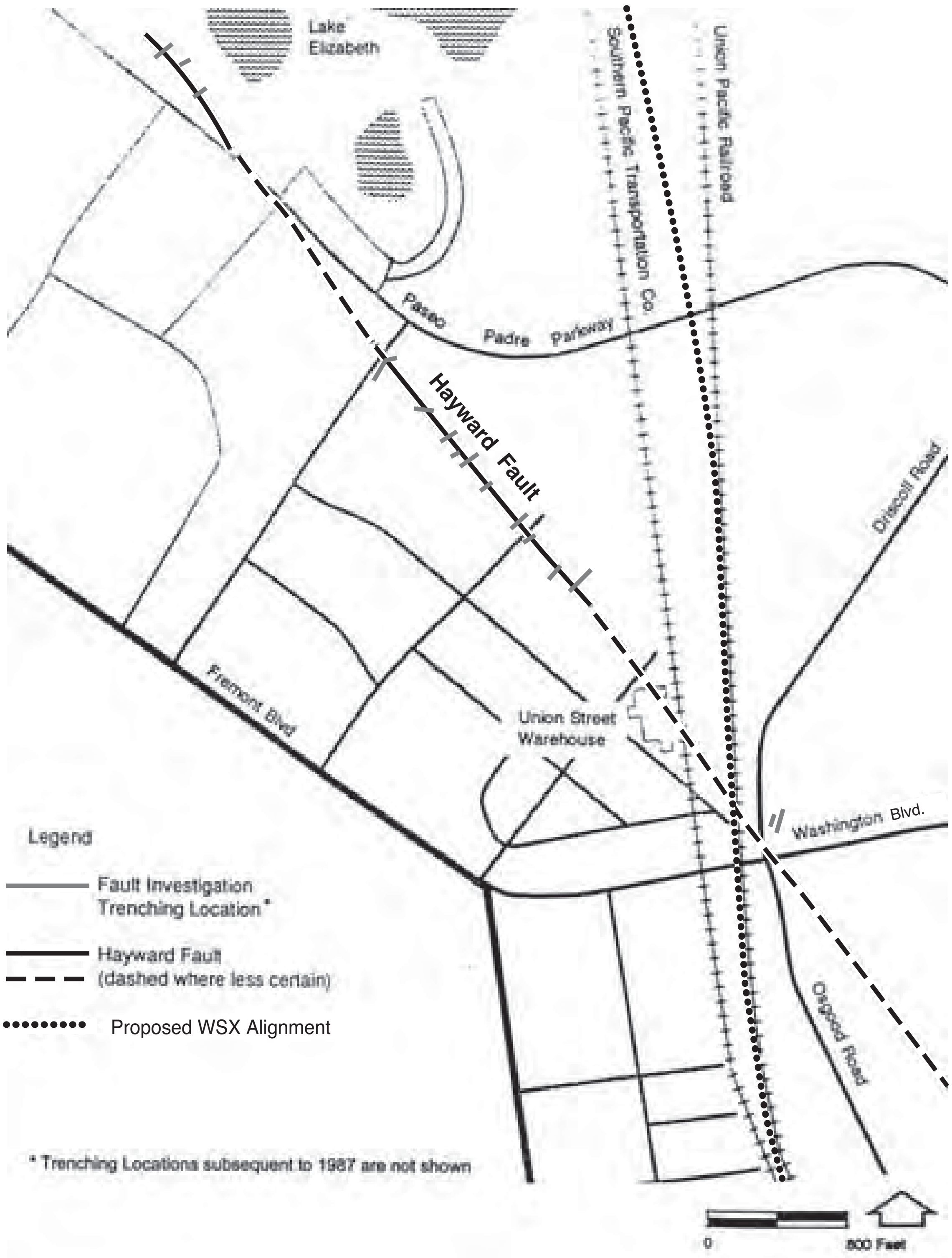
Source: Gregor, A., 1987 Fremont Central Park and Civic Center Earthquake Faults and Tranch Locations, Fremont Public Works Department, map scale 1:4,800

Figure 4.3-5a
Hayward Fault Traces
Tule Pond to Fremont Central Park



04071.04 (8-05)

Source: Gregor, A., 1987 Fremont Central Park and Civic Center Earthquake Faults and Tranch Locations, Fremont Public Works Department, map scale 1:4,800

Figure 4.3-5b
Hayward Fault Traces
Fremont Central Park to Washington Boulevard

by BART survey crews to determine when track alignment displacements are approaching tolerance levels established by BART. Measurement of track displacements will also be performed monthly by a specially designed laser geometry car currently used by BART to monitor track conditions at the Berkeley Hills tunnel, the location of an existing track that crosses the HFZ. All monitoring of track displacements will be documented and compiled in a file maintained by BART surveying staff. In addition to regular track alignment inspection, reports by BART train operators will be used to identify track conditions that could adversely affect train performance.

To reduce the potential for train derailments, damaged and deformed tracks will be repaired and/or realigned when unacceptable amounts of deformation are detected.

Mitigation Measure G-6—Design proposed structures to accommodate fault creep. Proposed structures placed directly across known traces of the HFZ (e.g., Tule Pond) will be constructed on extra-wide, mechanically stabilized earth embankments designed to accommodate incremental displacements resulting from fault creep. Additionally, specially designed splice boxes will be placed on both sides of fault to provide flexibility for power and communications cables, which will minimize damage from fault creep.

No-Build Alternative. Under the No-Build Alternative, no new elements associated with the proposed WSX Alternative would be introduced, and therefore no project-related effects would occur related to fault creep along the HFZ.

Impact G-3 – Potential impacts resulting from expansive soils.

WSX Alternative. The surface soils that occur along the WSX Alternative alignment are moderately to highly expansive. Expansive soils could potentially damage foundations, pavements, retaining walls, and other rigid structures installed as part of the WSX Alternative. The following mitigation measure would minimize this impact.

Mitigation Measure G-7—Design proposed structures to account for potential soil expansion. Standard engineering practices will be implemented where necessary to minimize the potential for damage from expansive soils. The specific practices used will be selected during the final design stages of the WSX Alternative, but may involve the treatment of expansive soils with lime to reduce expansion potential, the installation of structures that can withstand pressures generated by expansive soils, and/or the replacement of expansive soils with non-expansive fill material.

No-Build Alternative. Under the No-Build Alternative, no new elements associated with the proposed WSX Alternative would be introduced and no impacts from expansive soils would occur on project-related facilities.

Impact G-4—Potential impacts resulting from soil compression.

WSX Alternative. The marsh deposits located in the area of Tule Pond and Lake Elizabeth contain large quantities of organic material and are poorly consolidated. As such, they are considered to be relatively compressible. The placement of fill in these areas could cause the marsh deposits to compress. The resulting ground settlement could damage overlying structures that are included under the WSX Alternative, and could cause personal injury to people occupying these facilities. The following mitigation measures would minimize this impact.

Mitigation Measure G-8—Implement appropriate design criteria to minimize the potential for detrimental soil compression and ground settlement. The proposed embankment near Walnut Avenue will be designed and constructed in accordance with the requirements of the BART Extension Program Design Criteria and the CBSC. Organic soils and organic-rich sediments located in the area will be excavated and removed from the action area prior to construction. Under no circumstances will organic soils and organic-rich sediments be used as fill material.

BART may also choose to implement other engineering practices designed to reduce the potential for soil compression and settlement. The specific practices used will be selected during the final design stages of the WSX Alternative, but may involve the installation of wick drains and/or cement deep soil mixing or surcharge.

Mitigation Measure G-9—Monitor ground settlement during operation of the WSX Alternative. BART surveying staff will monitor settlement and track alignment along the proposed embankment south of Walnut Avenue during operation of the proposed action.

No-Build Alternative. Under the No-Build Alternative, no new elements associated with the proposed WSX Alternative would be introduced, and no impacts from soil compression would occur.

Impact G-5—Potential impacts on paleontological resources as a result of WSX construction activities. Project construction would entail a number of ground-disturbing activities with the potential to damage or destroy paleontological resources, including significant resources, that may be present on work sites. These include site preparation; various types of earthwork, including but not limited to subway excavation; and drilling for piers/pilings.

WSX Alternative. All Pleistocene units in the project area are highly sensitive for paleontological resources, and there is a potential for significant impacts to these resources during construction of two segments along the alignment:

- **North of Stevenson Boulevard to the South Ventilation Structure:** Logs of exploratory borings from geotechnical investigations performed for the proposed project suggest that older (Pleistocene) alluvium will be encountered during construction of the tunnel near Stevenson Boulevard. Specifically, the section of the proposed subway alignment that descends beneath the surface approximately 250 feet (76 meters) north of Stevenson Boulevard, extending to the south ventilation Structure located approximately 1,200 feet (366 meters) south of Stevenson Boulevard.
- **Paseo Padre Parkway south to Blacow Road, and southern terminus area.** The portion of the alignment from approximately Paseo Padre Parkway south to approximately Blacow Road is located in areas mapped as Qpf (Pleistocene alluvial fan deposits) and Qf (Latest Pleistocene to Holocene alluvial fan deposits) by Knudsen et al. (2000) (see Figure 4.3-1). From Blacow Road to approximately the southern terminus, the WSX alignment would cross outcrops of Latest Pleistocene to Holocene alluvial fan deposits and Latest Holocene alluvial fan deposits (Figure 4.3-1), including previously studied vertebrate-bearing Pleistocene strata (Savage 1951). The southern terminus is located in Qf deposits (Knudsen et al. 2000). As discussed above, the Qpf and Qf units are considered highly sensitive for paleontological resources.

Mitigation Measure G-10—Identify Pleistocene units before construction. BART will work with the project engineering design and geotechnical contractors to ensure that sites or areas where construction could impact Pleistocene units are identified before construction begins.

Mitigation Measure G-11— Provide paleontological monitoring for construction activities with potential to disturb Pleistocene units. Once construction begins, the paleontological monitor will be on site during all ground-disturbing activities in areas in which potential impacts to units of known or potential Pleistocene-age material in the surface or subsurface material could occur. BART will retain a qualified professional paleontologist[4] to provide monitoring services during ground-disturbing site preparation and construction activities including, but not necessarily limited to, vegetation clearing, excavation, and drilling. Where Pleistocene materials are exposed at the ground surface, the paleontological monitor will conduct preliminary survey and, if significant paleontological materials are found, surface salvage before site preparation and construction begin. The goal of salvage operations will be to ensure that any paleontological materials exposed at the surface are recovered and properly prepared and curated, or protected from damage using exclusion fencing or other appropriate means. Any exclusion fencing or other protective measures will be designed by the paleontological monitor in consultation with BART, to ensure that it adequately protects significant resources without unnecessarily impeding construction activities. Once construction begins, the paleontological monitor will be on site during all ground-disturbing activities in specified areas.

Specific areas where paleontological monitoring will be required include, but are not limited to, the northern section of the WSX alignment from approximately 250 feet (76 meters) north of Stevenson Boulevard to the northern ventilation structure (CPS) approximately 1,200 feet (366 meters) south of Stevenson Boulevard for the subway section; and the southern section of the alignment from 300 feet south of Paseo Padre Parkway to Blacow Road for the at-grade portion of the alignment, and the area near the southern terminus. In addition, cutting recovery will be monitored at sites where piers, pilings, or other features require drilling into units of known or potential Pleistocene age.

Mitigation Measure G-12—Stop work if vertebrate fossils are encountered during site preparation or construction. If vertebrate fossils are discovered during construction of the BART WSX alignment, including but not limited to sites with potential Pleistocene disturbance identified in Mitigation Measure G-11 above, all ground-disturbing work on the site will stop immediately until a qualified professional paleontologist can assess the nature and importance of the find and recommend appropriate treatment. Treatment will be consistent with SVP guidelines (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995), and may include preparation and recovery of fossil materials so that they can be housed in an appropriate museum or university collection. BART will ensure that information on the nature, location, and depth of all finds is readily available to the scientific community. BART will ensure that all professional construction staff receive briefings on recognition of fossil materials to ensure that the stop work directive is appropriately implemented on sites where monitoring is not required.

[4] The qualified professional paleontologist would meet all standards as required by the Society of Vertebrate Paleontology (Society of Vertebrate Paleontology Conformable Impact Mitigation Guidelines Committee 1995).

No-Build Alternative. Under the No-Build Alternative, no new project-related elements would be introduced, and no potential impacts on paleontological resources in Pleistocene units would occur.

Impacts Related to Operation of the Optional Irvington Station

Impact G-6—Potential impacts on optional Irvington Station resulting from earthquake-induced ground shaking and ground rupture.

WSX Alternative. Potential impacts specific to the optional Irvington Station as identified generally above include the exposure of structures to groundshaking hazards and the displacement of pavement at the optional Irvington Station. The WSX Alternative alignment also crosses the HFZ several hundred feet north of the alignment's intersection with Washington Boulevard (Figure 4.3-5b). The location of a fault trace in this area is well documented (Geotechnical Consultants 1993, Parikh Consultants Inc. 2002). The platform at the optional Irvington Station would be located approximately 400 feet south of this fault trace crossing. The fault would underlie the station's parking lot located east of Osgood Drive.

The following mitigation measures would minimize these potential impacts:

> **Mitigation Measure G-1—Conduct geotechnical surveys to accurately locate the primary and secondary traces of the HFZ.** This mitigation measure is described above.
>
> **Mitigation Measure G-4—Implement redundant emergency response measures from the BART Emergency Plan.** This mitigation measure is described above.
>
> **Mitigation Measure G-7—Design proposed structures to account for potential soil expansion.** This mitigation measure is described above.
>
> **Mitigation Measure G-13—Locate Irvington Station structures outside the zone of potential fault rupture.** Structures at the proposed Irvington Station that would be occupied by workers or passengers will be located outside the zone of potential fault rupture. The typical recommended minimum setback from an identified fault is 50 feet and 100 feet from an inferred or suspected fault trace (Blair and Spangle 1979).
>
> **Mitigation Measure G-14—Design and construct all Irvington Station structures in accordance with applicable building standards.** BART will design and construct all proposed structures at Irvington Station in accordance with the BART Extension Program Design Criteria and applicable standards from the CBSC in cooperation with the City of Fremont.

No-Build Alternative. Under the No-Build Alternative, no new elements associated with the optional Irvington Station would be introduced, and therefore no adverse effects would occur on project-related facilities from earthquake-induced ground shaking and ground rupture.\

Impact G-7—Potential impacts on paleontological resources during construction of the optional Irvington Station. The optional Irvington Station, if constructed, would also be situated in Pleistocene material, which is considered highly sensitive for paleontological resources, as discussed above.

WSX Alternative. Potential impacts on paleontological resources would include those described above for the WSX Alignment. In addition, the station and platform would be constructed within Pleistocene material.

The following mitigation measures would minimize these potential impacts:

> **Mitigation Measure G-10—Identify Pleistocene units before construction.**
>
> **Mitigation Measure G-11— Provide paleontological monitoring for construction activities with the potential to disturb Pleistocene units.**
>
> **Mitigation Measure G-12—Stop work if vertebrate fossils are encountered during site preparation or construction.**

No-Build Alternative. Under the No-Build Alternative, no new project-related elements would be introduced, and no potential impacts to potential resources within Pleistocene units would occur.

Impacts Related to Construction of the WSX Alternative and the Optional Irvington Station

Impact G-8—Potential slope instability in excavations and during construction.

WSX Alternative. Moderately deep excavations (up to 40 feet below existing ground surface) would be required for construction of cut-and-cover subway and subgrade sections of the WSX Alternative. Unstable subsurface conditions encountered during these excavations may result in failure of excavation sidewalls, which could threaten the safety of construction workers. Construction stormwater may contribute to these unstable surface conditions. See Section 4.5, *Hydrology*, for a more detailed description of construction stormwater as a source of erosion.

> **Mitigation Measure G-15—Design and construct deep excavations according to applicable building codes.** All excavations will be designed and constructed in accordance with applicable design criteria and standards from the CBSC, the BART Extension Program, and the shoring requirements of the California Occupational Safety and Health Administration.

No-Build Alternative. Under the No-Build Alternative, no new project-related elements would be introduced, and no impacts from slope instability would occur.

Section 4.4
Hazards and Hazardous Materials

4.4.1 Introduction

This section describes existing hazards and hazardous materials in the WSX Alternative area, analyzes the potential for WSX Alternative operation and construction activities to disturb hazardous materials, and identifies mitigation measures to address impacts. The purpose of this section is to evaluate environmental factors that may have affected soil and groundwater quality of the WSX Alternative area due to past and present environmental and commercial activities.

4.4.2 Affected Environment

4.4.2.1 Methodology for Assessment of Existing Conditions

Previous hazardous materials investigations reports were reviewed to document existing conditions. Previous reports reviewed include the following.

- Results of groundwater sampling conducted by BART in 1991.
- The 1992 EIR (San Francisco Bay Area Rapid Transit District 1991).
- The *Phase I Environmental Site Assessment* (Science Application International Corporation 2003).
- The 2003 SEIR (San Francisco Bay Area Rapid Transit District 2003).
- Reports prepared for the City of Fremont's grade separations project (Baseline Environmental Consultants 2000).

Additional investigations conducted for this analysis included a search of hazardous material databases, a review of previous land uses in the area through an examination of historical aerial photographs, a field inspection of the WSX Alternative alignment, and a review of the listings of federal and state regulatory agencies responsible for recording incidents of spills and agencies responsible for reviewing soil and groundwater contamination and treatment, storage, or disposal facilities that handle hazardous materials. The database search was conducted for records of hazardous material storage and sites contaminated with hazardous waste within a 1-mile radius of the WSX Alternative corridor.

4.4.2.2 Existing Conditions

The potential presence of hazardous materials, aboveground or in the subsurface soils or groundwater along and adjacent to the WSX Alternative alignment, could affect the health and safety of project construction workers, the public, or the environment during construction of the WSX Alternative, as well as BART riders and employees during operation. Excavation of soils containing hazardous materials and disposal of contaminated soils or water would require specific management, resulting possibly in either onsite treatment and/or off-site disposal.

The following discussion presents an inventory of existing information regarding the presence of hazardous materials in the study area.

Land Uses and their Potential for Contamination

Review of Historical Land Uses

Land uses in the study area were researched to identify locations where hazardous materials may be or may have been present. Historical aerial photographs dating from as early as 1954 were reviewed to determine the traditional and continuing use of land in the study area.

Analysis shows that the land in the vicinity of the study area has been used for agricultural purposes, was developed as residential and commercial properties, or remained undeveloped from 1953 to the present. The WSX Alternative corridor itself has been undeveloped land and/or agricultural land, except for the railroad tracks, which have existed in the WSX Alternative corridor since the 19th century and are visible in historical aerial photographs.

The first sign of Lake Elizabeth appears in the 1970 aerial photograph. The area the lake currently occupies was previously agricultural land.

Areas to the south of Auto Mall Parkway appear to be recent developments. The areas south of Grimmer Boulevard appear to have been used primarily as agricultural land from 1953 to the present.

Review of Current Land Uses

A site reconnaissance of the study area was conducted in May 2002 by Parikh Consultants, Inc., to identify possible nearby sites or current land uses that might constitute sources of soil and/or groundwater contamination that could adversely affect the WSX Alternative corridor. The site visit consisted of a drive-through and a walk-through of the study area to identify potential sources of hazardous materials storage and disposal as well as visible contamination of the soil surface.

Current land uses along and adjacent to the WSX Alternative alignment that may involve the use or storage of hazardous materials include the UP right-of-way, agricultural, and industrial uses in the area. The types of hazardous materials potentially associated with these uses include heavy metals, petroleum hydrocarbons, polynuclear aromatic hydrocarbons, pesticides, and arsenic.

Contamination in the WSX Alternative Corridor

The current or past use and storage of hazardous materials at or near the WSX Alternative alignment could have resulted in contamination of subsurface soils or groundwater. Potential sources of contamination include facilities along and adjacent to the WSX Alternative alignment where hazardous materials are or were used and stored, and where a release of hazardous materials is suspected or known to have occurred.

Potential Contamination

Lake Elizabeth was created in the 1970s, when surface water runoff from the nearby park was redirected to drain to the human-made lake. Because of this runoff, there is the potential for lake sediments to be contaminated with herbicides.

There are underground petroleum pipelines that cross the WSX Alternative corridor north of Washington Boulevard, and another set of underground petroleum pipelines parallel to and between the former SP and WP railroad tracks, located 600 feet north of Washington Boulevard. A review of databases and county files did not reveal releases associated with these pipelines within the WSX Alternative corridor.

The soils along Washington Boulevard and Auto Mall Parkway are potentially contaminated with lead from automobile exhaust.

There is a potential for the presence of asbestos-containing materials (ACM) at structures within the WSX Alternative corridor that were constructed before 1978. (1978 is the date commonly used as a cut-off for ACM use.) In addition, lead-based paint may have been used on some structures, such as the Grimmer Boulevard underpass structure and the Auto Mall Parkway overpass. Similarly, polychlorinated biphenyls (PCB) may also be present in these structures in the form of light ballasts in fluorescent lighting fixtures.

Based on BART's experience constructing extensions on former railroad rights-of-way, the UP corridor is potentially contaminated with arsenic, lead, petroleum hydrocarbons, and polynuclear aromatic hydrocarbons (Jensen pers. comm.).

Known Contamination

In 1991, BART collected 11 grab groundwater samples and performed four borings for soil sampling within the WSX Alternative corridor (Figure 4.4-1). Of the 11 groundwater and four soil samples, only one groundwater sample and two soil samples contained detectable contaminants. The groundwater sample (A2, Osgood Road near Blacow Road) contained diesel at 60 micrograms per liter. One soil sample (A2) contained detectable oil and grease, and the other soil sample (A4, north of Grimmer Boulevard) contained xylenes.

In 1998, 21 grab soil samples were collected at the Irvington Pump Station facility, immediately north of Paseo Padre Parkway. The samples were aggregated into eight samples; four samples were analyzed for asbestos, and four were analyzed for lead. None of the soil samples contained asbestos above the laboratory detection limits. Three of the samples analyzed for lead were analyzed for soluble lead, and one of those showed a concentration above the soluble threshold limit concentration. The total lead concentration was identified as being below the total threshold limit concentration. Further testing of the lead contamination in the vicinity of the sample would be required prior to excavation (Baseline Environmental Consultants 2000).

In May 2000, the City of Fremont conducted a hazardous materials study for the city's grade separations project. The report recommended conducting additional testing of the soil that would be disturbed near the UP right-of-way. Other than the Irvington Pump Station, the UP right-of-way, and the previous agricultural uses of the site, the report did not identify any additional concerns in the WSX Alternative corridor. The report indicated that of the 41 sites identified, only one had the potential to be of environmental concern, and that site was identified as a closed site by the Regional Water Quality Control Board (RWQCB). (Baseline Environmental Consultants 2000.)

Agency Record Search for Hazardous Waste Sites

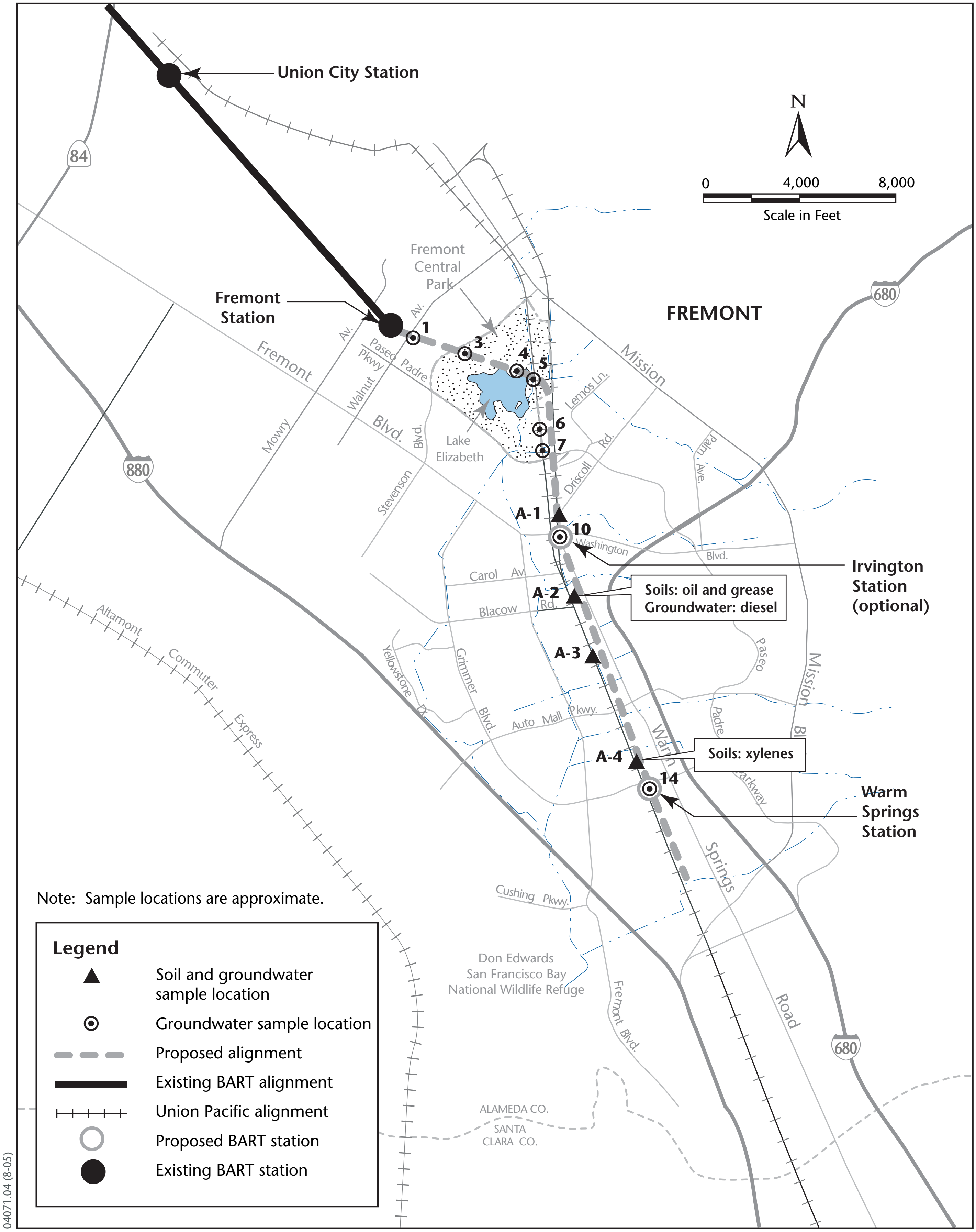
A computer database government record search was conducted by Parikh Consultants, Inc., to review regulatory agency lists to identify the presence of hazardous waste sites in the vicinity of the WSX Alternative. The records were searched for the existence of the following.

- National Priority List (NPL) sites.
- Resource Conservation and Recovery Act (RCRA) Corrective Actions (CORRACTS) and RCRA-permitted treatment, storage, and disposal (TSD) facilities.
- State SPL (state equivalent priority list) sites.
- Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) sites.
- California Waste Management Unit Database System Solid Waste Assessment Test data (WMUDS/SWAT).
- RCRA treatment, storage, and disposal sites and generators; state equivalent CERCLIS sites (SCL).
- Statewide leaking underground storage tanks (LUSTs).
- Solid waste facilities (SWFs).
- California Waste Discharge System (WDS) data.
- State Cortese List (CORTESE).
- California RWQCB spills, leaks, investigation, and cleanup sites (SLIC).
- Toxic Release Inventory (TRI) database.
- State and county underground storage tanks (USTs), Emergency Response Notification System of Spills (ERNS), and RCRA-registered small or large generators of hazardous water (RCRA generator).

The database was searched to locate risk sites[1] within a 1-mile radius of the WSX Alternative corridor. For those sites that were of additional concern,[2] file reviews were conducted at the RWQCB, Alameda County Water District (ACWD), and Fremont Fire Department, which is the local certified unified program agency (CUPA) for the City of Fremont.

The databases identified more than 100 mapped sites within a 1-mile radius of the WSX Alternative. The majority of these sites are down gradient of the WSX Alternative corridor, with respect to

[1] *Risk sites* are sites near the WSX Alternative corridor that have had releases to soil or groundwater and/or generate, store, and/or receive hazardous materials/wastes.
[2] *Sites of additional concern* refers to sites within the risk sites group that could have a direct impact on the corridor.



Source: Basemap: Jones & Stokes 2003; sample locations: Baseline Environmental Consulting 1991.

Figure 4.4-1
Soil and Groundwater Sample Locations

groundwater flow, and therefore do not have the potential to impact the WSX Alternative. Most of the up-gradient sites that are identified are located on Osgood Road or its side streets. Many of the sites identified up gradient of the subject area were small-quantity waste generators[3] without any noted violations, or were too far up gradient to be of environmental concern.

There are three sites near the Fremont BART station and several sites located on Osgood Road and side streets that may have the potential to affect the WSX Alternative alignment. These sites are listed in Table 4.4-1.

Table 4.4-1. Information on Hazardous Materials Sites in the WSX Alternative Corridor

Site	Address	Listing	Site Assessment
GSC Realty Corporation	1365 Walnut Avenue	LUST	Site closed in 1993. Impacts to soil only.
BART	2000 BART Way	HAZNET	Disposal of 1 ton of PCB-impacted soil. Disposal of PCB-impacted soil has been completed.*
Union Pacific Railroad	NA	NA	Potential for presence of arsenic, lead, petroleum hydrocarbons, and polynuclear hydrocarbons
City of Fremont Government Building/Police Building	39710 Civic Center Drive	UST	Presence of two 10,000-gal. unleaded USTs and one 10,000-gal. diesel UST; listed as LUST for discovery of release of TPH to soil during tank closure activities. Site closed in 2000.
Tri-City Rock	3553 Washington Boulevard	LUST	Release of TPH to soil only in 1991. Site closed in 1995. Impacted soil excavated and disposed offsite.
Fremont Lumber Company	3560 Washington Boulevard	LUST	1998 release affected soils within a 20- to 30-foot radius of a former UST.
Mission Valley Equipment Rentals	41655 Osgood Road	HAZNET LUST	Disposal of waste oil, and release of gasoline in 1987. Site closed in 1998.
Howard's Backhoe	41875 Osgood Road	NA	Discovery of release of gasoline to soil in 1985. Site closed in 1994.
Fremont Automotive	42450 Osgood Road	NA	Small-quantity generator for recycling of water that contains oil.
L & L Nursery Supply, Inc.	42950 Osgood Road	LUST	Release of TPH to soil and groundwater. Site remediated, undergoing monitoring. NOTE: Site is farther than 500 feet from WSX Alternative alignment.
Jonce Thomas	3270 Seldon Court	LUST	Release of petroleum hydrocarbons. Spill was remediated in June 2000.
Grade Way Construction	43801 Osgood Road	LUST	Releases discovered during removal of USTs in 1987. Site has been remediated.

[3] *Small quantity waste generator* is a business that generates between 220 and 2,200 pounds of hazardous waste per month (U.S. Environmental Protection Agency 2001).

Site	Address	Listing	Site Assessment
Shell Oil	43921 Osgood Road	UST	Several active USTs. Distant from WSX Alternative alignment.
Read Rite Corporation	44100 Osgood Road	NA	Disposal of soils and other organic liquids and chemicals. NOTE: Site is farther than 1,000 feet from WSX Alternative alignment.
Circle K Store	2950 Auto Mall Parkway	UST	No evidence of leading or off-site groundwater monitoring wells.
Valley Automotive Fuels	44671 Osgood	UST	No evidence of groundwater monitoring wells.
Clinton Heating and Air Conditioning	2162 Prune Avenue	LUST	Release to soil and groundwater. Impacted soils excavated; minimal groundwater impacts.
Bay Con Company	2150 Prune Avenue	NA	Release of TPH-D and MTBE to groundwater. Site is currently undergoing assessment.

Notes:

PCB = poly chlorinated biphenyl
UST = underground storage tank
LUST = leaking underground storage tank
TPH = total petroleum hydrocarbons
TPH-G = total petroleum hydrocarbons as gasoline
BTEX = benzene, toluene, ethylbenzene, or xylenes
MTBE = methyl tertiary butyl ether, tert-butyl methyl ether
TPH-D = total petroleum hydrocarbons as diesel

* Status of PCB-impacted soil disposal as per Gary Jensen, BART System Safety, February 7, 2003.

Source: San Francisco Bay Area Rapid Transit District 2003

In January 2003, Science Applications International Corporation (SAIC) completed a Supplemental Phase I Environmental Site Assessment on 34 sites along the WSX Alternative corridor of which BART anticipates partial or full acquisition. Work completed included technical review of all currently available documentation, including past environmental assessment and subsurface reports noted above, aerial photographs for the years 1954 to 2002; Sanborn Insurance maps with coverage specific to the Irvington District area for the years 1908, 1926, and 1932; state and local environmental regulatory agency files as identified for each site; EDR Radius Map and Database Report noted above; and current features and improvements of each site and adjacent sites as documented during fence line site reconnaissance. Findings, observations, and potential environmental issues were compiled on each site. SAIC recommended no further action on 11 sites and Phase II and/or III subsurface soil and groundwater characterization work plans for 23 sites. Table 4.4-2 below summarizes the recommendations for each of the sites.

Table 4.4-2. Summary of Sites Requiring Additional Exploration

Current Owner	Street Address	Recommendations
San Francisco Public Utility Commission	Paseo Padre Pkwy, Fremont, CA 94538	Perform Phase II & III subsurface characterization.
Blankstein	40720 Paseo Pkwy, Fremont, CA 94538	A Phase II subsurface characterization is currently not required based on January 2003 Supplemental Phase I ESA.
BERG	41075 Railroad Av, Fremont, CA 94539-4401; Business Address: 41080 High Street	Perform Phase II subsurface characterization.
First Interstate	3553 Washington Blvd, Fremont, CA 94539-0000	A Phase II subsurface characterization is currently not required based on January 2003 Supplemental Phase I ESA.
Leighton Realty	39350 Civic Center Dr, Fremont, CA 94538-2331	A Phase II subsurface characterization is currently not required based on January 2003 Supplemental Phase I ESA.
Alameda County Flood Control	Walnut Av, Fremont, CA 94536	A Phase II subsurface characterization is not required, based on the Supplemental Phase I ESA.
Leighton Realty	Center Dr, Fremont, CA 94536	A Phase II subsurface characterization is not required, based on the Supplemental Phase I ESA.
Leighton Realty	Center Dr, Fremont, CA 94536	A Phase II subsurface characterization is not required, based on the Supplemental Phase I ESA.
Alameda County Flood Control	Stevenson Bl, Fremont, CA 94538	Review with City of Fremont prior dredges analytical findings. For construction planning, perform additional subsurface screening of dredge sample if previous data unavailable.
City of Fremont, Central Park Golf Course	Mission Bl, Fremont, CA 94538	Perform Phase II subsurface screening.
City of Fremont	Paseo Padre Pkwy, Fremont, CA 94538	A Phase II subsurface characterization is not required, based on the Supplemental Phase I ESA.
BERG	Railroad Av, Fremont, CA 94538	Perform Phase II subsurface screening.
BERG	Railroad Av, Fremont, CA 94538	Perform Phase II subsurface screening.
Winworth		A Phase II subsurface characterization is not required, based on the Supplemental Phase I ESA.
BERG	High St, Fremont, CA 94538	Perform Phase II subsurface screening of soils beneath transformer.
UP	Railroad Ave, Fremont, CA 94538	Perform Phase II subsurface screening.
Charles Snow	2878 Prune Av, Fremont, CA 94569	Perform Phase II subsurface screenings limited to small area of BART take.
Alameda County Flood Control District	Prune Av, Fremont, CA 94538	Perform Phase II subsurface screening.

Current Owner	Street Address	Recommendations
Ashville	2215 Warm Springs Court, Fremont, CA 94538	Perform Phase II subsurface screenings limited to small area of BART take.
Unknown	45388 Warm Springs Bl, Fremont, CA 94538	A Phase II subsurface characterization is not required, based on the Supplemental Phase I ESA.
Radonich	2120 Warm Springs Court, Fremont, CA 94539-6774	Perform Phase II subsurface screening.
Russett	2090 Warm Springs Court, Fremont, CA 94539-6744	Perform Phase II/III Subsurface Characterization.
RMC Builder's Supply	2000 Warm Springs Court, Fremont, CA 94539-6777	Perform Phase II subsurface characterization.
Sakkaris	45915 Warm Springs Bl, Fremont, CA 94539-6746	Perform Phase II subsurface screening of soil piles adjacent to portion of BART take.
Barrows	45951 Warm Springs Bl, Fremont, CA 94539-6746	Perform Phase II subsurface screening.
Murphy	45973 Warm Springs Bl, Fremont, CA 94539-6721	Perform Phase II subsurface screening around building to be included in BART take.
City of Fremont, Fremont Central Park	1110 Stevenson Bl, Fremont, CA 94538-2967	Perform Phase II subsurface screenings of shallow soils within BART take.
New England Mutual Life	43941 Osgood Road, Fremont, CA 94539-5909	A Phase II subsurface characterization is not required, based on the Supplemental Phase I ESA.
City of Fremont, Fremont Central Park	Stevenson Bl, Fremont, CA 94539	Perform Phase II subsurface screenings of shallow soils within BART take.
New England Mutual Life	3045 Skyway Ct, Fremont, CA 94539	A Phase II subsurface characterization is not required, based on the Supplemental Phase I ESA.
Lacerda Trust	2318 Warm Springs Bl, Fremont, CA 94539	Perform Phase II subsurface screening of targeted debris areas.
Unknown	43801 Osgood Rd, Fremont, CA 94539-5630	Perform Phase II subsurface screenings of shallow soils along portion of BART take where current operator stores heavy construction equipment.
Unknown	43801 Osgood Rd, Fremont, CA 94539-5630	Perform Phase II subsurface screenings of shallow soils along portion of BART take where current operator stores heavy construction equipment.
Unknown	43801 Osgood Rd, Fremont, CA 94539-5630	Perform Phase II subsurface screenings of shallow soils along portion of BART take where current operator stores heavy construction equipment.

Source: Science Applications International Corporation 2003

Electromagnetic Fields

In recent years, there has been scientific study and public debate on the health effects of electromagnetic fields (EMF) from utility lines and electrical appliances and facilities. Electric- and magnetic-field strengths drop off with distance from the source. Electric fields are shielded or weakened by materials that conduct electricity, including trees, buildings, and human skin. Magnetic fields, on the other hand, pass through most materials and are therefore more difficult to shield. As a result, recent studies have focused on the possible health effects associated with magnetic fields.

Studies have been conducted to prove or disprove the relationship between EMF exposure and numerous forms of cancer, birth defects, mental disorders, and other adverse health conditions, but no direct link has been established. No health-based standards currently exist for long-term human exposure to EMF in the United States. Federal and state agencies have reviewed past studies to determine whether exposure triggers adverse health effects and have found no basis for setting health standards to date (Pacific Gas & Electric Co. 1999). Some state and local authorities have passed laws and ordinances limiting EMF exposure by establishing minimum distances between development and electrical systems of specific voltage. The distances and voltages vary by jurisdiction (Federal Transit Administration 1996). In 1993, the California Public Utilities Commission (CPUC) issued Decision 93-11-013 that established certain steps to address EMF. After an investigation to determine CPUC's role in mitigating health effects, if any, of EMF created by electrical utility power lines and by cellular radiotelephone facilities, CPUC developed measures to reduce EMF levels, develop design guidelines, create EMF measurement programs, facilitate stakeholder and public involvement, and begin educational and research programs (California Public Utilities Commission 1993).

4.4.3 Regulatory Setting

The following describes the regulatory framework pertaining to management of hazardous materials. The use, storage, and disposal of hazardous materials, including the management of contaminated soils and groundwater, are regulated by local, state, and federal laws. A description of agency involvement in management of hazardous materials is provided below.

4.4.3.1 Federal

Resource Conservation and Recovery Act of 1976

The Resource Conservation and Recovery Act of 1976 (RCRA) establishes a comprehensive program for identifying and managing hazardous waste, including reporting and record-keeping requirements for generators, a manifest system for transport of hazardous waste shipments, and standards for treatment and disposal facilities. The 1984 and 1986 amendments established additional reporting requirements, restriction of landfill disposal, and a program regulating underground storage tanks. RCRA regulates active facilities and does not address abandoned or historical sites.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) provides a federal "Superfund" to clean up uncontrolled or abandoned sites contaminated by releases of hazardous substances, as well as accidents, spills, and other releases of pollutants and contaminants into the environment. CERCLA, as amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA), authorizes the U.S. EPA to order the parties responsible for a release to take action to remediate the contaminated site or to conduct remediation itself and recover the costs from responsible parties.

Title III of SARA also authorized the Emergency Planning and Community Right-to-Know Act (EPCRA). EPCRA requires facility operators to undertake emergency planning and report on hazardous chemical inventories and toxic releases, in order to make this information available to local communities.

4.4.3.2 State

California Department of Toxic Substances Control

The Department of Toxic Substances Control (DTSC) regulates hazardous waste under the authority of the federal Resource Conservation and Recovery Act of 1976 and the California Health & Safety Code. California has enacted legislation pertaining to the management of hazardous waste that is equivalent to, and in some cases more stringent than, corresponding federal laws and regulations. DTSC, a department of the California Environmental Protection Agency, is responsible for the enforcement and implementation of hazardous waste laws and regulations. The state hazardous waste regulations are codified in Title 22 of the California Code of Regulations (CCR).

Regional Water Quality Control Board, San Francisco Bay Region

The WSX Alternative alignment is located within the jurisdiction of the San Francisco Bay RWQCB. The RWQCB is authorized by the Porter-Cologne Water Quality Control Act to implement water quality protection laws, including some federal water protection laws specified in CCR Title 26, Division 23, Subchapter 16. (See Section 4.5, *Hydrology*, for a complete discussion of the Porter-Cologne Water Quality Control Act.) When the quality of the groundwater or the surface waters of the state are threatened, the RWQCB has the authority to require investigations and remedial actions, when necessary. The RWQCB provides oversight in cases that require permits, investigation, and/or remediation. Extraction of contaminated groundwater or dewatering during construction, and subsequent discharge of such waters to the storm drain or to the waters of the state or the sanitary sewer system would require permits from the RWQCB or the local publicly owned treatment works, respectively.

4.4.3.3 Local

Alameda County Water District

At sites within the City of Fremont where groundwater quality is threatened, the Alameda County Water District (ACWD) works with the RWQCB to oversee and provide guidelines for the investigation and cleanup of contaminated sites. The ACWD acts in a technical advisory capacity to the RWQCB; the district is not an enforcement agency. Under cooperative agreements with RWQCB and the City of Fremont, ACWD provides technical oversight and remediation of groundwater cleanup sites, and submits closure recommendations to RWQCB when cleanups are completed.

Alameda County Health Services Agency, Hazardous Materials Division

The Hazardous Materials Division of the Alameda County Health Services Agency conducts inspections to ensure proper handling and storage of hazardous materials in Alameda County and is the local enforcement agency for those portions of Alameda County that do not have an environmental health program implemented by a city. For the City of Fremont, the county shares responsibility with the city for enforcing the proper storage and disposal of hazardous materials.

City of Fremont Hazardous Materials Department

For facilities located within City of Fremont boundaries, the City of Fremont Hazardous Materials Department is the enforcing agency for the handling and storage of hazardous materials. The city reviews hazardous materials business plans and conducts inspections of facilities that use or store hazardous materials above a certain quantity. The city also maintains operating permits for underground storage tanks. For sites where soil or groundwater contamination has been identified, or where releases of hazardous materials have been reported, the city works in conjunction with the DTSC or RWQCB to provide guidelines and oversight in site cleanup and environmental compliance.

4.4.4 Environmental Consequences and Mitigation Measures

4.4.4.1 Methodology for Impact Analysis

Analysis of impacts related to hazards and hazardous materials focused on the potential for construction of the WSX Alternative to result in exposure of construction workers to contaminated materials and the potential for operation of the WSX Alternative to result in exposure of BART riders and employees to contaminated materials.

The U.S. EPA uses the general 10^{-4} to 10^{-6} carcinogenic risk range as a target range within which it strives to manage risks for Superfund cleanups. The U.S. EPA guidance, Risk Assessment Guidance for Superfund (RAGS), Part D states: “In general, where the cumulative carcinogenic site risk to the reasonable maximum exposure (RME) individual is less than 10^{-4}, and the non-carcinogenic Hazard Index (HI) is less than or equal to 1, remedial action is not warranted under Superfund unless there are adverse environmental impacts or the applicable or relevant and appropriate requirements (ARARs) are not met.”

4.4.4.2 Impacts and Mitigation Measures

Impacts Related to Operation of the WSX Alternative

Impact HazMat-1—Creation of a hazard to the public or the environment from reasonably foreseeable accidents involving the release of hazardous materials.

WSX Alternative. BART operates electric trains that do not employ hazardous materials. Therefore, operation of the WSX Alternative, with the exception of the maintenance and storage facility proposed at the Warm Springs Station, would not involve the use or storage of hazardous materials. The 3-acre fenced maintenance yard proposed south of Warm Springs Station would contain a vehicle maintenance shop building, a power and way maintenance shop, an open paved area, a storage track, and approximately 30 parking spaces for BART employees.

The vehicle maintenance facility would include railcar lifts. Such hydraulic lifts require the use of hydraulic fluid, which may or may not contain ingredients considered hazardous under current OSHA regulations. Many hydraulic fluids available are stable and are not considered pollutants, explosive, or reactive. They require only dry oil absorbents for spill cleanup.

In the unlikely event of an accident involving adjacent fuel pipelines or railcars (which routinely transport hazardous materials) on the adjacent SP and UP lines, riders and BART employees could be exposed to hazardous materials (Huebel pers. comm., Hayden pers. comm.).

Implementation of the following mitigation measure is recommended to minimize this impact.

> **Mitigation Measure HazMat-1—Implementation of BART Emergency Plan**. Procedures for responding to potential hazards associated with discovery of hazardous materials releases from the pipelines or adjacent railcars traveling on the SP and UP tracks are described in BART's Emergency Plan. The BART System Safety Department is responsible for implementation of BART's Emergency Plan, the authoritative procedure to be used in an emergency event. The plan establishes standard policies and procedures for the mobilization of BART and other public safety resources so that fast, controlled, and predictable responses can be made to various types of emergencies. Specific response procedures for a full range of foreseeable types of emergencies are addressed in the plan and include response procedures for gas leaks and toxic spills. In all cases, the Emergency Plan identifies the responsibilities of the involved persons and authorities (train operators, BART Central Control, BART police, the responding fire departments, etc.) and sets forth an operations plan for each type of emergency. The various operations plans address the initial fact-finding and reporting procedures, communication requirements, evacuation and rescue procedures, emergency scene boundaries and restrictions, public information, and related factors.

No-Build Alternative. The No-Build Alternative would not result in the creation of a hazard to the public or to the environment from reasonably foreseeable accidents involving the release of hazardous materials.

Impact HazMat-2—Creation of a hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

WSX Alternative. Operation of the WSX Alternative would involve the use of electric BART railcars to transport BART riders. The railcars would not be used to transport hazardous materials at any time. There would be no effect.

No-Build Alternative. The No-Build Alternative would not result in the creation of a hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

Impacts Related to Construction of the WSX Alternative

Impact HazMat-3—Exposure of workers or the public to hazardous materials in the soil or groundwater resulting in adverse health effects.

WSX Alternative. Previous uses of the WSX Alternative alignment may have resulted in the release of hazardous materials into the soil or groundwater. The health and safety of construction workers and the general public could be adversely affected by exposure to hazardous materials along the WSX Alternative corridor. Soil excavation and removal for construction of roadway/track grade separations, trackbeds, and below-grade sections of the alignment could expose workers to contaminated soil if excavation encounters contaminants released from nearby known or suspected hazardous waste sites (see Table 4.4-1). There may also be potentially contaminated sites that have yet to be identified in the WSX Alternative corridor, and exposure could occur if previously unknown contamination is encountered.

Extensive dewatering of construction areas, particularly the cut-and-cover subway section, could cause groundwater inflow to the area causing migration of off-site contaminants to soil and groundwater within the construction footprint of the WSX Alternative. Unintended releases of hazardous materials could also occur from construction equipment and processes. Typical hazardous materials that may be used during the construction activities include motor oils, solvents, cleaning fluids, and lubricants. There is a potential for dermal contact and inhalation of contaminants from these exposures.

Implementation of the following mitigation measure would minimize this impact.

> **Mitigation Measure HazMat-3—Conduct additional site characterization; prepare and implement site-specific health and safety plan; develop and implement a soil/groundwater management plan**. BART will retain the services of a registered geologist or professional engineer to develop and implement a work plan for additional site characterization along portions of the WSX Alternative alignment where grading, excavation, or dewatering is likely to occur.
>
> Construction activity in contaminated areas, including excavation and grading, will be conducted with a site-specific health and safety plan prepared by a qualified professional. The plan will provide safety guidelines, delineation of action levels for personal protective gear, and emergency response procedures. The plan would be reviewed by all construction workers prior to commencement of construction.
>
> To mitigate impacts associated with exposure to hazardous materials during construction, BART will develop and implement a soil/groundwater management plan for approval by the appropriate regulatory agencies. Contaminated solids or groundwater excavated or extracted

during construction activities would be managed in accordance with the approved soil management plan and regulatory agency oversight. Remediation of soils could include excavation and on- or off-site treatment/disposal or in-place treatment of the affected soils. Remediation of groundwater could include in-situ treatment or extraction and treatment. Disposal options for contaminated soil and groundwater (i.e., on- or off-site treatment and/or disposal) would depend on the specific chemicals present and the levels of contamination. The following steps are included in such a process.

1. Develop a work plan for additional site characterization.
2. Undertake additional soil sampling in areas of known contamination to further define the horizontal and vertical extent of contamination.
3. Conduct groundwater testing in locations where dewatering activities may be required to identify any potential groundwater contamination for water management purposes.
4. Develop and obtain approval of a soil management plan to address proper handling of contaminated materials.
5. Handle contaminated soils in accordance with the approved soil management plan.
6. Construction work with contaminated soils will utilize dust control measures and sediment and erosion control measures (Mitigation Measure H-9) to prevent exposure to workers, the public, and the environment. Where appropriate, air monitoring will be conducted to measure the effectiveness of the control measures.
7. Manage groundwater discharges in accordance with construction stormwater, pre-treatment, or NPDES permits as appropriate.
8. Document the remediation work for submittal to the local and state agencies overseeing implementation of the soil management plan.

If any unidentified contaminated materials are encountered during construction or an accident results in the release of hazardous materials, halt work to ascertain the immediacy and nature of the material. If necessary, clear the area to provide safety to workers and the public. Take measures to isolate the release and determine a course of action for cleanup, treatment, and/or disposal of contaminated materials. Notify public emergency services and regulatory agencies as appropriate. Prior to construction near the underground fuel pipelines, the exact location of lines should be accurately established (e.g., accurate maps from the owner or operator or geophysical surveys). Potential hazards associated with rupture of the pipelines or discovery of hazardous materials releases from the pipelines should be included in the site health and safety plan.

No-Build Alternative. Construction would not occur under the No-Build Alternative, and workers or the public would not be exposed to hazardous materials that might result in adverse health effects.

Impact HazMat-4—Potential handling of hazardous materials within 0.25 mile of an existing school.

WSX Alternative. The Grimmer Elementary School is located adjacent to and on the west side of the WSX Alternative alignment at 43030 Newport Drive in Fremont. The closest school buildings are approximately 300 feet from the WSX Alternative alignment. The school playfields are immediately adjacent to the railroad corridor and separated from the BART alignment by the UP right-of-way, which is approximately 60 feet wide. During construction, any hazardous materials present in the railroad roadbed could be disturbed and released. Implementation of Mitigation Measure HazMat-3 described above would minimize this impact.

> **Mitigation Measure HazMat-3— Conduct additional site characterization; prepare and implement site-specific health and safety plan; develop and implement a soil/groundwater management plan**. This mitigation measure is described above.

No-Build Alternative. No hazardous materials present in the railroad roadbed would be disturbed or released under the No-Build Alternative because construction would not occur; therefore, no handling of hazardous materials within 0.25 mile of an existing school would result.

Impact HazMat-5—Potential for demolition or renovation of existing structures to expose workers to lead-based paint and asbestos-containing materials.

WSX Alternative. The WSX Alternative may require demolition or renovation of structures built prior to 1978. Such structures may include asbestos-containing materials and/or lead-based paint. Implementation of the following mitigation measure is recommended.

> **Mitigation Measure HazMat-5—Survey and properly handle materials from structures that may contain asbestos and lead-based paint**. Prior to demolition or renovation of structures built before 1978, a survey for the presence of ACM will be conducted. The survey will be conducted by Asbestos Hazard Emergency Response Act (AHERA)-certified personnel, trained according to state and federal regulations. Structures will also be surveyed for the presence of lead-based paint. If the results of the survey detect the presence of lead-based paint, construction will be performed in accordance with the Lead in Construction Standard (8 Cal. Code of Regulations Section 5132.1). ACM will be removed in accordance with the requirements of Cal OHSA (8 Cal. Code of Regulations 5129) and the Bay Area Air Quality Management District (BAAQMD).

No-Build Alternative. The No-Build Alternative would not result in the potential for demolition or renovation of existing structures to expose workers to lead-based paint and asbestos-containing materials.

Impact HazMat-6—Potential for interruption or delay of ongoing site investigation/ remediation activities.

WSX Alternative. Construction and operation of the WSX Alternative prior to completion of all site investigation/remediation activities along the alignment could interfere with or delay investigation and cleanup efforts; increased soil and groundwater contamination could result because of continued migration of contaminants through soil and groundwater. This interference or delay could result in increased exposure of people to hazardous materials and/or increased remediation costs. Implementation of the following mitigation measure would minimize this impact.

> **Mitigation Measure HazMat-6—Cooperation and coordination with responsible site investigation/remediation parties and agencies**. BART will cooperate with ongoing investigation and cleanup efforts to the extent possible. BART will provide access as necessary to BART property for collection of soil samples, installation and monitoring of groundwater wells, or management of contaminated soils or groundwater. Persons conducting investigation/remediation activities would be required to comply with all regulatory requirements and BART safety and emergency programs.

No-Build Alternative. The No-Build Alternative would not result in the potential for interruption or delay of ongoing site investigation/remediation activities.

Impacts Related to Optional Irvington Station

The impacts and mitigation measures identified above for the WSX Alternative would also apply to the optional Irvington Station, except for Impact HazMat-4 (Potential handling of hazardous materials within 0.25 mile of an existing school) and the corresponding mitigation measure because there is no school within 0.25 mile of the Irvington Station site. The impacts of the No-Build Alternative described above would apply equally to not building the optional Irvington Station.

Section 4.5
Hydrology

4.5.1 Introduction

This section describes existing hydrology and water quality conditions in the hydrology study area, analyzes the potential impacts of the alternatives on hydrology and water quality, and identifies mitigation measures to avoid or reduce adverse impacts.

4.5.2 Affected Environment

4.5.2.1 Methodology for Assessment of Existing Conditions

The area studied for the analysis of hydrology and water quality is approximately bounded on the north by the Fremont BART Station, on the south by the Warm Springs segment of Mission Boulevard, on the east by the ridgeline defining the eastern edge of the local watersheds, and on the west by the UP alignment. This is referred to as the hydrology study area, and it defines the area that is likely to affect or be affected by proposed BART facilities. BART would mitigate any effects caused by the WSX Alternative in accordance with BART design standards and Alameda County Flood Control and Water Conservation District (ACFCD) requirements.

Existing hydrologic and water quality conditions in the study area were evaluated qualitatively, and in accordance with standard professional practice. Key sources of information consulted on existing hydrologic conditions included the following.

- The current Fremont General Plan (City of Fremont 1991, as amended).
- The California State Water Resources Control Board's (SWRCB's) listing of water bodies identified as having limited water quality (California State Water Resources Control Board 2003).
- Flood Insurance Study (FIS) for the region that includes the WSX Alternative area (Federal Emergency Management Agency 2000a).
- Flood Insurance Rate Maps (FIRMs) for the region that includes the WSX Alternative area (Federal Emergency Management Agency 2000b).
- Conceptual plan for restoration and enhancement of Mission Creek in Fremont (Jones & Stokes 2000).

- Site-specific geotechnical investigation performed for the WSX Alternative (Parikh Consultants 2002).
- The *Tule Pond Hydrology Study* (Bay Area Transit Consultants 1993).
- *Draft Dewatering Feasibility Study, BART Warm Springs Extension* (Fugro West Inc. 2004).

4.5.2.2 Existing Conditions

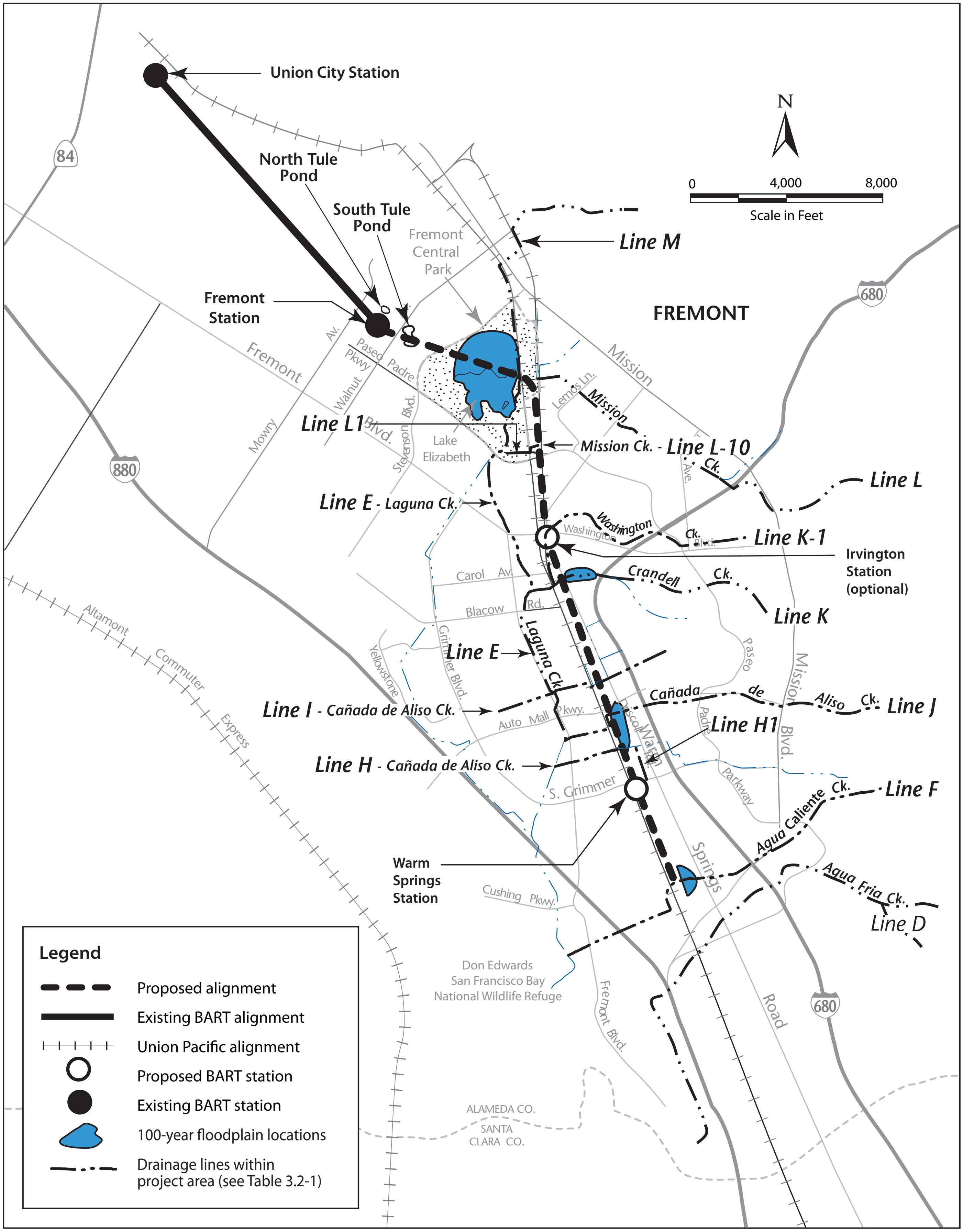
Climate and Precipitation

The San Francisco Bay area, like much of California's central coast, enjoys a Mediterranean climate characterized by mild, wet winters and warm summers. Moderated by proximity to San Francisco Bay and the ocean, temperatures are seldom below freezing. Summer weather is dominated by sea breezes caused by differential heating between the interior valleys and the coast, while winter weather is dominated by storms from the northern Pacific Ocean that produce the majority of the region's annual rainfall. The mean annual temperature in Fremont is 57°F. The mean annual rainfall in Fremont is approximately 18 inches, most of which occurs between October and April (City of Fremont 1991, as amended).

Surface Hydrology and Flooding

Surface Water Drainages in the WSX Alternative Area

Surface hydrology in the eastern Fremont area is dominated by perennial and intermittent streams that flow westward from the East Bay hills and the foothills of the northern Diablo Range toward San Francisco Bay. Laguna Creek (Line E on Figure 4.5-1) is the principal drainage of the study area, draining a watershed that includes part of Fremont and the northern foothills of the Diablo Range as well as the Livermore and San Ramon Valleys (Alameda County Water District 2002). There are seven major drainage areas within or immediately adjacent to the WSX Alternative alignment, shown in Figure 4.5-1 and described further in Table 4.5-1.



Source: FEMA FIRM maps 2000 and ACFCD maps.

Figure 4.5-1
Major Drainages in WSX Alternative Area

Table 4.5-1. Existing Drainage Channel Characteristics in Hydrology Study Area

Drainage Line	Associated Watershed	Total Drainage Area (square miles)	Crossing Location (BART stationing [feet])	Characteristics at Crossing		
				Conveyance Structure		100-Year Peak Flow (cubic feet per second)
				West of Alignment	East of Alignment	
M	Mission Creek	1.0	NA	NA	Open Channel	330
L	Mission Creek	0.9	2275+50	Open Channel	Open Channel	3360
L-10[1]	Mission Creek	NA	2302+20	Open Channel	Open Channel	139
L-1	Mission Creek	NA	2305+50	NA[2]		
K	Crandall Creek	3.3	2361+00	6-by-3.5-foot box culvert and 72-inch pipe[3]	6-by-5-foot arch and 72-inch pipe[3]	1670
I	Cañada de Aliso	0.6	2406+00	84-inch pipe	7-by-6-foot box culvert	245
J	Cañada de Aliso	1.6	2424+50	72-inch pipe	72-inch pipe	560
H	Cañada de Aliso	1.3	2434+00	modified box culvert	modified box culvert	589
H-1	Cañada de Aliso	NA	2434+00 to 2442+00	NA	48-inch pipe	NA
F[4]	Arroyo del Agua Caliente (Agua Caliente Creek)	2.7	2493+50	8- by 6-foot box culvert	81-inch pipe	945

Notes:

NA = No data available.
[1] Currently, L-10 is an open channel west of the alignment. Immediately east of the alignment, it is open channel or 48-inch RCP a little further upstream. Upon completion of the city's grade separation project, it will be two 72-inch RCP pipes, one immediately east and one immediately west of WSX, and the 100-yr flow will be 296 cubic feet per second (cfs).
[2] Drainage channel will be filled in by the City of Fremont's grade separations project.
[3] "Channel crossing to be improved to convey 100-year flow below the WSX trackway while maintaining upstream and downstream water levels."
[4] Line F does not cross the WSX Alternative alignment; however, its flooding may affect the project.

Sources: San Francisco Bay Area Rapid Transit District 1991, Federal Emergency Management Agency 2000a

The lower reaches of the drainages shown on Figure 4.5-1 have been modified to serve as stormwater drainage channels. ACFCD requires that drainage structures be designed to reduce post-development flows from the 15-year storm to predevelopment levels. ACFCD also requires that drainage facilities serving watershed areas larger than 50 acres be designed to safely convey flows from the 100-year storm.[1] Accordingly, as of 1991, existing drainage structures were sized to effectively convey flood

[1] The *100-year storm* is a storm that has a 1% chance of occurring in any given year; the *15-year storm* is a storm that has a 6.7% chance of occurring in any given year.

flows from the 15-year storm (Otsuka pers. comm.); many are still not capable of effectively conveying flood flows from the 100-year storm (Federal Emergency Management Agency 2000a).

Peak flows for the 100-year storm and resultant flooding have increased over the past decade because of additional development in the area's upper watersheds (Federal Emergency Management Agency 2000a). The current FIS (Federal Emergency Management Agency 2000a) for the region that includes the WSX Alternative area incorporates updated flood hazard information along selected area drainages; peak flows for the drainages affected by the WSX Alternative are shown in Table 4.5-1. Flooding is a concern along the northeastern portion of Lake Elizabeth, and along Mission Creek, Crandell Creek, Cañada de Aliso, the unnamed tributary to Laguna Creek shown as drainage Line H in Table 4.5-1, and Agua Caliente Creek. Where the WSX Alternative alignment crosses some of these drainages, flow exceeds the capacity of the conveyance structures during extreme flood events and water moves as sheet flow across the existing railroad embankments (Federal Emergency Management Agency 2000a).

Tule Pond and Lake Elizabeth

Tule Pond, located at the north end of the WSX Alternative alignment, is a sag pond[2] formed along the Hayward fault (Parikh Consultants 2002). It has been modified to serve as a flood control basin for local runoff during the wet season. Tule Pond is bisected by Walnut Avenue, but the portion north of Walnut Avenue (Tule Pond North) is hydrologically connected to the portion south of Walnut Avenue (Tule Pond South) via two 18 x 29-inch pipe arch culverts. The portion of Tule Pond within the WSX Alternative corridor (Tule Pond South) has an area of approximately 6 acres and is seasonally flooded.

Lake Elizabeth, located in Fremont Central Park, is an 83-acre recreational lake owned by ACFCD and maintained with groundwater by the City of Fremont. It originated as a natural sag (Stivers Lagoon) formed along an active trace of the Hayward fault (see City of Fremont 1991, as amended), but has been artificially enlarged, and hardscape has been installed to stabilize portions of the shoreline. Local educational groups study and monitor the Lake Elizabeth-Tule Pond area. Recently there has been discussion by local agencies and nonprofit groups about the potential to return the Lake Elizabeth area to a more natural environment. At this time, no restoration or conservation plans have been announced.

In addition to serving as a recreational resource, Lake Elizabeth and the surrounding park areas also provide approximately 985 acre-feet of flood storage capacity during the wet season (Jones & Stokes 2000). High wet-season flows in Mission Creek back up where the creek is culverted at Paseo Padre Parkway and flow over a weir into Lake Elizabeth. As the flood flows subside, lake water drains back into Mission Creek via the same weir. During extreme flood events, flood flows in Mission Creek overtop the bank and discharge directly into Lake Elizabeth upstream of the weir. During the summer, the City of Fremont installs flashboards in the weir and adds supplemental water to offset evaporation and regulate lake level for recreation uses (Jones & Stokes 2000). Because of the shallow slopes adjoining Lake Elizabeth, surface runoff rates are slow and little overland runoff reaches the lake.

[2] *Sag* refers to a depression formed by surface deformation along an active fault trace. A *sag pond* forms when a sag is filled by runoff and/or groundwater to form a body of standing water.

Lake Elizabeth acts as a sink for sediment transported by Mission Creek, particularly when the creek discharges directly into the lake at flood stage. Bathymetric surveys of the lake suggest that sediment has been accumulating at an average rate of approximately 8,000 cubic yards per year (Jones & Stokes 2000). The lake is periodically dredged to maintain floodwater storage capacity; dredge spoils are retained in a bermed area north of the lake and two dredge ponds with an aggregate area of approximately 20 acres located west of the lake. The two dredge ponds west of the lake were maintained by the City of Fremont as temporary dredge ponds; the ponds no longer exist.

Approximately 550 linear feet of the WSX Alternative alignment is within the northeast arm of Lake Elizabeth (in a subway structure below the lake bottom.) The WSX Alternative corridor includes 3.7 acres of the lake's area. The portion of Lake Elizabeth intersected by the WSX Alternative corridor has a maximum depth of approximately 6 feet.

Subsurface Hydrology

The WSX Alternative area overlies the Warm Springs subarea of the South Bay Groundwater Basin. The basin provides approximately 50% of the Alameda County Water District's (ACWD's) water supply (Alameda County Water District 1990). Aquifers in the Warm Springs subarea consist of thin discontinuous horizons within the Warm Springs alluvial apron. In general, groundwater flows west toward San Francisco Bay (California Department of Water Resources 1968).

The Hayward fault may act as a substantial barrier to east-west movement of groundwater in the WSX Alternative area (Fugro West, Inc. and PB Team 2004). Consequently, groundwater levels east of the fault are as much as 50 feet higher than those west of the fault. Near Lake Elizabeth, the water table is typically 4–8 feet below ground surface (Parikh Consultants 2002).

The portion of the WSX Alternative alignment that will be constructed below ground surface is located east of the Hayward fault in an area referred to as the Above Hayward Fault (AHF) sub-basin. Information received from the Alameda County Water District (Paul Piraino pers. comm.) indicates that, unlike other areas within the Niles Cone[3], the AHF sub-basin is largely unconfined and the first encountered water-bearing zone is the regional aquifer, composed of highly permeable soils (i.e., cobbles, gravel, and sand). Test wells in the vicinity of Lake Elizabeth confirm this information from ACWD with calculated hydraulic conductivity values ranging from 1,050 to 1,870 feet per day."(Fugro West, Inc 2004)

Previous geotechnical studies conducted by Fugro West, Inc. (2003) indicate a surficial fine-grained layer ranging in thickness from 15 to 30 feet along the 2,500-foot long section of proposed track between the north portal and the thicker fine-grained section near Lake Elizabeth. The underlying material consists of coarse sands and gravels with variable silt content to the total depth explored of about 80 feet. The bottom of the proposed BART subway along this section of track ranges from 20 to 33 feet below ground surface.

Geotechnical boring logs within the area of the pumping test indicated clayey soils from the surface to a depth of 10 to 15 feet, underlain by 5 to 10 feet of silt, sandy silt, and silty sand. The coarse-grained materials between 20 and 80 feet below ground surface (bgs) consist of mixtures of gravel, sand, and silt. In general, the coarse-grained materials (between 20 to 50 feet bgs where dewatering

[3] Niles Cone is a prolific underground aquifer located in the Niles district of Fremont that is used as a source of high-quality drinking water.

would occur) appear to be most permeable between where the north portal begins and 1,500 feet to the southeast. The location tested during this study is considered to be representative of the most permeable section, located approximately 1,000 feet southeast of the north portal, within the proposed subway segment.

Water Quality

None of the surface water bodies in the WSX Alternative area are considered water quality limited pursuant to Section 303(d) of the federal Clean Water Act (CWA), except for Mission Creek[4], a potential option for discharge of dewatering effluent, which is impaired for a variety of pollutants/stressors (California State Water Resources Control Board 2003). However, runoff and discharges from industrial facilities and urban areas may contribute elevated levels of contaminants, especially petroleum products and heavy metals, to local water bodies. Sediments accumulating in Lake Elizabeth also likely carry adsorbed nutrients as well as pesticides and other pollutants derived from upstream urban areas (Jones & Stokes 2000).

Groundwater in the Fremont area has been identified as containing elevated levels of nitrates and boron. Nitrates are likely derived in part from naturally occurring nitrate-bearing minerals in the area's sediments, and in part from discharges from wastewater treatment facilities and septic tanks. Boron is likely derived from naturally occurring minerals in the area's sediments. Groundwater quality has been locally affected by leakage from underground storage tanks and by infiltration of surface spills (San Francisco Regional Water Quality Control Board 2001).

However, as mentioned above, the AHF sub-basin is a unique portion of the Niles Cone. The tremendous water storage and flow potential of the AHF sub-basin aquifer materials explain why a major portion of ACWD's recharge and extraction occur in the AHF sub-basin. The quality of water in the AHF sub-basin is considered to be of highest quality and consistently meets all drinking water standards.

Although the Department of Water Resources (DWR) reported in 1968 that excessive amounts (greater than 44 ppm) of nitrates were found in groundwater in the region, the nitrates were found southwest of Union City and the Niles district in Fremont, and not in the project area. In addition, testing for nitrates is routinely conducted from ACWD's groundwater production wells, and the results are significantly below the maximum containment level of 45 ppm (Paul Piraino pers. comm.).

In 1960, a DWR report indicated that some wells in the vicinity of geologic faults had high concentrations of boron, with the highest observed concentration being 5.3 ppm. However, based on DWR data collected between 1962 and 1967, boron concentrations were below 0.7 ppm in all Niles

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[4] In 2002, Mission Creek was included on the U.S. Environmental Protection Agency (U.S. EPA) List of Water Quality Limited Segments, in accordance with Section 303(d) of the Clean Water Act, for impairment by ammonia, hydrogen sulfide, polycyclic aromatic hydrocarbons (PAHs), and high concentrations of chlordane, chlorpyrifos, chromium, copper, dieldrin, lead, mercury, mirex, polychlorinated biphenyls (PCBs), silver, and zinc in sediment (U.S. Environmental Protection Agency 2003). Potential sources of these pollutants result from industrial point sources and combined sewer overflows within the Mission Creek watershed. However, U.S. EPA determined that only the reach from the start of the creek channel to 4th Street is impaired. This creek is listed as a low priority for establishment of a Total Daily Maximum Load (TMDL) for the pollutants, thus a strategy for reduction and elimination of these pollutants is not anticipated until the problem sources and potential solutions are further studied and assessed.

Cones aquifers. In addition, ACWD collected samples from two AHF monitoring wells (one adjacent to the Hayward fault) in 1998, and boron concentrations were 0.57 and 0.67 ppm. A boron concentration of 2 ppm is considered suitable for agricultural use. (Paul Piraino pers. comm.)

4.5.3 Regulatory Setting

The following sections describe current laws and regulations relevant to the WSX Alternative and hydrology and water quality in the study area.

4.5.3.1 Federal

Clean Water Act

The federal Clean Water Act (CWA) was enacted as an amendment to the federal Water Pollution Control Act of 1972, which outlined the basic structure for regulating discharges of pollutants to waters of the U.S. The CWA now serves as the primary federal law protecting the quality of the nation's surface waters, including lakes, rivers, and coastal wetlands. The CWA authorizes states to adopt water quality standards for water bodies in the state and includes programs addressing both point source and nonpoint source pollution.[5] The CWA operates under the principle that all discharges from point sources into the nation's waters are unlawful unless specifically authorized by a permit; permit review is one of the CWA's primary regulatory tools. Permits issued to point source discharges must contain effluent limitations that implement state water quality standards and technology-based standards established by the U.S. Environmental Protection Agency (U.S. EPA). U.S. EPA establishes water quality standards for states that fail to do so; for California, after the state's corresponding water quality standards were judicially invalidated, U.S. EPA established such standards for certain toxic water pollutants in the "National Toxics Rule" and "California Toxics Rule." The following sections provide additional details on specific CWA sections that apply to the WSX Alternative.

Section 303 and 304

Sections 303 and 304 provide for water quality standards, criteria, and guidelines.

Section 401 – Water Quality Certification

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the U.S. must obtain certification from the state in which the discharge would originate. The state must certify that the discharge will comply with state water quality standards and other requirements of the CWA. Therefore, all projects that have a federal component and may affect state water quality (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401. Section 401 certification or waiver for the WSX Alternative corridor is under the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (RWQCB) .

[5] *Point source pollution* is pollution that originates or enters surface waters at a single, discrete location such as an outfall structure. *Nonpoint source pollution* originates over a broader area and includes urban contaminants in stormwater runoff and sediment loading from upstream areas.

Section 402 – Permits for Point Source and Stormwater Discharges

Discharges from a point source are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit that specifies allowable limits, based on available wastewater treatment technologies, for pollutant levels on their effluent. In California, the SWRCB is authorized by the U.S. EPA to oversee the NPDES program through the state's nine RWQCBs. Prior to any point source discharge that could affect the quality of the water of the State, the discharger must file a report of waste discharge with the Regional Board. After any necessary public hearings, the Regional Board prescribes Waste Discharge Requirements, which implement the water quality control plans. Under the Porter-Cologne Act, Waste Discharge Requirements serve as NPDES permits. CWA Section 402 also regulates all point source stormwater discharges (including combined wastewater and stormwater discharges) to surface waters through the NPDES program. Additional information on NPDES provisions relevant to the WSX Alternative is provided in Section 4.5.3.2, *State*, below.

Section 404 – Permits for Fill Placement in Waters and Wetlands

CWA Section 404 regulates the discharge of dredged and fill materials into "waters of the U.S." *Waters of the U.S.* refers to oceans, bays, rivers, streams, lakes, ponds, and wetlands, including any or all of the following.

- Areas within the ordinary high water mark of a stream, including nonperennial streams with a defined bed and bank and any stream channel that conveys natural runoff, even if it has been realigned.
- Seasonal and perennial wetlands, including coastal wetlands.

Wetlands are defined for regulatory purposes as areas "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3, 40 CFR 230.3). (See Section 4.6, *Wetlands*, of this document for further discussion of wetlands.)

Project proponents must obtain a permit from the U.S. Army Corps of Engineers (Corps) for all discharges of dredged or fill material into waters of the U.S., including wetlands, before proceeding with a proposed activity. The Corps may issue either an individual permit evaluated on a case-by-case basis, or a general permit evaluated at a program level for a series of related activities. General permits are preauthorized and are issued to cover multiple instances of similar activities expected to cause only minimal adverse environmental effects. Nationwide Permits (NWPs) are a type of general permit issued to cover particular fill activities. Each NWP specifies particular conditions that must be met in order for the NWP to apply to a particular project. Waters of the U.S. in the WSX Alternative corridor are under the jurisdiction of the U.S. Army Corps of Engineers, San Francisco District.

Section 404 permits may be issued only if there is no practicable alternative to the proposed discharge that would have a less-adverse effect on the aquatic ecosystem (as long as the alternative does not have other significant adverse environmental consequences). Compliance with CWA Section 404 requires compliance with several other environmental laws and regulations. The Corps cannot issue an individual permit or verify the use of a general permit until applicable requirements of NEPA, the federal Endangered Species Act (see Section 4.7), the federal Coastal Zone

Management Act, and the National Historic Preservation Act (see Section 4.12) have been met. In addition, the Corps cannot issue or verify any permit until a water quality certification, or waiver of certification, has been issued pursuant to CWA Section 401.

Federal Flood Insurance Program

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 were enacted in response to concern about the increasing costs of disaster relief. The intent of these acts is to reduce the need for large publicly funded flood-control structures and to limit disaster relief costs by restricting development on floodplains.

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development on floodplains. FEMA is responsible for issuing FIRMs for communities participating in the NFIP. These maps delineate flood hazard zones in the community. The analysis in this section was based on the most recent FIRMs, which have an effective date of February 9, 2000.

FEMA administers the NFIP to provide subsidized flood insurance to communities complying with FEMA regulations that limit development in floodplains. FEMA issues flood insurance rate maps for communities participating in the NFIP. These maps delineate flood hazard zones in the community.

Executive Order 11988

Executive Order 11988 (Floodplain Management) addresses floodplain issues related to public safety, conservation, and economics. The policy applies to projects that would significantly encroach into the floodplain and requires findings to be made that ensure that the following goals are achieved.

- Avoidance of incompatible floodplain development.
- Consistency with the standards and criteria of the NFIP.
- Restoration and preservation of the natural and beneficial floodplain values.

Federal guidelines were developed for implementing Executive Order 11988 directives that outline an eight-step decision-making process, as follows.

- Step 1: Determine whether a proposed action would take place in the base floodplain.
- Step 2: Provide for public review.
- Step 3: Identify and evaluate practicable alternatives to locating action in the base floodplain.
- Step 4: Identify the impact of the proposed action.
- Step 5: Minimize threats to life and property and to natural and beneficial floodplain values, and restore and preserve natural and beneficial floodplain values.
- Step 6: Reevaluate alternatives.

- Step 7: Issue findings and a public explanation.
- Step 8: Implement the action.

U.S. Department of Transportation (DOT) Order 5650.2, *Floodplain Management and Protection*, contains DOT's policies and procedures for implementing Executive Order 11988. FEMA has also promulgated relevant policies and procedure at 44 CFR Part 9. These policies direct agencies to avoid funding or approving projects in floodplains where practicable.

4.5.3.2 State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act provides for the development and periodic review of water quality control plans (Basin Plans) that designate beneficial uses of California's major rivers and groundwater basins and establish narrative and numerical water quality objectives for those waters. Basin plans are primarily implemented by using the NPDES permitting system to regulate waste discharges so that water quality objectives are met (see *Section 402 – Permits for Stormwater Discharge* in *Clean Water Act* above).

Activities in areas defined as "waters of the state" that are outside the jurisdiction of the Corps (e.g., isolated wetlands) are regulated by RWQCB under the authority of the Porter-Cologne Water Quality Control Act. Such activities may require the issuance, or waiver, of waste discharge requirements from RWQCB.

Transportation maintenance facilities that discharge stormwater are regulated under the NPDES General Permit for Discharges of Storm Water Associated with Industrial Activities Excluding Construction Activities, which was adopted in November 1991 and revised in 1992 and then again in 1999. Coverage under this general permit requires the facility operator to submit a notice of intent to the SWRCB, prepare a Storm Water Pollution Prevention Plan (SWPPP, pronounced "swip"), perform monitoring, and submit annual monitoring reports to the appropriate RWQCB. The SWPPP must include measures used to eliminate nonstormwater discharges to the facility's storm drain system. Examples of nonstormwater discharges include waters from the rinsing or washing of vehicles, equipment, buildings, or pavement; materials that have been improperly disposed of; and spilled or leaked materials.

Transportation construction is now regulated under the NPDES General Permit for Storm Water Discharges Associated with Construction Activities (General Construction Permit), which was adopted by the SWRCB in August 1992 and revised in 1999 and again in 2001. Construction permits are discussed below under *Construction Activity Permitting*.

State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB administers water rights, water pollution control, and water quality functions throughout the state, while the Regional Water Quality Control Boards conduct planning, permitting, and enforcement activities. In California, the SWRCB is also responsible for implementing the

NPDES program through the state's nine RWQCBs. The WSX corridor and surrounding vicinity are within the jurisdiction of the San Francisco Bay RWQCB.

Beneficial Uses and Water Quality Objectives

The RWQCB is responsible for the protection of beneficial uses of water resources within the San Francisco Bay Region. Beneficial uses are the desired resources, services, and qualities of the aquatic system that are supported by achieving and protecting high water quality. The RWQCB uses planning, permitting, and enforcement authorities to meet this responsibility, and has adopted the water quality control plan (Basin Plan) for the San Francisco Bay Basin (San Francisco Water Quality Control Board 1995) to implement plans, policies, and provisions for water quality management. Beneficial uses are described in the Basin Plan and are designated for major surface waters and their tributaries, as well as groundwater. The Basin Plan also contains water quality objectives that are intended to protect the beneficial uses of the basin. The RWQCB has region-wide and water body/beneficial use-specific water quality objectives.

Surface waters in the San Francisco Bay Region consist of fresh-water rivers, streams, and lakes (collectively described as inland surface waters), estuarine waters, and coastal waters. Estuarine waters include the Bay system from the Golden Gate to the regional boundary near Pittsburg and the lower portions of streams flowing into the Bay, such as the Napa and Petaluma rivers in the north and Coyote and San Francisquito creeks in the south. Inland surface waters support or could support most beneficial uses. The specific beneficial uses for inland streams include municipal and domestic supply, agricultural supply, industrial process supply, groundwater recharge, water contact recreation, non-contact water recreation, wildlife habitat, cold freshwater habitat, warm freshwater habitat, fish migration, and fish spawning. The San Francisco Bay Estuary supports beneficial uses such as estuarine habitat, industrial service supply, and navigation in addition to all of the beneficial uses supported by streams.

Lake or Streambed Alteration Agreements (California Fish and Game Code Section 1600 et seq.)

The California Fish and Game Code regulates activities that affect the flow, channel, or banks of natural bodies of water. Project proponents are required to notify and enter into a streambed alteration agreement with the California Department of Fish and Game (CDFG) before beginning construction of a project that will result in any of the following.

- Diversion, obstruction, or change in the natural flow or the bed, channel, or bank of any river, stream, or lake.
- Use of materials from a streambed.
- Disposal or deposition of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake.

Lake and streambed alteration activities are covered under California Fish and Game Code Section 1600 et seq. Section 1600 et seq. typically do not apply to drainages that lack a defined bed and banks, such as swales and vernal pools.

Construction Activity Permitting

As mentioned above, the RWQCB administers the NPDES stormwater permitting program in the San Francisco Bay Region for construction activities. Construction activities disturbing 1 acre or more of land are subject to the permitting requirements of the NPDES General Permit for Discharges of Storm Water Runoff Associated with Construction Activity (General Construction Permit). For qualifying projects, the project applicant must submit a notice of intent to the RWQCB to be covered by the General Construction Permit prior to the beginning of construction. The General Construction Permit requires the preparation and implementation of a SWPPP, which must be completed before construction begins. Implementation of the SWPPP starts with the commencement of construction and continues through the completion of the project. Upon completion of the project, the applicant must submit a notice of termination to the RWQCB to indicate that construction is completed.

As of February 2003, the NPDES stormwater permit applies to all ground-disturbing activities that would affect 1 acre or more. For the purposes of the NPDES program, construction activities are defined as clearing, excavating, grading, or other land-disturbing activities.

The SWPPP is required to identify receiving waters and stormwater discharge locations, and to include pollution prevention measures (erosion and sediment control measures, measures to control nonstormwater discharges and hazardous spills, and post-construction stormwater management measures); demonstration of compliance with all applicable local and regional erosion and sediment control and stormwater management standards; identification of responsible parties; a detailed construction description and timeline; and a monitoring and maintenance schedule for the best management practices (BMPs) for sediment control, spill containment, post-construction measures, etc.

Dewatering Activities Permitting

Small amounts of construction-related dewatering are covered under the General Construction Permit. For dewatering activities that are not covered by the General Dewatering Permit, an individual NPDES permit and waste discharge requirements (WDRs) must be obtained from the RWQCB. Generally, such a permit would include waste discharge limitations and prohibitions similar to or more stringent than those in the General Construction Permit, as well as monitoring and reporting requirements.

Best Management Practices

The term *best management practices* (BMPs) refers to a wide variety of measures taken to reduce pollutants in stormwater and other non-point source runoff. Measures range from source control, such as use of permeable pavement, to treatment of polluted runoff, such as detention or retention basins and constructed wetlands. Maintenance practices (e.g., street sweeping) and public outreach campaigns also fall under the category of BMPs. In general, data establishing the effectiveness of BMPs in reducing target pollutants is scarce. Further, the effectiveness of a particular BMP is highly contingent upon the context in which it is applied and the method in which it is implemented. BMPs are best used in combination to most effectively remove target pollutants.

4.5.3.3 Local

Alameda Countywide Clean Water Program

The Alameda Countywide Clean Water Program (Clean Water Program) was initiated with the goal of forging consistent, effective countywide strategies to control sources of stormwater pollution. The In 2001, San Francisco Bay RWQCB issued a joint municipal stormwater permit to the 17 agencies and cities participating in the Clean Water Program (Alameda Countywide Clean Water Program 2001). The participating entities include Alameda County; ACFCD and its Zone 7; and the Cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City. The Clean Water Program is responsible for helping participant entities ensure that they are fulfilling their obligations under the permit and for preparing detailed reports that describe what each entity is doing to prevent stormwater pollution. The Clean Water Program coordinates its activities with other pollution prevention programs, such as wastewater treatment, hazardous waste disposal, and waste recycling.

The Clean Water Program has developed a Storm Water Quality Management Plan (Plan) that describes the Program's approach to reducing stormwater pollution. The Storm Water Quality Management Plan for fiscal years 2001/02 through 2007/08 is the Clean Water Program's third to date, and serves as the basis of the Clean Water Program's NPDES permit (Alameda Countywide Clean Water Program 2001). This project in the City of Fremont, which is a participating entity of the Clean Water Program, is within the boundaries addressed by the Plan. The Plan does not regulate discharge requirements. Rather, the Clean Water Program's Plan is an advisory tool intended to assist dischargers within the boundaries of the 17 participatory agencies to comply with RWQCB regulations. The Plan provides details and guidelines for RWQCB compliance for entities that will generate discharges to water bodies.

4.5.4 Environmental Consequences and Mitigation Measures

4.5.4.1 Methodology for Analysis of Environmental Consequences

Potential impacts on hydrology and water quality were assessed qualitatively using standards developed by BART on the basis of regulatory requirements and accepted professional practice related to water resources management.

4.5.4.2 Alternative-Specific Environmental Analysis

Impacts Related to Operation of the WSX Alternative

Impact H-1—Alteration of flooding conditions due to changes in infiltration rates, drainage patterns, or the rate and amount of surface runoff.

WSX Alternative. Completion of the WSX Alternative would involve construction of impervious surfaces on areas that are presently undeveloped. Approximately 49 acres of impervious area would be created as a result of construction and operation of the WSX Alternative (not including the additional 18 acres that would be created if the optional Irvington Station were also constructed). New areas of impervious surface would include the Warm Springs Station, the maintenance yard, the train control bungalow, the traction power substations, the gap breaker stations, and the ventilation structures. These additional impervious areas would decrease the amount of rainfall expected to infiltrate into the ground and would result in higher peak flows in area drainages. Increased peak flows could exacerbate flooding problems along the drainage lines that experience flooding under existing conditions (the northeastern portion of Lake Elizabeth, Mission Creek, Crandell Creek, Cañada de Aliso, Agua Caliente Creek, and the unnamed tributary to Laguna Creek shown as Line H on Figure 4.5-1). If post-construction flows were not controlled, existing flooding problems could be exacerbated, and additional flooding and channel bank scouring could take place, resulting in an adverse impact on hydrology. Mitigation Measure H-1 would minimize this impact.

> **Mitigation Measure H-1—Design and implement a stormwater management system to safely convey stormwater.** BART will design and implement a stormwater management system and will develop and put into operation a stormwater management plan to convey flows up to and including the 100-year storm. The stormwater management system will be incorporated into plans and specifications for the WSX Alternative, and BART will submit the WSX Alternative designs to ACFCD for approval to ensure that the WSX Alternative does not exacerbate either upstream or downstream flooding conditions. Drainage systems must be designed in compliance with guidelines published by ACFCD. In addition, any work that would encroach on structures or areas owned or operated by ACFCD would require approval from ACFCD. The stormwater management plan may recommend use of stormwater detention facilities to temporarily store the increased flows from storms up to and including the 15-year storm, and to discharge the flows at approximately predevelopment levels. BART will consult with ACFCD, RWQCB, and the City of Fremont, as appropriate, to ensure that the WSX Alternative does not exacerbate either upstream or downstream flooding.

No-Build Alternative. The No-Build Alternative would result in no change from current conditions.

Impact H-2—Change in flood storage capacity at Lake Elizabeth.

WSX Alternative. Lake Elizabeth is an important flood storage facility; any reduction in capacity of the lake would adversely affect the flood management capabilities of the City of Fremont and ACFCD. The WSX Alternative alignment crosses the northeast arm of the lake, which is approximately 6 feet deep. A subway would be constructed under the lake; the top of the subway box would be a minimum of 6 feet below the existing lake bottom. When subway construction is complete, the lake bottom would be backfilled over the structure and the lake would be restored over the alignment. Consequently, the long-term flood storage capacity of the lake after the WSX Alternative is completed would not differ from existing conditions.[6] This change is accordingly considered to have no impact.

No-Build Alternative. There would be no change in flood storage capacity at Lake Elizabeth under the No-Build Alternative.

[6] Temporary impacts on Lake Elizabeth during construction are discussed in Impacts H-9, H-10, and H-13 below.

Impact H-3—Loss of flood storage capacity at Tule Pond South.

<u>WSX Alternative</u>. Construction of the WSX Alternative would necessitate filling in part of the portion of Tule Pond located south of Walnut Avenue (Tule Pond South). No major drainage lines presently flow into Tule Pond South, but it is hydrologically connected to the portion of Tule Pond located north of Walnut Avenue (Tule Pond North) via two culverts under Walnut Avenue. Filling in part of Tule Pond South would reduce available flood storage capacity. The deepening of Tule Pond to offset losses in storage due to the partial filling in one location of the pond would not necessarily result in increased flood storage capacity. The close proximity to groundwater levels during the normal wet season would result in a greater amount of stored water but no increased capacity to contain floodwater above this water level. The loss of flood storage capacity is considered an adverse impact. Mitigation Measure H-3 would rectify the impact.

> **Mitigation Measure H-3–Mitigate the loss of flood storage capacity by providing an equal or greater amount of storage capacity at the same location.** To maintain existing flood storage capacity, BART will expand Tule Pond South and/or create an additional flood storage facility (e.g., detention pond) at the same location. The storage capacity will be at least as large as the loss of storage resulting from installation of the WSX Alternative (see Figure 3-4a in Chapter 3, *Alternatives Considered*).

<u>No-Build Alternative</u>. There would be no loss of flood storage capacity at Tule Pond South under the No-Build Alternative.

Impact H-4—Delivery of increased pollutant loads to urban drainages from expanded impervious areas.

<u>WSX Alternative</u>. Operation of the WSX Alternative would increase traffic and parking in the WSX Alternative corridor, resulting in increased accumulation of pollutants such as hydrocarbons and trace metals on impervious surfaces (roads and parking areas). These pollutants, which are delivered to waterways by local runoff, would have the potential to affect water quality and aquatic life, resulting in an adverse impact. The following mitigation measure would minimize potential impacts related to increased pollutant loads and associated water quality degradation.

> **Mitigation Measure H-4—Incorporate design features and implement best management practices (BMPs) for post-construction water quality protection.** BART will incorporate design features for post-construction water quality protection into the stormwater management system described in Mitigation Measure H-1 above, and will ensure that appropriate water quality protection BMPs are used during operation of the WSX Alternative. Design features may include, but will not necessarily be limited to, water quality inlets, grassy swales, oil-water separators, and wet ponds. These structures remove hydrocarbons, dissolved pollutants, and particulate matter using a range of mechanisms, including particulate settling, biological uptake, flocculation, and filtration. BART will monitor and maintain water quality design features as necessary for the life of the WSX Alternative.
>
> In addition to physical structures, BMPs may include programs designed to educate staff and reduce potential impacts on water quality. Likewise, BART may incorporate operational elements that will reduce or eliminate potential sources of point- and nonpoint source pollutants. In addition, BART may receive assistance in defining those BMPs and putting them into practice via the Clean Water Program's stormwater quality management plan.

> For stormwater discharges associated with the maintenance facility, BART will file a Notice of Intent for coverage under the State Water Resources Control Board's General Permit for Discharges Associated with Industrial Activity. As required by the General Permit, BART will prepare a Storm Water Pollution Prevention Plan (SWPPP) for the maintenance facility and will implement BMPs as provided in the SWPPP.

No-Build Alternative. Delivery of pollutant loads to urban drainages from expanded impervious areas would not occur under the No-Build Alternative.

Impact H-5—Interference with groundwater recharge.

WSX Alternative. As discussed under Impact H-1 above, the WSX Alternative would result in construction of additional areas of impervious surfaces, especially at the proposed Warm Springs Station and on associated sidewalks and parking lots. Increased areas of impervious surface could reduce the area available for potential recharge of groundwater by creating a barrier that water cannot penetrate (subsequently, the water could not infiltrate into the subsurface groundwater). However, soils underlying the WSX Alternative Warm Springs Station site are generally poorly drained silt and clay loams that provide little recharge capacity (Welch 1981). The WSX Alternative project consists primarily of underground subway rather than impervious ground cover in the vicinity of the Above Hayward Fault sub-basin where a major portion of ACWD's recharge and extraction occurs. The potential reduction in the amount of groundwater recharge is considered a negligible effect.

No-Build Alternative. The No-Build Alternative would not interfere with groundwater recharge.

Impact H-6—Potential depletion of local groundwater supplies during operation.

WSX Alternative. As described in the *Subsurface Hydrology* subsection of *Existing Conditions* above, groundwater flows to the west in the WSX Alternative area. The subway segment of the WSX Alternative would represent a localized barrier to westward flow of groundwater near Lake Elizabeth, although the extent of the barrier would be limited. Moreover, westward flow of groundwater near Lake Elizabeth may be naturally impeded by the Hayward fault. In addition, groundwater tests indicate that aquifer flow is extensive and that the highly permeable soil layer reaches depth greater then 80 feet, while the WSX Alternative subway box is planned to a 35-40 foot maximum depth (Fugro West, Inc. 2004). A small amount of groundwater leakage within the tunnel section is anticipated. The estimated rate of leakage through the entire length of tunnel section is 8 gallons per minute (gpm) (see Impact H-8 below). Compared to a 33,000 gpm flow calculated as potential groundwater intrusion to the open-cut tunnel area during the construction phase, (Fugro West, Inc. 2004) this leakage rate is negligible with respect to depletion of groundwater. Consequently, the presence of the subway segment of the WSX Alternative is not expected to result in substantial depletion of local groundwater supplies.

No-Build Alternative. The No-Build Alternative would result in no change from current conditions.

Impact H-7—Exposure of people or property to water-related hazards and flooding.

WSX Alternative. There are numerous creeks, drainage channels, and storm drain facilities throughout the study area that cross the proposed WSX Alternative alignment and that would need to be protected, relocated, or modified to accommodate the project and satisfy BART and local agency criteria. Flooding is a concern along the northeastern portion of Lake Elizabeth and along Mission Creek, Crandell Creek, Cañada de Aliso, the unnamed tributary to Laguna Creek shown as drainage

Line H in Table 4.5-1, and Agua Caliente Creek. Where the WSX Alternative crossed some of these drainages, flow exceeds the capacity of the existing conveyance structures during extreme flood events, and water moves as sheet flow across the existing railroad embankments (Federal Emergency Management Agency 2000a).

Construction of the WSX Alternative is not considered a significant encroachment on the floodplain pursuant to Executive Order 11988 for the reasons that are summarized below and detailed in the *Floodplain Finding Memorandum* (see Appendix D). Therefore, the WSX Alternative is considered consistent with the goals of Executive Order 11988. The *Floodplain Finding Memorandum* identifies the following findings.

- The risks associated with implementation of the WSX Alternative are not substantial adverse impacts because the WSX Alternative would reduce risk to life and property through increased conveyance at crossings, as needed. The WSX Alternative would not impact water surface elevations such that loss of life or property would result because the WSX Alternative would reduce risk to life and property through increased water conveyance at WSX Alignment crossings, as needed.
- The WSX Alternative would not support incompatible floodplain development because it would serve as an extension to the current alignment and is consistent with surrounding land uses and floodplain values.
- The WSX Alternative would not have any adverse impacts on natural and beneficial floodplain values because potential impacts to floodplain values would be limited to those temporary impacts associated with construction of the crossings.
- There are no special mitigation measures necessary to minimize impacts on floodplain values because floodplain values would be preserved and/or restored from the temporary effects of project construction by implementing the appropriate permit conditions developed during the permit process. The WSX Alternative would only affect existing local crossings, and would not adversely impact existing floodplain values.
- The WSX Alternative does not constitute a significant floodplain encroachment as defined in the Federal Aid Policy Guide 23 CFR 650A (23 CFR 650.101 through 23 CFR 650.117), because the action would not alter emergency access or evacuation routes during flooding, would not pose an appreciable increased risk associated with flooding, would not adversely impact floodplain beneficial uses, and would not support base floodplain development.

The WSX Alternative would increase conveyance capacity at the crossings as needed. Therefore, it is expected that property in the vicinity of the WSX Alternative would not be at risk for flooding post construction, thereby reducing risk to life and property. Additionally, the WSX Alternative would be constructed so that it does not interfere with the 100- or 500-year flow path from east to west.

No-Build Alternative. The No-Build Alternative would result in no change from current conditions.

Impact H-8—Water quality degradation from operational dewatering.

WSX Alternative. Portions of the WSX Alternative, once complete, would be located at or below the local groundwater table. As a result, seepage of groundwater is likely to occur, and operation of the WSX Alternative would require dewatering. At the north and south ends of the tunnel section, transition areas leading to each portal would be constructed as retained-cut or "U-Wall" sections. The areas adjacent to these transition areas would be graded to drain away from the transitions, but precipitation falling directly within the U-Wall area would flow to the portals where it would be collected in a sump before entering the tunnel and then pumped to the surface. Project plans show the northern portal pump station would pump to an existing storm drain at Stevenson Boulevard, which flows south through Central Park to Lake Elizabeth. The southern portal pump station is planned to drain to a grassy swale, which would drain to the south to the L-1 channel. These proposed drainage systems maintain existing drainage boundaries to the downstream facilities.

The tunnel section would also have a sump and pump station to collect a normal rate of groundwater leakage, estimated at 8 gpm for the entire length of tunnel. The emergency fire flows from the tunnel's fire suppression system will also drain to the tunnel sump. Currently, project plans show the tunnel pump would discharge to the vicinity of Mission Creek near the southern vent structure. Project design is being coordinated with ACFCD to determine the location and requirements for these three pump station discharges.

Seepage water collected in the tunnel will not become polluted as it will not come into contact with significant quantities of pollutants within the tunnel. The seepage water originates from high quality groundwater that is also being used for domestic water supply. If stabilization of the soils surrounding the tunnel during construction becomes necessary, a neutral stabilization method will be applied. Features that help reduce pollutants from entering the tunnel seepage collection and conveyance systems (e.g., dust covers, traps, etc) can also be installed. Results from recent water quality testing of seepage water from other subway tunnel pump sumps show very low concentrations of heavy metals and hydrocarbons, most below detection level and the rest met water quality objectives as described in the Basin Plan (San Francisco Bay Area Rapid Transit District 2004) .

It should be noted that the anticipated flow rate/volume (8 gpm) from the tunnel, may vary depending on final tunnel designed, implying that specific flow volumes and flow rates for any of the discharge options cannot be guaranteed at this time.

Tunnel seepage will be collected in a pump sump as a part of operational dewatering. The collected tunnel seepage will be discharged in one of the following six methods:

1. Discharge to Mission Creek. The collected tunnel seepage may be discharged to flow from the south vent structure over a 100-foot-long grassy swale southwest to Mission Creek. The groundwater infiltration to the subway will be collected in the tunnel sump at the rate of 8 gpm and discharged to the creek three times per day, for approximately 8 minutes, at a rate of 500 gpm or 1.1 cfs. This flow rate is considered to be nominal as it is 0.14% of the Mission Creek 10-year flow of 790 cfs, and 0.03% of the 100-year flow of 3,360 cfs. The discharge will flow over the grassy swale as shallow sheet flow. The swale will allow for infiltration of pumped tunnel water, retention of sediments, particulate and other suspended constituents. Any potential erosion from the discharge would be handled by an erosion protection regime, such as rock rip rap or turf reinforcement.

   If this method is implemented, BART will confer with the RWQCB to determine whether an NPDES permit is required for the discharge. If so, BART will obtain and comply with the conditions of the NPDES permit. If the RWQCB determines that an NPDES permit is not required, but directs BART to undertake other actions (such as a monitoring program) to ensure that Mission Creek is not adversely affected by the discharge, BART will comply with the RWQCB direction.

2. Discharge to Lake Elizabeth. Tunnel seepage could also discharged directly to Lake Elizabeth. Lake Elizabeth is not a water quality limited water body and the tunnel seepage water volume is negligible by comparison to the volume of water in the lake (985 acre feet). If this method is implemented, BART will obtain and comply with the conditions of an NPDES permit authorizing the discharge.

3. Discharge to newly created wetland. The City of Fremont is planning to create a new wetland area between Central Park and the UP alignment. The city is planning on using ground water to supply the wetland. Any tunnel seepage water pumped to the wetland would supplement and potentially reduce the amount of groundwater required. If this method is implemented, BART will confer with the RWQCB to determine whether an NPDES permit is required for the discharge. If so, BART will obtain and comply with the conditions of the NPDES permit. If the RWQCB determines that an NPDES permit is not required, but directs BART to undertake other actions (such as a monitoring program) to ensure that the wetland is not adversely affected by the discharge, BART will comply with the RWQCB direction.

4. Irrigation Water. Pumped tunnel seepage water could be made available to the City of Fremont for irrigation in Central Park or the city's golf course east of the railroad alignment. Any water provided for irrigation would reduce the amount of groundwater currently pumped for irrigation. Specific water quantities cannot be guaranteed at this time. Prior to utilizing the water for this purpose, BART and the City would test the water for various pollutants of concern in order to determine that none exist at concentrations above acceptable standards for this application. California Code of Regulations Title 22 guidelines for the unrestricted use of recycled water will be used as the standard.

5. Groundwater Recharge. Pumped tunnel seepage could be used for groundwater recharge. If this method is implemented, BART will be required to notify the RWQCB and BART may be required to obtain a Waste Discharge Requirements Order (WDR) authorizing the discharge.

6. Discharge to sanitary sewer. Pumped tunnel seepage could be treated on-site for sedimentation or other localized conditions (e.g., pH) and discharged to a sanitary sewer. However there are no nearby sewer lines. Given the expected good quality of the pumped tunnel seepage, this option it is not deemed necessary. Although the quantity of water is insignificant compared to the volume of water received by the sanitary sewer on a daily basis, BART will coordinate this activity with Union Sanitary District in order to coordinate the activity and to ensure that the sewer capacity is adequate.

Mitigation measure H-8—Obtain NPDES permit and implement permit conditions for all operational dewatering activities that discharge to surface waters.

A. If the subway seepage water is discharged to Mission Creek, Lake Elizabeth, a new wetland area, or used for groundwater recharge, BART will confer with the RWQCB to determine whether an NPDES permit or Waste Discharge Requirements are required for the discharge. If so, BART will obtain and comply with the conditions of the NPDES permit or WDRs. If the RWQCB determines that an NPDES permit or WDRs are not required, but directs BART to undertake other actions (such as a monitoring program) to ensure that the receiving waters or wetlands are not adversely affected by the discharge, BART will comply with the RWQCB direction.

B. If the subway seepage discharge is used for irrigation water, prior to utilizing the water for this purpose, BART and the City of Fremont will test the water for various pollutants of concern in order to determine that none exist at concentrations above acceptable standards for this application. (California Code of Regulations Title 22 guidelines for the unrestricted use of recycled water would be used as the standard.)

C. Although not considered necessary at this time, if the subway seepage is pumped to a sanitary sewer, BART will coordinate this activity with the Union Sanitary District.

D. If a groundwater recharge method is selected, BART may be required to obtain permits from ACWD and the USEPA. In that event, as part of the permitting process, BART would provide any necessary documentation of water quality to ensure adequate protection of beneficial uses.

No-Build Alternative. The No-Build Alternative would result in no change from current conditions.

Impacts Related to Construction of the WSX Alternative

Impact H-9—Potential for accelerated erosion and discharge of sediment into water bodies as a result of ground-disturbing activities.

WSX Alternative. Construction of the WSX Alternative would require site clearing and grading along the WSX Alternative alignment; at the sites of the proposed Warm Springs Station, maintenance facilities, and traction power and train control facilities; and at sites of proposed construction laydown areas. Exposed soil could be eroded and additional sediment discharged to water bodies in the vicinity of the WSX Alternative. Increased sediment load has the potential to clog the gills and filters of aquatic organisms, to decrease flood storage capacity in Lake Elizabeth and Tule Pond, and to decrease aesthetic and recreational values in these and the other water bodies in the vicinity of the WSX Alternative, resulting in a possible impact on hydrology. The following mitigation measure would minimize this impact.

Mitigation Measure H-9—Ensure implementation of stormwater general NPDES permit conditions. As required by the NPDES General Permit for Discharges of Storm Water Associated with Construction Activities, BART will ensure that specific erosion and sediment control measures are utilized during WSX Alternative construction to prevent accelerated erosion stemming from grading and other ground-disturbing activities. Measures include, but are not limited to, the following.

Erosion Control Measures:

- Temporary and permanent seeding of disturbed areas and stockpiles.
- Use of erosion control blankets.
- Stabilization of construction area entrances and exits.

- Dust suppression (e.g., watering exposed surfaces and stockpiles of soils and/or excavated material, covering stockpiles with plastic tarps).

Sediment Control Measures:

- Use of straw rolls, sediment fences, straw bales, and/or sediment traps to prevent sediment-laden runoff from leaving the construction area.
- Use of temporary dikes to redirect or control runoff.

These measures would be installed before October 15 and monitored throughout the winter rainy season (October 15–March 15). The measures and monitoring requirements specified under the NPDES General Permit would minimize the potential for accelerated erosion and sedimentation. In addition, BART may receive assistance in defining and utilizing those BMPs via the Clean Water Program's stormwater quality management plan. BART will verify that a notice of intent (NOI) and a SWPPP have been filed before allowing construction to begin. BART will routinely inspect the project site to verify that the BMPs specified in the SWPPP are properly installed and maintained. BART will immediately notify the contractor if there is a noncompliance issue and require compliance.

No-Build Alternative. The No-Build Alternative would result in no change from current conditions.

Impact H-10—Water quality degradation at Lake Elizabeth, Mission Creek, Tule Pond, and Cañada de Aliso during construction.

WSX Alternative. Soil and geologic conditions vary over the length of the WSX alignment. BART intends to utilize conventional cut-and-cover excavation where feasible. The alignment would be excavated with laid-back slopes, meaning that the walls of the excavation would have a horizontal:vertical ratio of approximately 2:1 to stabilize the soil and avoid cave-ins while the subway structure is being constructed. When the subway construction is completed, the excavation would be backfilled over the subway structure to restore the pre-existing ground level. For certain areas, a variation of the cut-and-cover method would be used where sheet piles (metal sheets driven into the ground to hold back the surrounding earth from the excavation zone) might be used instead of laid-back slopes to create a narrower construction zone. Given the presence of a known aquifer underlying a portion of the project area, the need for construction dewatering is anticipated.

Along an approximate 2,500-foot length of the 4,600-foot subway section through Fremont Central Park, there is a highly permeable sand and gravel layer. According to preliminary geotechnical analysis, construction dewatering in the area of this layer by conventional means may be technically infeasible (Fugro West 2004). Limiting or eliminating groundwater intrusion to the subway excavation area through the use of cement slurry walls or other methods appears to be necessary for project construction in this area. Further, hydrologic investigations will be utilized to determine appropriate construction methods. However, whatever construction method is selected, the discharge of groundwater extracted during construction dewatering in this area would be subject to the discharge permitting requirements discussed below. (The anticipated construction methods to be utilized at Lake Elizabeth, Mission Creek, Tule Pond and Cañada de Aliso may also be adjusted depending on the results of further hydrologic investigations.)

Construction of the WSX Alternative would include the installation of a temporary cofferdam in Lake Elizabeth to accommodate the cut-and-cover construction operation. The cofferdam in Lake Elizabeth is expected to consist of an earthen fill placed at the mouth of the eastern arm of the lake.

When the cofferdam is in place, the area east of the cofferdam would be dewatered by pumping water into the western side of the lake. When dewatering is completed, the alignment would be excavated with laid-back slopes, that would have a horizontal:vertical ratio of approximately 2:1. When subway construction is completed, the lake bottom would be backfilled over the subway structure; water would flow back into the lake's eastern arm from the western side of the lake; and the cofferdam would be removed, restoring the lake over the alignment.

A similar construction method would be used for cut-and-cover subway construction at Mission Creek, except that sheet piles might be employed to create a narrower construction zone. Creek flow downstream would be maintained through temporary culverts or other means.

Sediments on the bottom of Lake Elizabeth and Mission Creek in the vicinity of the cofferdams could be entrained into lake and creek waters by cofferdam installation and removal operations, potentially increasing turbidity. Further, the cut-and-cover operation at Lake Elizabeth and Mission Creek could loosen lake-bottom sediments, such that when water is restored to the dewatered section of the lake or channel, the sediments could be more prone to entrainment and subsequent downstream conveyance.

Dewatering and fill placement activities at Tule Pond and in Mission Creek, where the option of operational dewatering discharges exists, could also result in release of sediments during construction and dewatering. Construction activities at Tule Pond may vary based on final design level soils, geotechnical, and hydrological analyses. It is likely, however, that dewatering of all or a portion of Tule Pond would be required. The construction sequence might entail driving sheet piles within the construction zones in Tule Pond and then pumping out the water in the affected portion of the pond.

In other areas of the alignment, such as Cañada de Aliso, construction activities will likely include excavation and removal of existing drainage structures under the railroad tracks, grading of existing channels, and installation of pipe and box culverts underneath the WSX Alternative alignment.

Therefore, construction of the WSX Alternative has the potential to degrade water quality at Lake Elizabeth, Mission Creek, Tule Pond, and Cañada de Aliso. Implementation of the following mitigation measures would avoid this impact.

> **Mitigation Measure H-10(a)—Implement water quality control measures to prevent release of sediment.** BART will ensure that water quality control measures, such as turbidity barriers/curtains, are in place before construction activities begin in these areas, and before cofferdam installation. The barriers have pores that are large enough to allow water to pass through, but the pores are small enough to trap most sediments that may be suspended in the water. Measures will be installed on the west side of the cofferdam in Lake Elizabeth to prevent the release of disturbed lake-bottom sediments into the majority of the lake. Additional turbidity barriers/curtains or other appropriate measures will be installed at the outlet to Mission Creek to retain entrained lake-bottom sediments. BART may also use additional technologies to reduce potential impacts on water quality. These technologies may include, but not be limited to, the use of sheet piles instead of using an earthen cofferdam.
>
> BART will also ensure that construction activities related to dewatering or the runoff of stormwater from Lake Elizabeth, Mission Creek, Tule Pond, and Cañada de Aliso will incorporate BMPs to minimize impacts on water quality. BMPs may include, but not be limited to, using sediment barriers (e.g., silt curtains), limiting the amount of exposed soils, and incorporating settling basins before discharge of water.

Mitigation Measure H-10(b)—Obtain NPDES permit and implement permit conditions for all construction dewatering activities that discharge to surface waters. If feasible, wastewater generated as a part of construction dewatering will be either contained onsite such that there is no discharge to surface waters or discharged to the sanitary sewer for treatment at a wastewater treatment plant.

If discharge to surface waters is unavoidable, prior to engaging in construction-related dewatering activities, BART will obtain an NPDES permit and WDRs from the RWQCB. Depending on the volume and characteristics of the discharge, coverage under the General Construction Permit is possible. This permit contains numerical and narrative limits that are sufficiently protective of water quality such that impacts to surface water or groundwater as a result of dewatering effluent will be minimized.

If dewatering discharges are of a nature that will not allow coverage under the General Construction Permit, BART will need to obtain an individual NPDES permit for dewatering discharges, which will also contain standards such that water quality is not degraded.

During dewatering activities, all permit conditions will be followed. This will include the design and implementation of measures to meet permit conditions, such as retention of dewatering effluent until all particulate matter has settled before it is discharged, use of infiltration areas, and other BMPs. Final selection of water quality control measures will be subject to approval by RWQCB.

BART will verify that coverage under the appropriate NPDES permit has been obtained before allowing dewatering to begin. BART will routinely inspect the dewatering site to verify that measures specified in the permit are properly implemented and perform visual inspections of effluent to verify quality before the effluent is discharged. Inspections will include verification that the effluent is not discolored and does not exhibit sheens or films, which indicate the presence of contaminants other than sediment. If, during the dewatering permitting process, it is determined that there is reasonable potential for contaminants besides sediment to be found in dewatered effluent, BART will collect samples and conduct laboratory analyses for these constituents as part of the monitoring regime. For ongoing dewatering activities, monitoring will be performed at least biweekly. BART will immediately notify the contractor if there is a noncompliance issue and require compliance.

No-Build Alternative. The No-Build Alternative would result in no change from current conditions.

Impact H-11—Release of hazardous substances that violate water quality standards.

WSX Alternative. Laydown and operation of construction equipment, including heavy earthmoving equipment and haul trucks, could result in the accidental release of substances such as fuels and lubricants that have the potential to degrade water quality and result in violation of applicable water quality standards, which would result in an impact on water quality. The following mitigation measure would avoid or minimize this impact.

Mitigation Measure H-11—Implement hazardous materials spills prevention and control plan. As part of its NPDES General Permit for Construction Activities, BART will be required to develop and implement a Storm Water Pollution Prevention Plan (SWPPP), which includes provisions for hazardous material spill prevention and control related to the use of construction equipment for the WSX Alternative. The SWPPP will describe storage procedures and construction site housekeeping practices and identify the parties responsible for monitoring and spill response. The measures and monitoring procedures required under the NPDES General Permit will minimize the potential for release of hazardous materials to the environment. BART will ensure the filing of the NOI for the NPDES permit and development and implementation of a SWPPP. BART will review the SWPPP before allowing construction to begin. BART will routinely inspect the project site to verify that the BMPs specified in the SWPPP are properly installed and maintained. BART will immediately notify the contractor if there is a noncompliance issue.

No-Build Alternative. The No-Build Alternative would result in no change from current conditions.

Impact H-12—Potential depletion of local groundwater supplies during construction.

WSX Alternative. As described in *Existing Conditions* above, the Hayward fault may act as a significant barrier to east-west movement of groundwater in the WSX Alternative area. During construction, dewatering of Tule Pond would be required, and depending on the hydrology of the area, dewatering of the retained-cut section between Walnut Avenue and Stevenson Boulevard might also be required. Near Lake Elizabeth, the water table is located 0–8 feet below ground surface. Groundwater is present within the depth of excavation that would be required for construction of the subway segment of the WSX Alternative (Fugro West, Inc. 2004). Construction of the subway beneath Lake Elizabeth and Mission Creek would also require a dewatering system.

Dewatering measures may result in localized lowering of shallow groundwater levels. This groundwater supports wetland and riparian habitats in the area. Because the effects of dewatering on shallow groundwater would be temporary and localized (briefer than 6 months and within 1,000 feet of the alignment), they are expected to be minimal. Potential impacts from this activity on biological resources are discussed in detail in Section 4.6, *Wetlands*.

The Alameda County Water District withdraws groundwater from eight production wells in the Peralta-Tyson Wellfield, which receives a significant amount of water from the Above Hayward Fault sub-basin in the WSX Alternative project tunnel portion through Central Park. The Above Hayward Fault sub-basin has been calculated at high values of permeability (hydraulic conductivity) with extensive groundwater flow, as determined by the construction dewatering feasibility study completed for the WSX Alternative (Fugro West 2004). In fact, groundwater flow is so great that construction dewatering by conventional means may be technically infeasible along a portion of the subway section and other construction alternatives to eliminate or limit groundwater intrusion are being explored (discussed above under Impact H-10).

Mitigation Measure H-12—Develop and implement a construction dewatering plan. Prior to construction, BART or BART's contractor will develop and implement a construction dewatering plan based on a comprehensive hydrogeological assessment of groundwater conditions in the Above Hayward Fault aquifer in the vicinity of the WSX alignment. The hydrogeological assessment will be developed with ACWD staff’s assistance to determine the potential variations in groundwater levels in the subject aquifer. The location of testing wells will be determined in collaboration with ACWD. The testing will be completed prior to issuance of the notice to proceed to the contractor. BART will require BART’s contractor to submit the construction dewatering plan to ACWD for its concurrence. The plan will identify the portions of subway construction that will be constructed using conventional dewatering techniques and those areas that would require alternative construction techniques, such as a jet-grouted base slab and/or deep soil mixing walls to minimize the need for groundwater pumping. The plan will address the potential effects of the selected construction techniques on groundwater level and will incorporate performance criteria developed in consultation with ACWD to limit pumping related to project dewatering.

No-Build Alternative. The No-Build Alternative would result in no change from current conditions.

Impact H-13—Temporary reduction in flood storage capacity at Lake Elizabeth.

WSX Alternative. Construction of the WSX Alternative would include the installation of a temporary cofferdam in Lake Elizabeth to accommodate the cut-and-cover construction operation. The presence of the cofferdam is expected to displace 50 acre-feet of flood storage. Lake Elizabeth currently provides 985 acre-feet of storage (Jones & Stokes 2000), so approximately 935 acre-feet of storage would still be available even if 50 acre-feet of storage were temporarily displaced. However, although the City of Fremont is required to maintain only 931 acre-feet of storage for flood control purposes (Jones & Stokes 2000), the reduction in flood storage capacity could have considerable impacts on downstream flooding if a substantial storm occurred during construction. In addition, during flood events, Mission Creek frequently flows over the eastern bank of Lake Elizabeth into the area that would be enclosed by the cofferdam and dewatered during construction. Consequently, flooding on Mission Creek during construction could inundate the construction area, possibly damaging the facilities and releasing hazardous construction-related materials to the environment, which would result in an impact on flood storage capacity. This impact would be avoided by Mitigation Measure H-13(a) if construction at Lake Elizabeth can be completed between April 1 and November 1. If not, Mitigation Measure H-13(b) would compensate for the impact.

Mitigation Measure H-13(a)—Limit construction of cut-and-cover subway to the dry season. BART will close the cofferdam after April 1 and will complete construction and breach the cofferdam by November 1. Using this construction method, there would only be a small reduction in flood storage during the flood season (fill above the normal water level) and the construction period would be maximized.

If WSX Alternative construction at Lake Elizabeth cannot be completed between April 1 and November 1, Mitigation Measure H-13(b) will be instituted.

Mitigation Measure H-13(b)—Create additional flood storage capacity equal to or greater than the temporary reduction in flood storage during construction. One or more of the following solutions could be employed to provide additional flood storage to offset the temporary reduction of flood storage during construction activities.

- Actively manage the level of water within Lake Elizabeth to provide additional storage capacity equal to the storage loss.
- Construct a second temporary cofferdam on the east side of the open trenching activities during construction and divert flows back into the eastern arm of Elizabeth Lake.
- Construct additional storage facilities (e.g., detention basin) at the same location to provide additional storage capacity.

One or more of these solutions would be implemented with the review and concurrence of the City of Fremont and ACFCD.

No-Build Alternative. The No-Build Alternative would result in no change from current conditions.

Impacts Related to the Optional Irvington Station

The discussion of impacts related to the optional Irvington Station concludes that, with mitigation applied, there would be no adverse impacts on water resources in the area proposed for the optional Irvington Station.

Impacts Related to Station Operation

Impact H-14—Alteration of flooding conditions due to changes in infiltration rates, drainage patterns, or the rate and amount of surface runoff as a result of the presence of optional Irvington Station.

WSX Alternative. The optional Irvington Station would add 18 acres of impervious surface to the 49 acres resulting from operation and construction of the WSX Alternative. The additional impervious area would further decrease the amount of rainfall expected to infiltrate into the ground and would result in higher peak flows in area drainages. As described under Impact H-1 above, uncontrolled post-construction flows could exacerbate existing flooding problems and could contribute to additional flooding and channel bank scouring. This would be considered an adverse impact. Mitigation Measure H-1 would minimize this impact.

> **Mitigation Measure H-1—Design and implement a stormwater management system to safely convey stormwater.** This mitigation measure is described above.

No-Build Alternative. The No-Build Alternative would result in no change from current conditions.

Impacts Related to Station Construction

WSX Alternative. Some of the impacts and mitigation measures identified above for the WSX Alternative would also apply to the optional Irvington Station. For construction-related impacts, Impacts H-9 and H-11 and Mitigation Measures H-9 and H-11 would apply. The section *Impacts Related to Warm Springs Extension* above contains descriptions of mitigation measures that apply to both the Warm Springs Extension and the optional Irvington Station.

No-Build Alternative. The No-Build Alternative would result in no change from current conditions.